AECOM

I-89 Commuter Transit Service Feasibility Study

FINAL REPORT

Upper Valley Lake Sunapee Regional Planning Commission

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1. Introduction

The Interstate 89 (I-89) corridor in New Hampshire connecting New London to Lebanon/Hanover is a heavily traveled roadway with no commuter transit services between these major destinations. The corridor has been identified in numerous documents, such as Long Range Transportation Plans and Human Service Transportation Coordination Plans, as having a need for a transit connection. It has also been documented that the overall regional transportation network would be greatly improved if there was a transit connection. For example, the Park-and-Ride Lot located just off of Exit 13 in Grantham has the capacity for 50 vehicles but is underutilized because there are no transit connections available. Currently the only scheduled transit providers operating on the corridor are intercity providers Greyhound Lines and Dartmouth Coach. Due to limited schedule and lack of intermediate stops, existing intercity service is not ideal as a commuter service. With the implementation of a commuter service along the I-89 corridor, local connections could also be made to Stagecoach Transportation, The Current, and Advance Transit.

This report describes the goals and objectives of the study, existing market and transportation conditions, the results of the public outreach effort conducted as part of the study, develops transit service alternatives for the corridor, provides performance measures to evaluate alternatives, includes a discussion and selection of a preferred alternative by the project advisory group, describes funding strategies that may be utilized to implement commuter service in the corridor, and concludes with a phased implementation strategy for the preferred alternative.

An Executive Summary for the study is included as Appendix A.

2. Goals and Objectives

Study goals and objectives were developed by the study team in coordination with the project advisory group at the onset of the study. While goals outline priorities, objectives are measurable actions that are necessary to realize the goals. The following 4 goals were established for the I-89 Commuter Transit Service Feasibility Study:

1. Identify existing transportation systems, level of service, and demand for commuter service in the study area
2. Develop commuter transit service options that connect New London to Lebanon and Hanover
    a. Include a variety of stop types and locations
    b. Include provisions for stop locations to have adequate parking, pedestrian/bicycle access, and customer amenities
    c. Assess transit service options based on evaluation criteria including potential implementation challenges
3. Identify coordination and connection opportunities with existing transportation services
    a. Connect to existing transportation services at convenient times and locations
    b. Evaluate interoperability potential including fare media, shared stop locations, cross-marketing, etc.
4. Identify coordination and partnership opportunities with institutions, agencies and employers in the region
    a. Identify coordination opportunities to advocate for/educate on transit services
    b. Develop sustainable partnerships, including funding partnerships, for the long-term success of the service

3. Previous Studies

As noted in the introduction, the I-89 corridor between New London and Lebanon/Hanover has been identified in numerous documents, such as Long Range Transportation Plans and Human Service Transportation Coordination Plans, as having a need for a transit connection. Previously completed studies were reviewed to provide context for this study. Each study that was reviewed is listed in Table 1 and includes relevant information gleaned from each report.

Table 1: Previous Studies

Document	Date	Summary of Findings
New Hampshire Long Range Transportation Plan	2006	• I-89 corridor is the fastest growing region • 25% of NH residents don't have a license or can't drive • Transportation and land use must be coordinated • Improve statewide public transit
New Hampshire Long Range Transportation Plan	2010	• Travel is increasingly inter-regional • Large transit service gaps between regions • Need for increased connectivity and availability of transportation services • Corridor planning is needed
Hanover Master Plan	2003	• Heavy commuter traffic along Route 120 • Small % of residents use the bus • Advance Transit is a fare free system • Increase the number of Park-and-Rides
New London Master Plan	2012	• Need for public transportation to serve the region • Need for expansion of the I-89 Exit 12 Park-and-Ride Lot • Encourage land uses that enable alternative transportation mode choice
Lebanon Master Plan	2012	• Encourage diversity of transportation modes • Encourage use of public transit to decrease traffic congestion and parking demand in CBD • Improve amenities at transit facilities & stops • Coordinate with service providers & UVTMA
Coordinated Public Transit & Human Service Transportation Plan	2014	• Maintain & expand travel within the region • Coordinate with existing transit providers • Tie transportation into existing economic centers
UVLSRPC Regional Plan	2015	• Vision: all residents, businesses, and visitors in the UVLSRPC Region can access viable, efficient, and affordable transportation options • Goal: 2% transit mode share by 2030 • Goal: 1 million local fixed route transit riders by 2030 • Identifies need for feasibility study along I-89 Corridor, a Park-and-Ride facility near Exit 17, and mobility hubs in Lebanon and Hanover • Identifies congestion at Exit 18 and the NH Route 120 Corridor between Lebanon and Hanover
NH 120 – Transit Plan		• NH 120 in Lebanon and Hanover; some overlap in study area • DHMC and Dartmouth College commute patterns
Advance Transit, Transit Development Plan	2012	• Regional bus service is needed for outlying towns and Park-and-Ride Lots • Commuter service to the town of Enfield is needed, current bus service as an extension of the Blue route is not financially sustainable • Regional employees and focus groups stated a needed for commuter bus service from New London and Grantham

4. Existing Transit Services

This chapter details the current transit, ridesharing services and Park-and-Rides operating within the I-89 Commuter Transit Feasibility Study towns of Hanover, Lebanon, Enfield, Grantham and New London.

4.1 Local Bus Transit

Advance Transit (AT) is the primary operator of local bus services throughout region, including the study area towns of Lebanon, Hanover and Enfield. There is currently no fixed route service offered in Grantham and New London. AT provides connections with Stagecoach Transit and The Current in Hanover, Lebanon and White River Junction.
AT eliminated fares on all routes in 2001; possible due to funding partnerships with the Upper Valley Towns, Dartmouth College and the Dartmouth-Hitchcock Medical Center. As a result of initiating the fare free system, ridership increased by 735% from 2000 to 2015. Service, on the seven routes, operates weekdays from approximately 6:00 AM to 6:00 PM, there is no weekend service. Table 2 provides an overview of the existing conditions; a map of these services is shown in Figure 1.

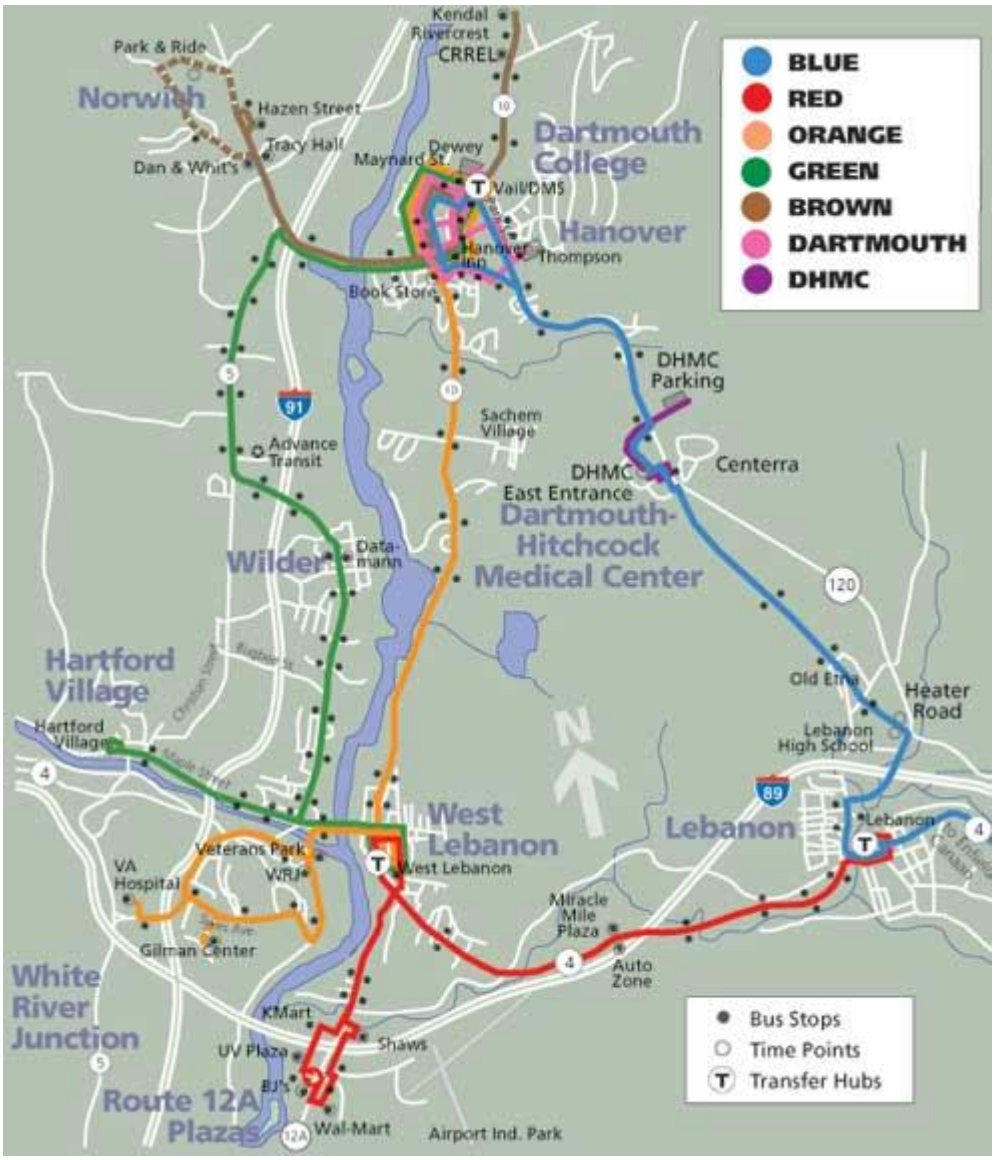
Table 2: Advance Transit Route Operating Characteristics

Route	Service Span	Peak Headway (min)	Towns Served	One-way Travel Time	Annual Ridership (FY2016)
Blue	5:15 AM – 7:10 PM	15	Hanover, Lebanon, Enfield, Canaan	29 min to Lebanon 59 min to Canaan	208,836
Green	5:50 AM – 6:33 PM	30	Hanover, West Lebanon,	30 minutes	100,399
Red	6:00 AM – 6:25 PM	30	Lebanon, West Lebanon	25 minutes	184,642
Brown	6:25 AM – 6:40 PM	40	Hanover, Norwich (VT)	14 minutes	33,395
Orange	6:20 AM – 6:08 PM	60	Hanover, West Lebanon, Hartford Village (VT), Wilder (VT), Norwich (VT)	27 minutes	76,910
Dartmouth Shuttle[1]	7:00 AM – 9:00 PM	10	Hanover	10 min NB 14 min SB	56,880
DHMC	6:00 AM – 6:00 PM	5 min	Hanover	5-10 min	262,078

Source of Data: Advance Transit, 2016

[1] During the summer months service on this route is reduced to 13 minute peak headways and ends at 7 PM. All other routes operate the same schedules year-round.

Figure 1: Map of Advance Transit Bus Services



Source of Data: Advance Transit, 2016

The designated transfer hub in Hanover is the Vail/DMS stop located in front of the Geisel School of Medicine on the Dartmouth College Campus in Hanover. It is serviced by the Blue, Brown, Green Routes and Dartmouth Shuttle. There is a shelter; buses use a pull-out to serve the hub and it can accommodate two buses in the pull-out and one on the street. This station is typically served by 30-foot buses. The Hopkins Center/Hanover Inn on The Green is also used as a transfer center as it is served by the Brown, Green, and Orange Routes and Dartmouth Shuttle. The bus pull-out can accommodate up to 3 buses, has an enclosed glass shelter and information kiosk. This location is also used by intercity and commuter buses. The intercity buses pull to the front and AT behind. Due to the high activity at this location, it is not a good location to dwell. Transfer hubs are also located in Lebanon at City Hall and in West Lebanon at the Kilton Public Library.

AT's fleet of 33 vehicles utilizes one maintenance facility. The fleet consists of 35-foot low floor transit buses, 30-foot large cutaways and small cutaways used for the complementary paratransit service (see Table 3). The building houses administration, transportation, maintenance, and vehicle storage. All vehicles are stored inside including three

support vehicles, but the maintenance and storage garage areas are at capacity. AT could accommodate up to two additional vehicles if they were stored outside.

Table 3: AT Vehicle Fleet

Vehicle Type	Number
9 Passenger cutaway vans	5
35' heavy duty transit bus - diesel	11
35' heavy duty transit bus - hybrid	3
Large cutaway 27/2 passengers	14

Source of Data: Advance Transit, 2016

Complementary paratransit service is provided by Access AT. An application is required to use the service and is reserved for individuals who cannot use the fixed route service. The service is free and is available Monday through Friday during fixed route operational hours.

4.2 Commuter Bus Transit

Commuter bus service is provided by Stagecoach Transportation Services and The Current. Stagecoach operates service out of Randolph, Vermont and provides commuter service to the region with the 89ER (Figure 2) and River Route (Figure 3). Both routes are free for Dartmouth faculty and staff with a proper ID. DHMC employees receive a reduced fare of $1.00 per trip; otherwise the fare is $3.50. The 89ER operates service between Randolph, Lebanon and Hanover and the River Route between Wells River, Lebanon and Hanover. Both provide service to Dartmouth College and DHMC. The 89er makes three trips in the morning leaving Randolph at 5:40 AM, 5:55 AM and 6:20 AM and three in the afternoon leaving Hanover at 4:08 PM, 4:38 PM and 5:03 PM. The River Route provides eight trips daily, four during each peak. Three of the four morning trips and half of the evening trips service DHMC, downtown Lebanon and Hanover.

The Current operates service out of their facility in Rockingham, Vermont and provides service to the study area via the Upper Valley Route (Figure 4). Two trips in each the morning and afternoon are made to/from DHMC and downtown Hanover with stops at select I-91 Park-and-Rides. One-way travel time to DHMC is 62 minutes and Hanover is 40 minutes. The fare is $2.00 per trip.

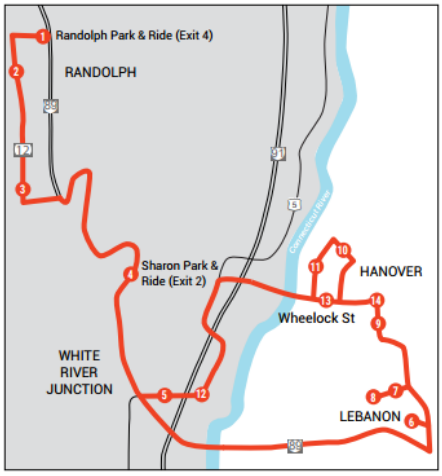


Figure 2: Stagecoach 89ER Route

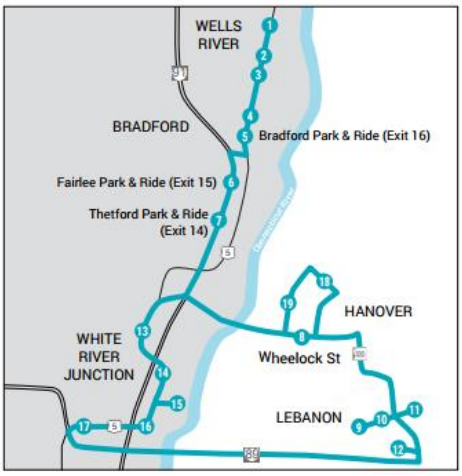


Figure 3: Stagecoach River Route

Figure 4: The Current Upper Valley Route

4.3 Intercity Transit

Intercity transit in the region is provided by Vermont Transit Lines, Dartmouth Coach and Greyhound. Vermont Transit Lines has a facility in Rutland, Vermont and operates the Route 4, an east-west service between Rutland Vermont and Hanover/Lebanon. In Hanover the route stops on The Green, in front of the Hopkins Center. The Lebanon stop is the DHMC East entrance. Two trips daily, one-in each direction, are provided. The one-way fare from Rutland to Lebanon is $10.50 and travel time is two hours. Between Hanover and Lebanon the travel time is 15 minutes and fare is $0.50.

Dartmouth Coach provides service from Hanover to New York City via I-91 and Boston via I-89. The bus facility is located in Lebanon and consists of 15 coach buses. Dartmouth Coach is constructing a new facility on Labombard Road in Lebanon that will accommodate the loading and unloading of up to five buses at a time. There will be parking for up to 400 cars at the new facility. The Boston-Logan Airport route operates seven trips daily in each direction, leaving Hanover approximately every two hours between 5:00am and 5:00pm. Stops within the study area communities include Hanover, Lebanon and New London. The Hanover stop is in front of the Hopkins Center, the Lebanon stop is at the Dartmouth Regional Transportation Terminal on Etna Road and the New London stop is the I-89 Exit 12 Park-and-Ride Lot. The one-way fare from Hanover/Lebanon to Boston is $38 and from New London $33. While commuter passes are available, travel between just New London and Hanover/Lebanon require a full fare and northbound boardings are not allowed in New London. Travel time between New London and Hanover is 50 minutes.
Greyhound operates one route within the study area from Montreal, Canada to Logan Airport in Boston, Massachusetts with a stop in Hanover. The Hanover stop is at the Hanover Inn. Daily there are two trips in either direction. Between Hanover and Boston the fare ranges from $32-$39 depending on the day of week. Travel time is 2 hours and 50 minutes.

4.4 Rideshare Services

The Upper Valley Transportation Management Area (UVTMA) is a coalition of transit, rideshare, planning commissions, employers and municipalities that advocates for increases in alternative mode transportation including transit service and Park-and-Ride facilities. Their goals are to reduce the costs associated with employee parking, make commuting to work affordable, promote sustainability, improve traffic conditions, and improve parking conditions. They work with individual employers to create commuting programs and benefits that meet the needs of the employees. Programs they have created include the following:

- Preferred carpool parking
- Parking pass buy backs
- Vanpools
- Carpool matching
- Transit reimbursement
- Per diem benefits for not commuting via single occupancy vehicles
- Creation of commuter points that can be traded in for time off
- Providing bicycle racks and basic maintenance tools for employee use
- Workplace bike shares

Upper Valley Rideshare offers carpool matching for commuters in the 28 Upper Valley communities of Vermont and New Hampshire. The service is operated by Advance Transit and encourages carpooling, biking, walking, telecommuting and taking the bus as alternative modes. The carpool matching is free and confidential. An emergency ride home reimbursement benefit is available for employers located within the Advance Transit service area and individuals enrolled in the program. Individuals can be reimbursed up to $50 for taxi, bus, train or rental car fees.

4.5 Park-and-Ride Lots

Park-and-Ride Lots are located at Exit 12 (New London) and Exit 13 (Grantham); both are owned and maintained by New Hampshire Department of Transportation District 2 Office (Table 4). The New London Park-and-Ride Lot is located on Route 103A. The lot has been experiencing increased usage within the last four years increasing from 74.24% utilization in 2011 to 85.61% in 2014. The lot is used by several groups including private and institution-sponsored carpools/rideshares, Dartmouth Coach, Upper Valley Ride, Premier Coach, Compass Travel Agency, Terrapin Tours, Proctor Academy, Colby-Sawyer College, and Dartmouth College. While average utilization is 85.61%, at times the lot is completely full and cars are parked illegally. When visiting the lot the team observed three cars parked illegally and one bike locked to a pole. Additional transit service to this lot may require expansion but there is limited space to accommodate expansion for surface parking.

Table 4: Park-and-Ride Lots

Lot	Spaces	Utilization (2014)	Lighted	Bus Shelter	Trash Receptacle	Emergency Phone	Security Cameras	Bike Rack
New London, Exit 12	132	85.61%	Yes	Yes	No	Yes	Yes	No
Grantham, Exit 13	53	24.53%	Yes	Yes	No	No	No	No

Source of Data: New Hampshire Department of Transportation, Parking Count Log, 2015

The Grantham lot is located just off of Exit 13 along Route 10. Historically the lot has had low utilization. During the site visit there were 14 (26.42% utilization) vehicles using the lot. There is a fence separating the lot from several businesses. There were three bikes locked to the chain link fence.

The Exit 16 is an unofficial Park-and-Ride Lot at the NHDOT District 2 Office on Eastman Hill Road. There are no amenities at this location, except lighting, but there is a bike trail connecting Eastman Hill Road to Smith Pond Road. Vehicles also use the Evans Exit 16 Truck Stop for an unofficial Park-and-Ride Lot.

5. Market Conditions

Understanding the demographic and socioeconomic characteristics provides valuable insight into the potential transit markets in an area. Additionally, identifying employment trends and commuting patterns provides insight into movement within a region and potential demand for transit connections between places.

The following sections use data from two primary sources: the US Census Bureau's American Community Survey (ACS) (2010-2014 5-year estimate) and the US Census Bureau's Longitudinal-Employer Household Dynamics Program (LEHD) (2014). It is important to note that each of these datasets come with certain caveats and limitations. For example, while the ACS data are available at the smaller block group geography, they have a relatively high margin of error and cover topics as reported by residents (i.e., by where people live). Conversely, LEHD uses administrative records from employers; however, it excludes some employment categories (e.g., self-employed, military, etc.).

5.1 Demographics and Socioeconomics

Population by community is shown in Table 5. Overall, there are about 60,000 residents living in the study area. Lebanon and Hanover have the highest populations.

Table 5: Population by Community

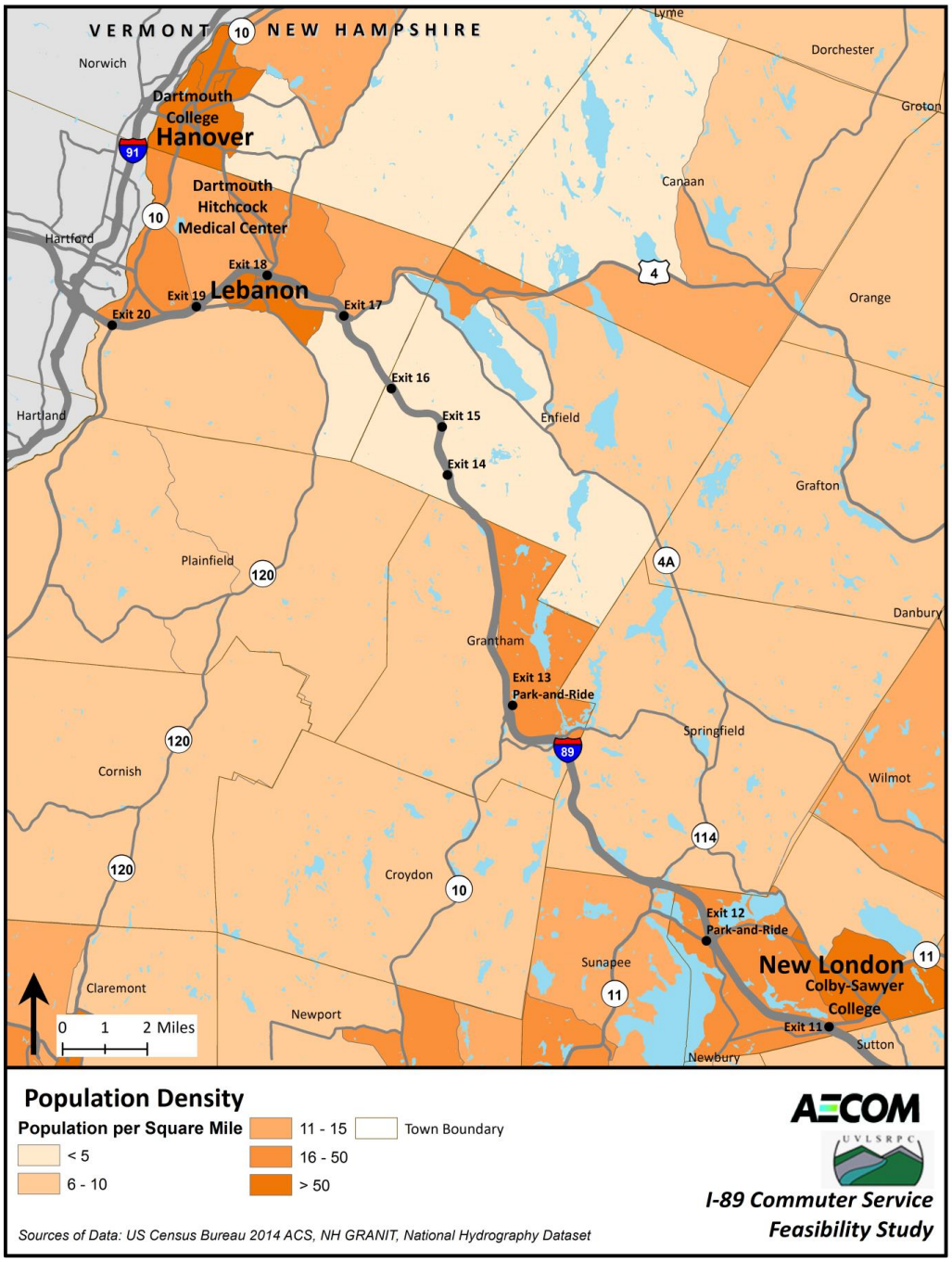
Community	2014 Population
Lebanon	13,474
Hanover	11,311
New London	4,539
Canaan	3,910
Croydon	651
Enfield	4,565
Grafton	1,278
Grantham	2,970
Newport	6,434
Orange	308
Plainfield	2,518
Springfield	1,313
Sunapee	3,363
Sutton	2,014
Wilmot	1,367
Total	**60,015**

Source of Data: US Census Bureau, American Community Survey, 2014

Population Density

Another important demographic characteristic is the distribution of the population across the region. Population density maps can help identify where populations may be concentrated and where populations may be sparse. This can be particularly helpful in transit planning when considering how and where services can best meet the transportation needs of various populations. Population density in the region is mapped in Figure 5. Downtown Lebanon and downtown Hanover have the highest population densities in the study area with other higher density areas located adjacent to downtown areas in both communities as well as in New London and Grantham.

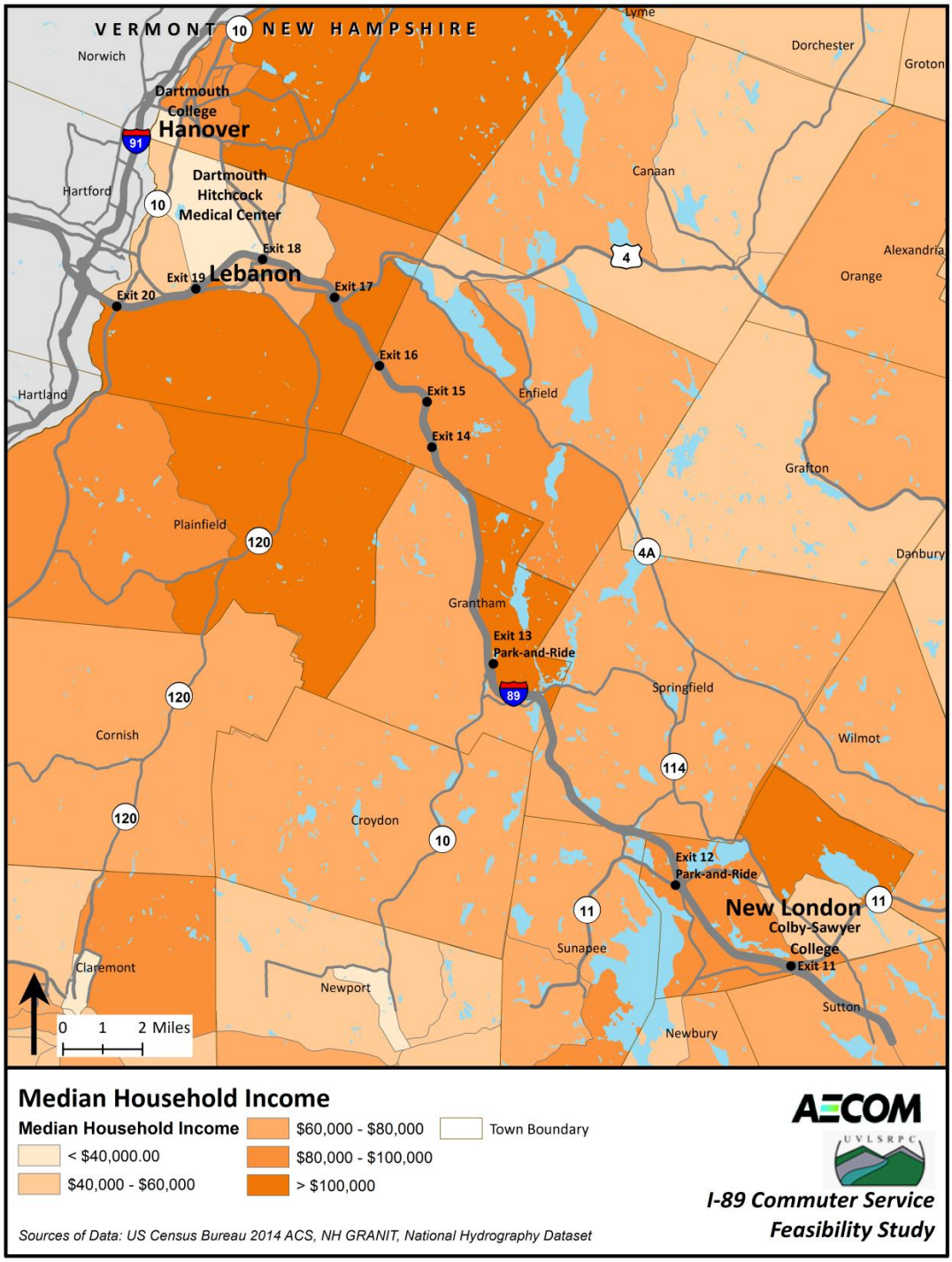
Figure 5: Population Density



Income

Income is a key determinant in the type of transportation used to commute. People with lower incomes are often more likely to be in need of public transportation options than people with higher incomes who can afford private transportation. Median household income describes the average income of households within the study area. Median household income is mapped in Figure 6. The study area has generally high median household incomes, but there are also pockets of lower median household incomes, particularly in the areas of college student residences.

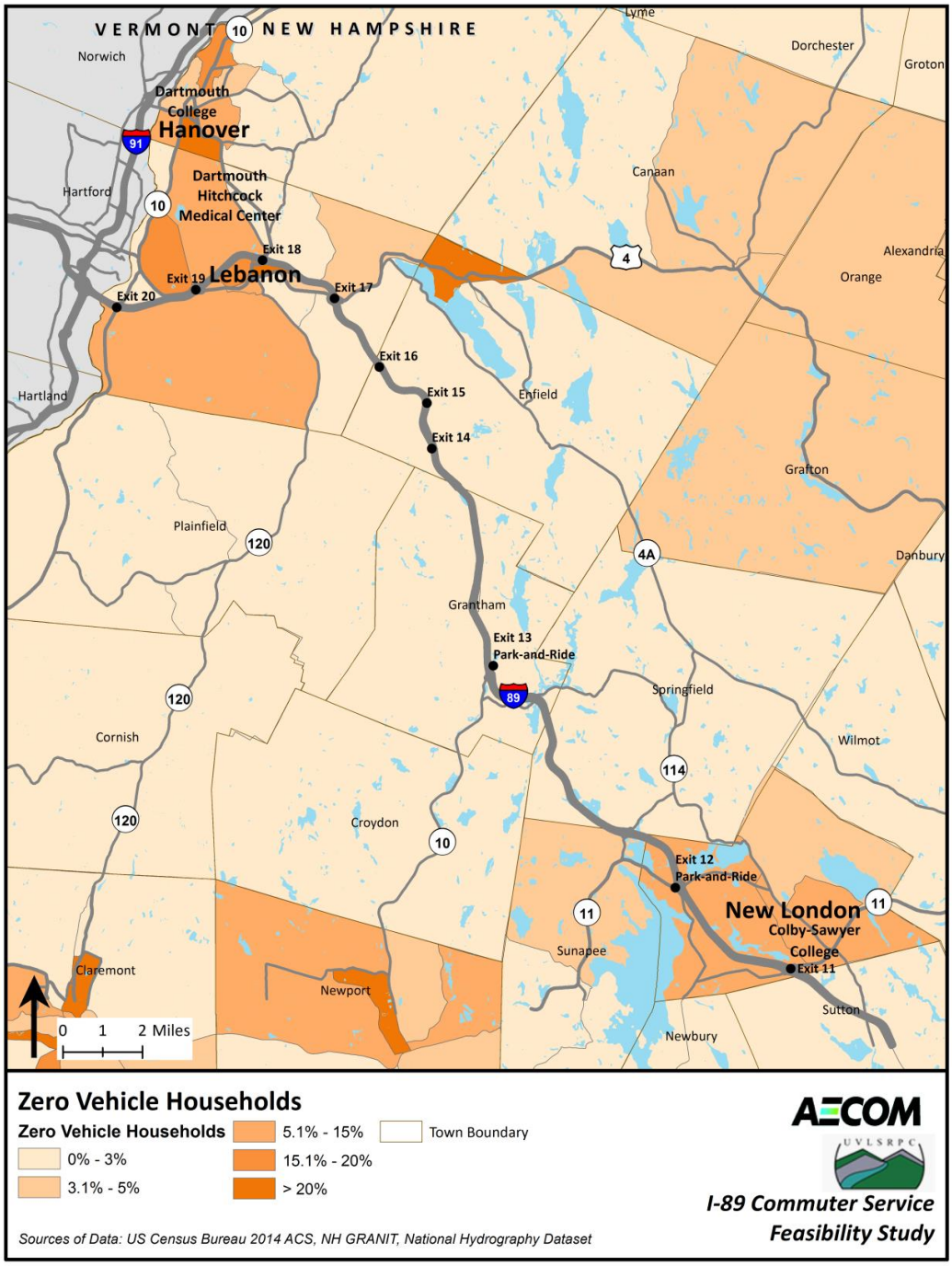
Figure 6: Median Household Income



Zero-Vehicle Households

Another common measure of transit dependence and demand is the number of cars per household. Zero-vehicle households are considered to be entirely dependent upon alternate transportation sources. Percentage of zero-vehicle households by block group is mapped in Figure 7. The highest percentages of zero-vehicle households are also found in areas with concentrations of college students as well as in the downtown areas of the larger communities.

Figure 7: Zero Vehicle Households



5.2 Employment

The trip to work is often the most frequent trip taken by many people; therefore, employment characteristics are important factors in the transportation and transit discussion. Large employers are commonly destinations for significant numbers of people, which make them important to transit service. This section looks both at workers residing in the study area (labor force) and workers employed in the study area (employees/jobs).

In addition to ACS data, the Census Bureau's LEHD dataset, produced through the Local Employment Dynamics Partnership, provides more detailed information on workers and work locations based on employer administrative records.

Workers

The labor force in the region comes from within the study area as well as from outside the study area. For the purpose of this study, the focus is on the communities adjacent to and feeding into I-89 between New London and Hanover. Residence locations of the labor force are presented in Figures 8, 9 and 10 by employment location.

Figure 8 shows the residence locations of people who work in Lebanon. Employees in Lebanon generally live in Lebanon or Hanover, but there are other pockets of residences around the study area along I-89 and in New London. Figure 9 shows the residence locations of people who work in Hanover. Employees in Hanover generally live in Hanover or Lebanon, and are less dispersed around the study area than employees in Lebanon, but there are also other pockets of residences including some areas in New London.

Figure 10 shows the residence locations of people who work in New London. Most of the people who work in New London also live there, but there are also pockets of residences south of New London outside of the study area, particularly in the Claremont, Concord, and Manchester areas (off the map). North of New London, there are not many pockets of residential concentration for New London employees.

While these maps show home location based on employment location, which is the primary commuter connection, this region also has secondary commuter demand with students traveling between campuses, as well as to Dartmouth Hitchcock Medical Center as it is a teaching hospital and the location of many clinical courses.

Figure 8: Residence Locations of Lebanon Employees

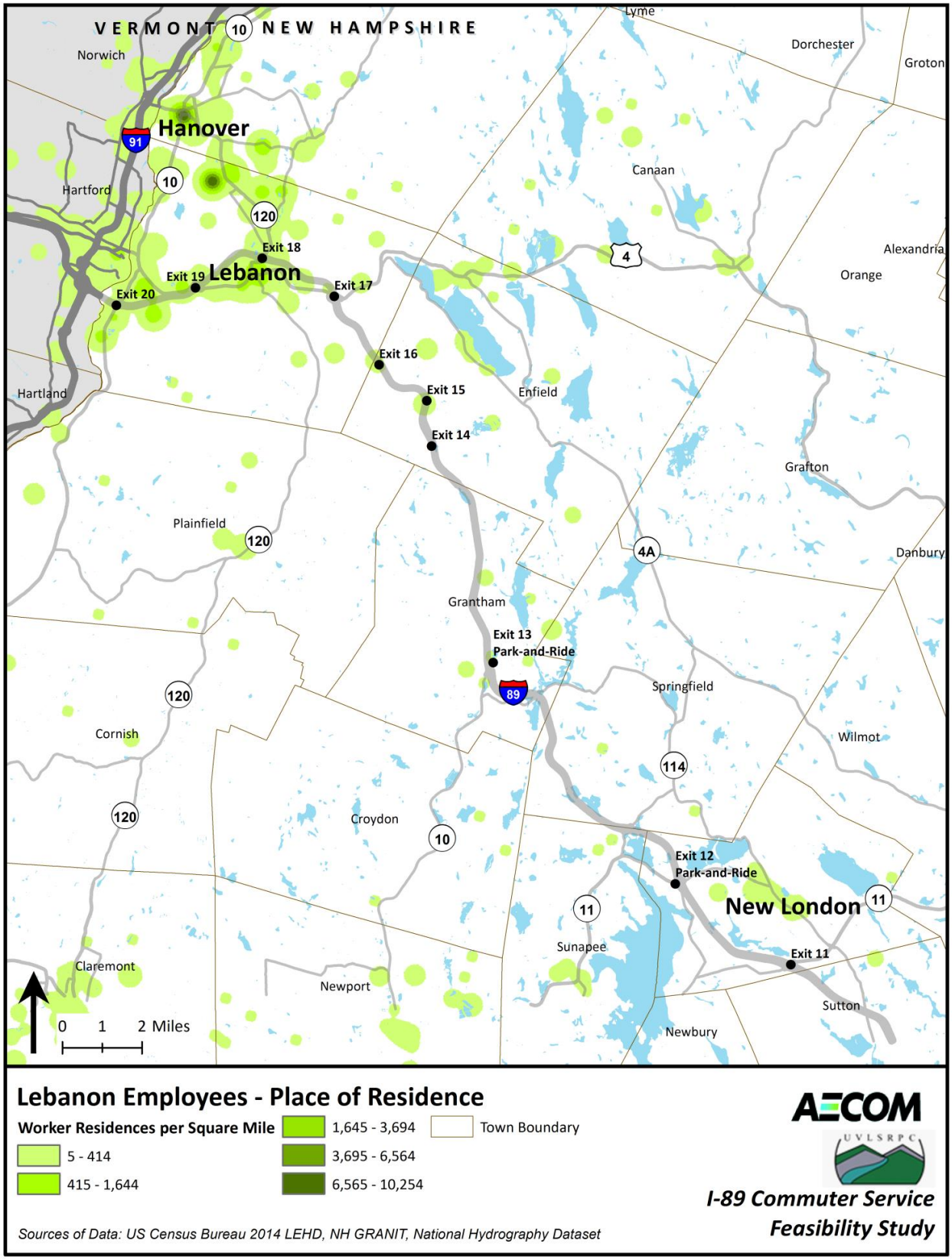


Figure 9: Residence Locations of Hanover Employees

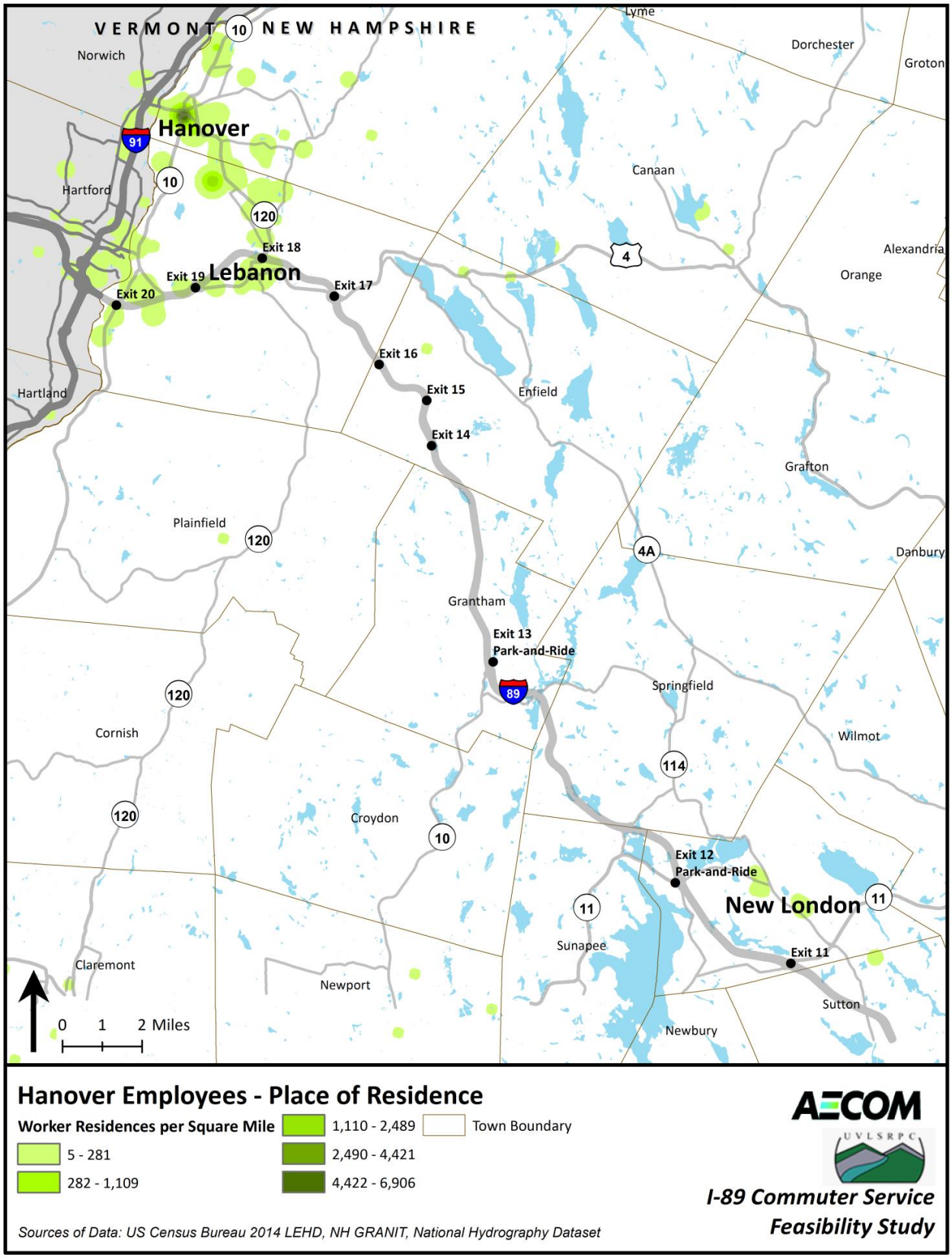
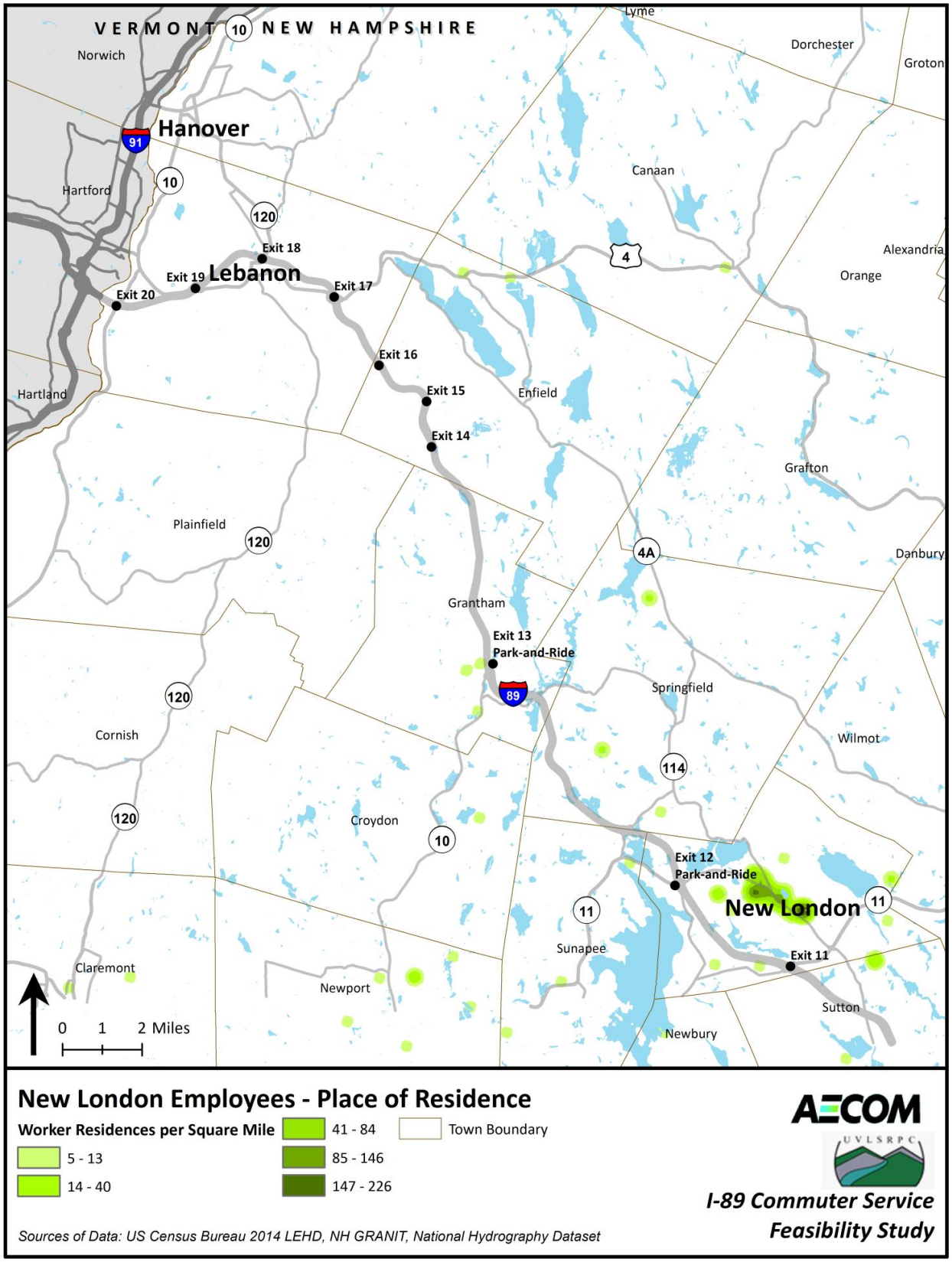


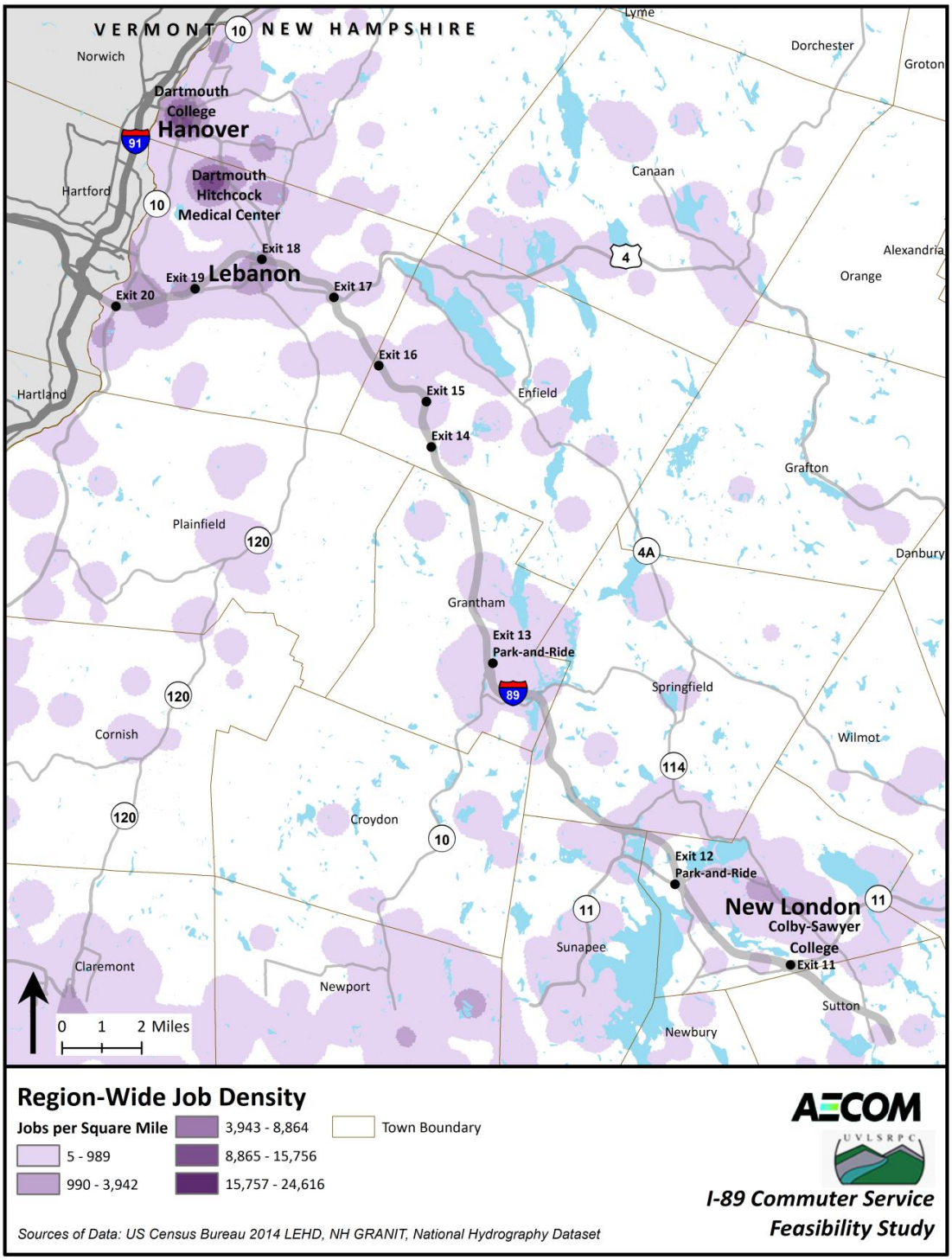
Figure 10: Residence Locations of New London Employees



Jobs

Figure 11 is a map of job density for the study area. Lebanon and Hanover have the highest density of jobs in the study area, but there are other concentrations in New London and along I-89, Route 4, and Route 120. Major employers in the region are discussed in the following section.

Figure 11: Job Density Region-Wide



Major Employers

Inherently, many large employers are also major destinations for a significant number of people in the study area, and in many cases a large number of people arrive and depart from these locations on a set schedule. Table 5 lists major employers in the study area based on community statistics provided to the Economic and Labor Market Bureau, a division of the New Hampshire Department of Employment Security.

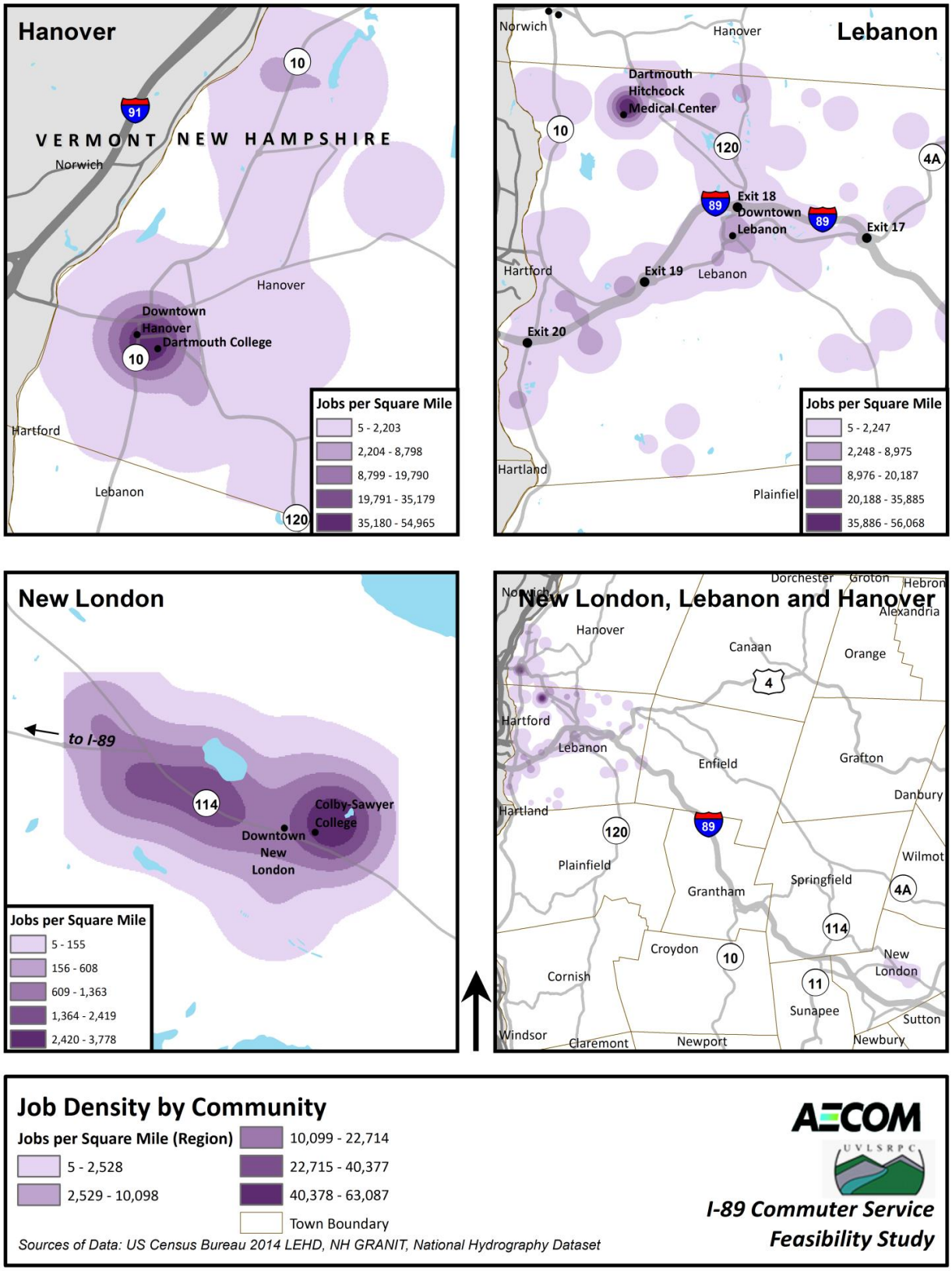
Table 6: Major Employers in the Study Area

Employer	City	# Employees
Dartmouth-Hitchcock Medical Center	Lebanon	6,904
Trustees of Dartmouth College	Hanover	3,200
Sturm Ruger & Co Inc	Newport	1,455
Hypertherm	Hanover	1,120
Alice Peck Day/Lifecare Center	Lebanon	607
Hypertherm	Lebanon	569
New London Hospital	New London	520
FujiFilm	Lebanon	390
Timkin	Lebanon	377
Colby-Sawyer College	New London	350

Source of Data: Economic and Labor Market Bureau, NH Employment Security, March 2016

Figure 12 includes maps of job density by community for Lebanon, Hanover, and New London. In Hanover, jobs are concentrated downtown around Dartmouth College. In Lebanon, jobs are primarily concentrated at Dartmouth-Hitchcock Medical Center, the largest employer in the state, but are also concentrated in pockets along I-89 and downtown. In New London, jobs are concentrated along Main Street (Route 114) throughout downtown and at Colby-Sawyer College.

Figure 12: Job Density by Community



Commuting

The most frequent trips people typically make are those to and from work. How people make these trips is of great interest to transit service providers. Table 7 describes how commuters travel to work by mode of transportation. Table 8 shows the same information by percentage using each mode. The vast majority of workers in the region drive alone to work, but there are also substantial numbers of carpoolers in the area as well as people in Lebanon and Hanover using public transportation. In Hanover, 30% of workers walk to work.

Table 7: Means of Transportation to Work (#) by Community

Community	Drove Alone	Carpooled	Public Transportation	Taxi	Motorcycle	Bicycle	Walked	Other	Worked at Home	Total
Lebanon	5,039	685	358	0	0	35	197	129	478	**6,921**
Hanover	2,113	437	195	0	33	115	1,403	71	294	**4,661**
New London	1,247	96	11	0	0	0	183	24	178	**1,739**
Canaan	1,625	177	34	0	0	0	39	51	35	**1,961**
Croydon	307	24	0	0	0	0	0	0	12	**343**
Enfield	2,228	233	36	0	23	0	68	35	75	**2,698**
Grafton	507	46	0	0	0	3	0	0	18	**574**
Grantham	1,000	233	0	0	0	0	11	65	86	**1,395**
Newport	2,615	329	0	0	0	0	224	108	132	**3,408**
Orange	127	21	2	0	0	0	6	7	4	**167**
Plainfield	1,147	107	0	0	12	4	50	5	112	**1,437**
Springfield	477	105	0	0	0	0	33	21	71	**707**
Sunapee	1,271	145	0	0	10	0	36	35	115	**1,612**
Sutton	876	72	8	0	0	0	15	26	96	**1,093**
Wilmot	609	39	5	0	0	0	0	8	51	**712**
Total	**21,188**	**2,749**	**649**	**0**	**78**	**157**	**2,265**	**585**	**1,757**	**29,428**

Source of Data: US Census Bureau American Community Survey, 2014

Table 8: Means of Transportation to Work (%) by Community

Community	Drove Alone	Carpooled	Public Transportation	Taxi	Motorcycle	Bicycle	Walked	Other	Worked at Home
Lebanon	73%	10%	5%	0%	0%	1%	3%	2%	7%
Hanover	45%	9%	4%	0%	1%	2%	30%	2%	6%
New London	72%	6%	1%	0%	0%	0%	11%	1%	10%
Canaan	83%	9%	2%	0%	0%	0%	2%	3%	2%
Croydon	90%	7%	0%	0%	0%	0%	0%	0%	3%
Enfield	83%	9%	1%	0%	1%	0%	3%	1%	3%
Grafton	88%	8%	0%	0%	0%	1%	0%	0%	3%
Grantham	72%	17%	0%	0%	0%	0%	1%	5%	6%
Newport	77%	10%	0%	0%	0%	0%	7%	3%	4%
Orange	76%	13%	1%	0%	0%	0%	4%	4%	2%
Plainfield	80%	7%	0%	0%	1%	0%	3%	0%	8%
Springfield	67%	15%	0%	0%	0%	0%	5%	3%	10%
Sunapee	79%	9%	0%	0%	1%	0%	2%	2%	7%
Sutton	80%	7%	1%	0%	0%	0%	1%	2%	9%
Wilmot	86%	5%	1%	0%	0%	0%	0%	1%	7%

Source of Data: US Census Bureau American Community Survey, 2014

5.3 Future Growth and Development

Future growth and development is generally projected at the planning region level. For the Upper Valley/Lake Sunapee Region, employment growth is expected to be 10.2% through 2022[2]. Industries of highest projected growth include: Healthcare and Social Assistance, Education Services, and Construction and Extraction Occupations. The population of the region is expected to grow more slowly over the next 25 years than it has in previous decades: less than 9% between 2010 and 2040[3].

6. Peer System Review

As part of the I-89 Commuter Transit Feasibility Study, a peer review was prepared to gain an understanding of how other similar systems are operating commuter service. This peer review explores five commuter bus routes which operate in similar conditions as to the study area. Although each transit system and route is unique, the similarities and differences in these five peers provide useful insight into how commuter service is provided and operated.

6.1 Description of Peer Systems

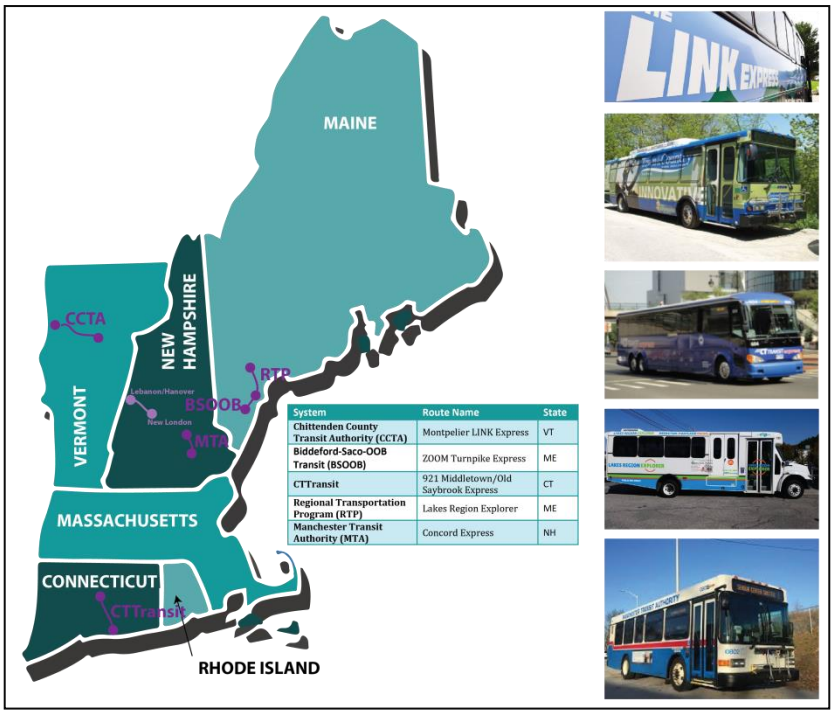
Five peer systems were selected to examine operating characteristics and amenities for commuter route services. The five peer systems were selected in conjunction with the study advisory group and can be found in Table 9. All five operate service in both rural and urban areas and are located in New England.

Table 9: Peer Systems

System	Route Name	State
Chittenden County Transit Authority/Green Mountain Transit (CCTA/GMT)	Montpelier LINK Express	Vermont
Biddeford-Saco-OOB Transit (BSOOB)	ZOOM Turnpike Express	Maine
CTTransit	921 Middletown/Old Saybrook Express	Connecticut
Regional Transportation Program (RTP)	Lakes Region Explorer	Maine
Manchester Transit Authority (MTA)	Concord Express	New Hampshire

[2] New Hampshire Employment Security, Economic and Labor Market Information Bureau. *Planning Regions – Looking Ahead to 2022*, January 2015.
[3] Upper Valley Lake Sunapee Regional Planning Commission. *Regional Plan 2015*.

Figure 13: Map of Peer System Locations

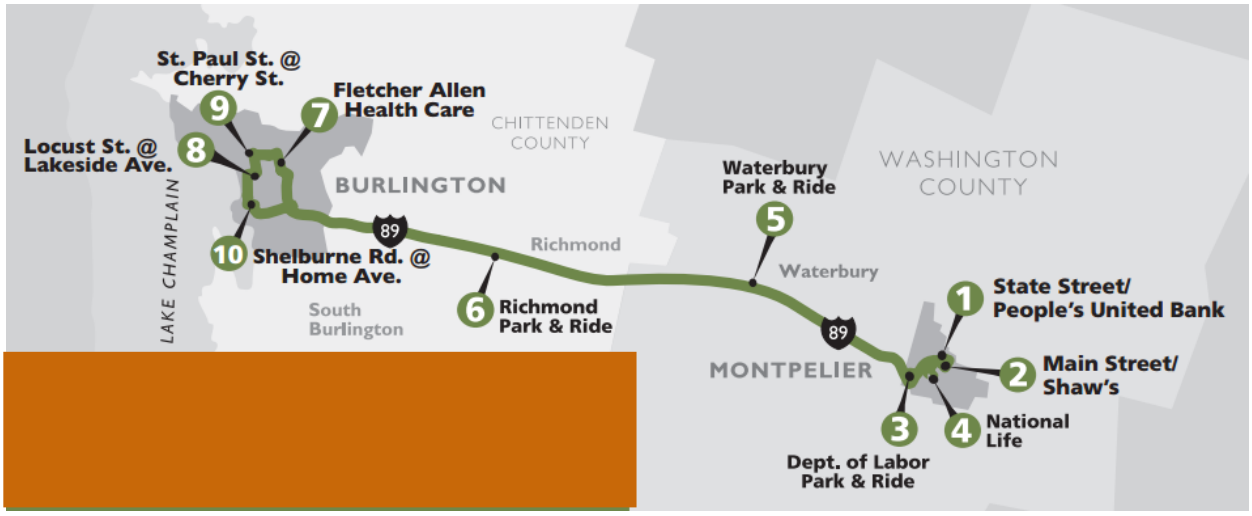


System	Route Name	State
Chittenden County Transit Authority (CCTA)	Montpelier LINK Express	VT
Biddeford-Saco-OOB Transit (BSOOB)	ZOOM Turnpike Express	ME
CTTransit	921 Middletown/Old Saybrook Express	CT
Regional Transportation Program (RTP)	Lakes Region Explorer	ME
Manchester Transit Authority (MTA)	Concord Express	NH

Montpelier LINK Express (VT)

The Montpelier LINK Express provides service between Burlington and Montpelier (Figure 14), Vermont throughout the day from 6:00 AM to 7:30 PM. There are 13 trips in each direction daily. Service is added when trips consistently experience overcrowding and there are standees. Trips begin and end with circulating through downtown Montpelier and Burlington, making several stops. Service is also provided to several Park-and-Ride locations along Interstate 89.

Figure 14: Montpelier LINK Express Route



ZOOM Turnpike Express (ME)

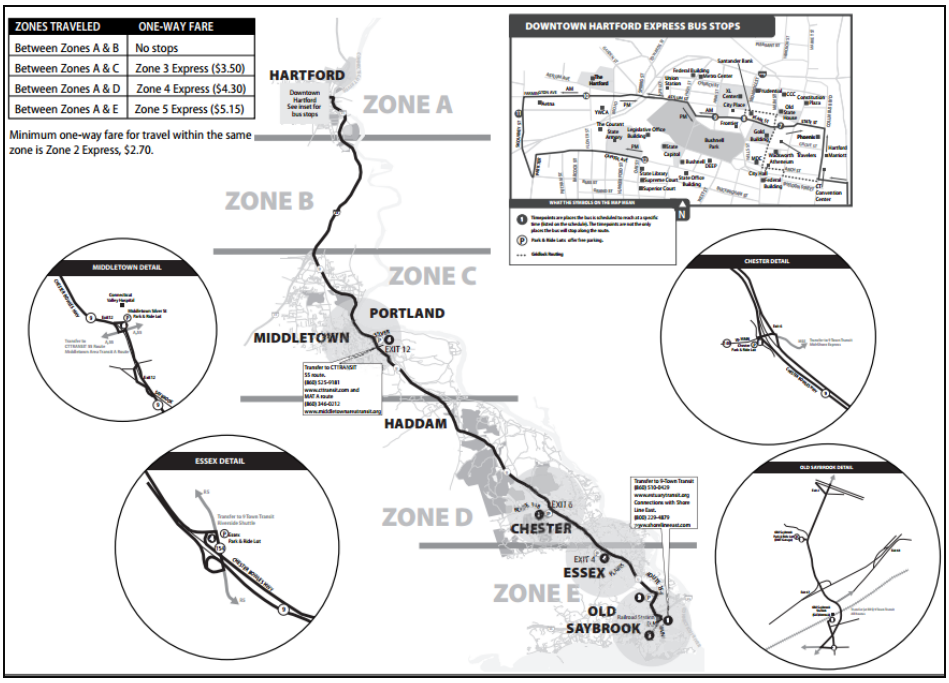
The ZOOM Turnpike Express travels from Park & Ride lots in Biddeford and Saco, via the Maine Turnpike, to Congress Street and the University of Southern Maine in Portland (Figure 15). The route operates 10 round trips per day on weekdays from 6:00 AM to 6:40 PM, only during morning and afternoon peak hours.

Figure 15: ZOOM Turnpike Express Route

Route 921 Middletown-Old Saybrook Express (CT)

Route 921 Middletown – Old Saybrook Express provides service between Old Saybrook and Hartford Connecticut, via Route 9 and Route 91 (Figure 16). There are four inbound and five outbound trips daily. All trips are in the peak direction of travel only. Trips start and end at the commuter rail station in Old Saybrook and serve Old Saybrook center and Park-and-Ride Lots along Route 9 (Old Saybrook, Essex, Chester and Middletown). There are no stops between Middletown and Hartford; in downtown Hartford service circulates from Central Row to Sigourney Street and Capitol Avenue.

Figure 16: Route 921 Middletown/Old Saybrook Express Route



Lakes Region Explorer (ME)

The Lakes Region Explorer began operating in late 2013 after a study conducted in 2011 found that there was a need to provide commuter service between Naples and Portland, Maine along Route 302 (Figure 17). Due to its success, service was extended north to Bridgton and many new stops were added in 2015. Four round trips per day are provided with hours geared towards trips that bring people into Portland in the morning.

Concord Express (NH)

The Concord Express service was launched in 2012 and, due to its success, an additional weekday trip will be added in FY2017. The route provides express bus service between downtown Manchester and the Stickney Transportation Center (Concord) and Main Street in Concord, New Hampshire via I-93 (Figure 18). There are no intermediate stops off of I-93. Service is bi-directional, with seven trips daily Monday through Friday. Saturday service provides three trips; there is no Sunday service.

Figure 17: Lakes Region Explorer Route

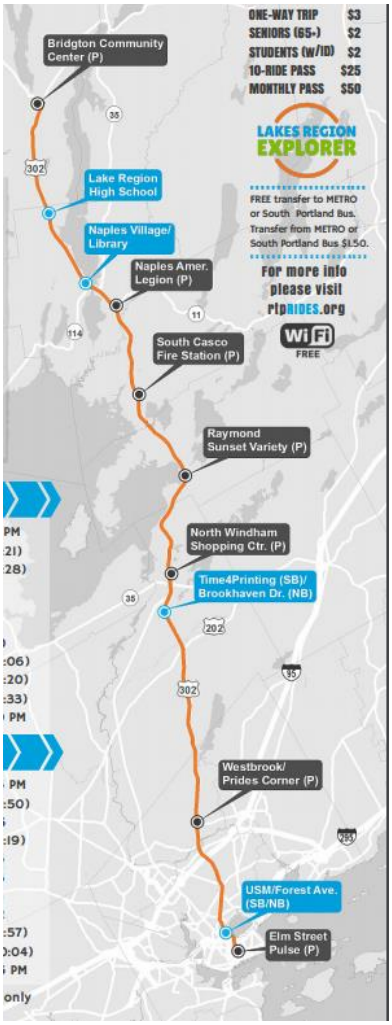
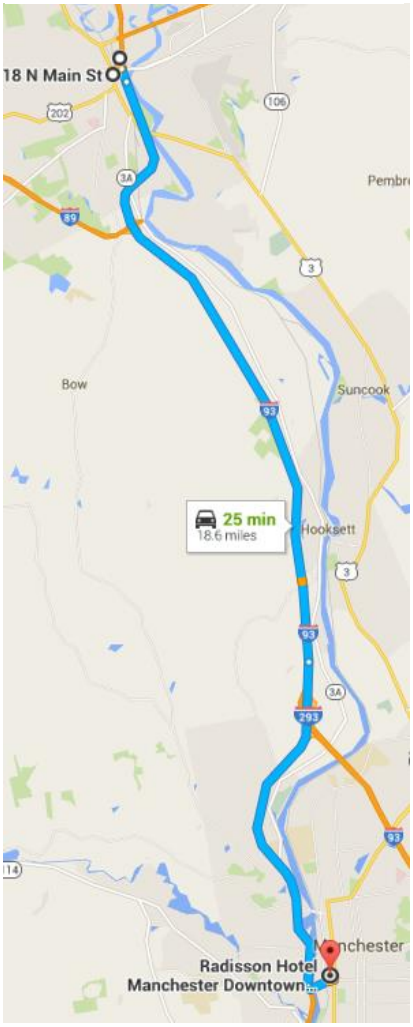


Figure 18: Concord Express Route



Peer Routing/Level of Service Summary

Overall, when looking at all of the peers, service is generally bi-directional with the same number of trips provided in each direction but trip times are geared towards bringing people into the major employment centers in the morning and away in the afternoon (Table 10). For all the peers, there is at least one trip that will get passengers into the urban center prior to 8:00 AM and at least one trip that heads outbound from the urban center after 6:00 PM. Three of the 5 peers provide trips approximately every 30 minutes during the peak. Most operate mid-day service but it is typically limited to one or two trips per day. In general weekend service is not provided.

Table 10: Peer Route Characteristics

Peer	Trips per (out/in)	AM Peak Direction	Mid-Day service	Vehicle Type	Weekend Service	Hours of service	One way Travel Time
Montpelier LINK Express	13/13	Bi-directional	Yes	Coach bus	No	5:40AM-9:15AM; 12PM-7:30PM	1 hour and 30 minutes
Zoom Turnpike Express	10/10	Bi-directional	No	City bus	No	6:00AM-9:30AM; 2:45PM-6:40PM	40 minutes
921 Middletown/Old Saybrook Express	5/4	Inbound	Yes	Coach bus	No	5:30AM-8:30AM; 12:00PM-6:35PM	1 hour and 30 minutes
Lakes Region Explorer	4/4	Bi-directional	Yes	Cutaway	No	6:00AM-10:40AM; 11:35AM-1:05PM; 3:45PM-10:15PM	1 hour and 30 minutes
Concord Express	7/7	Bi-directional	Yes	City bus	Saturday ONLY	**M-F:** 5:30AM-6:25PM **Sat:** 10:00AM-5:25PM	30 minutes

One way travel time ranges from 40 minutes to 90 minutes. Routes that have longer travel times (over an hour), provide service using coach buses or cutaways. Both these vehicle types have coach-style cushioned seats. All except the Middletown/Old Saybrook Express have wheelchair ramps and securements. All five peers provide bicycle racks on the bus. The most common design is to have a bicycle rack mounted on the front bumper, which can accommodate 2-3 bicycles. The Montpelier LINK Express has bicycle rack storage compartments that must be opened and closed by the bus operator.

6.2 Stops and Stations

The number of stops varies greatly amongst the peers: between three and twelve (see Table 11). Most of the peers stop at intermediate locations between the origin and urban area they serve before circulating to numerous stops in the core employment area. The Concord Express route is the only peer that does not offer intermediate stops. For the majority of the peers, the average stop spacing outside of the urban area is between 9 and 11 miles. Parking is typically available at one-third of the stops.

Table 11: Peer Stop Statistics

Peer	Number of Stops	Average stop spacing outside of the Urban Area	Parking Availability
Montpelier LINK Express	10	11 miles	3/10
Zoom Turnpike Express	6	9 miles	2/6
921 Middletown/Old Saybrook Express	12	9.75 miles	4/12
Lakes Region Explorer	9	4.20 miles	6/9
Concord Express	3	18 miles	0/3

6.3 Operations

Comparative operational statistics for the peer systems are provided in Table 12. Passengers per one-way trip measures ridership as a function of the amount of service provided. High values indicate a route that is performing

well. Higher values also require larger vehicles; standees are not typically allowed on commuter routes due to their length and high speeds. The peers range greatly in the number of passengers per one-way trip. The routes that travel greater distances tend to have a greater number of passengers per one-way trip. For all peers, the average passengers per one-way trip is 10.8.

The farebox recovery ratio is the percentage of operating costs covered by fares collected, calculated by the fares collected divided by the cost to operate the route. The peers vary greatly in the farebox recovery from 10% to 69% (farebox revenue/operating cost). For all the peers, the average farebox recovery is 32%.

Cost efficiency measures the cost of providing service, taking into account fare revenue collected per passenger. Cost efficiency also varies greatly and ranges from $1.40 per passenger to $22.77 per passenger (operating cost – farebox revenue)/passengers). For all peers, the average cost efficiency is $9.51 per passenger.

Table 12: Peer Operating Characteristics

Peer	Passengers/ One-way Trip	Farebox Recovery	Cost Efficiency
Montpelier LINK Express	19.88	69%	$1.40
Zoom Turnpike Express	6.47	18%	$5.60
921 Middletown/Old Saybrook Express	22.2	24%	$12.57
Lakes Region Explorer	2.7	10%	$22.77
Concord Express	2.72	37%	$5.23
Peer Average	**10.79**	**32%**	**$9.51**

6.4 Fares

There are a variety of fares, passes, and discounts available amongst the peers. Four of the peers have a flat rate fare while CTTransit has a zone based fare where the cost depends on the distance travelled. Table 13 includes a description of the fare structures for each of the peer systems.

Flat rate fare peers range between $3.00 and $5.00 for a single trip. Discounts are provided by many of the peers for off-peak times, children or the elderly/disabled. Two peers, Montpelier LINK Express and the MTA Concord Express, provide discounts during off peak times. Three peers, Montpelier LINK Express, Middletown/Old Saybrook Express, and Lakes Region Explorer do not charge a fare for young children to ride when accompanied by an adult. All peers except Zoom Turnpike Express offer a discount fare (typically half price) to elderly and disabled riders. All systems have free transfers to the local bus system in the area.

Table 13: Peer Fare Structure

	Montpelier LINK Express	Zoom Turnpike Express	921 Middletown/Old Saybrook Express	Lakes Region Explorer	Concord Express
Single or Zonal based fare?	SINGLE	SINGLE	ZONAL; 4 ZONES	SINGLE	SINGLE
One-way fare	$ 4.00	$ 5.00	$2.70 - $5.15	$ 3.00	$ 5.00
Off Peak Discount	$ 2.00	NO	NO	NO	NO; HALF-FARE IDS AVAILABLE FOR $2.00 IF MANCHESTER RESIDENT, $10.00 IF NON-RESIDENT
Children Discounted Fare	UNDER THE AGE OF 2 ARE FREE; AGES 2-17 ARE $2.00	NO	AGES 4 AND UNDER ARE FREE; MAXIMUM OF 3 CHILDREN PER ADULT	CHILDREN 5 AND UNDER ARE FREE WITH PAYING ADULT; STUDENTS WITH ID ARE $2.00	NO
Elderly/Disabled Discounted Fare	$ 2.00	NO	$1.35 - $2.55 (HALF PRICE)	$2.00 FOR ELDERLY	$ 2.50
Transfers to local route	Available; FREE	Available; FREE	Available; FREE	Available same day; FREE	NOT Available, unless to Airport; FREE

All of the peers offer a discounted monthly pass (see Table 14). For the peers that have a flat fare the pass ranges between $50 and $150 a month. The trend is such that the greater the level of service on the commuter route the more costly the monthly pass is. The MTA Concord Express also offers student and senior/disabled discounted monthly passes. All systems but the MTA Concord Express offer multi-ride passes. These passes are good for 10 single trips and can be used over any period of time. Multi-ride passes allow for passengers to buy a set number of transit trips ahead of time usually at a discount. Only one peer, Zoom Turnpike Express, offers a quarterly pass.

Table 14: Peer Pass Structure

	Montpelier LINK Express	Zoom Turnpike Express	921 Middletown/Old Saybrook Express	Lakes Region Explorer	Concord Express
10-ride Pass	$40.00	$39.00	$24.30 - $46.35	$25.00	NO
Monthly Pass	$150.00	$100.00	$92.00 - $175.00	$50.00	$60.00
Quarterly Pass	NO	$260.00	NO	NO	NO
Student Monthly Pass	NO	NO	NO	NO	$45.00
Senior/Disabled Monthly Pass	NO	NO	NO	NO	$30.00

6.5 Funding

Each of the peers has different funding streams. The Zoom Turnpike Express is funded by MaineDOT and the Maine Turnpike Authority. The MTA Concord Express was launched using toll credits, which funded the demonstration project for two years. After the two year mark, continuation of service was justified based on ridership as a proof of

concept, and the cost was absorbed into the local match. The Montpelier LINK Express service is funded by fare revenue (69% farebox recovery) as well as local, state and federal assistance. Service expansions are funded with CMAQ funding. CCTA/GMT applies for the New Start grants through the state to receive the CMAQ funding. CMAQ funding requires a 20% local match. All CTTransit Commuter routes are funded through state funds and fare revenue only. The Route 921 Middletown/Old Saybrook Express recovers 24% of the cost through fares. The Lakes Region Explorer is funded by the towns in which it operates.

6.6 Technology

Technology today serves a variety of functions in many aspects of everyday life including transit. A review of the peer systems technology provides an understanding of trends within commuter transit. This section explores three primary sectors of technology; schedule information, fare payment and the ability to stay connected. See Table 15 for a description of technology deployment in each of the peer services.

Automatic Vehicle Location (AVL) provides real-time information on the vehicles location and anticipated arrival at a stop, which allows passengers to plan accordingly. One of the peers (Concord Express) has AVL/real time information available for the routes, and it is currently being deployed by another (Montpelier LINK Express). Google Transit combines bus schedules with Google Maps to allow the public to plan their trip using Google Maps. Systems must convert their schedule information into a format called General Transit Feed Specification (GTFS) in order to display in Google. Two of the three peers have their schedule information in Google. Nationally the standard is if a system has real time information, then the schedules and routes are also in Google Transit because the software that generates the real-time information can be converted into a GTFS data set. This is not the case with the peers. One system, MTA Concord Express, has real time information but they are not in Google Transit. Two of the peers, Montpelier LINK Express and 921 Middletown/Old Saybrook Express, are in Google Transit.

Table 15: Peer Technology Comparison

Peer	AVL/Real Time	Google Transit	Electronic Fare payment	Wi-fi on board
Montpelier LINK Express	currently being installed	Yes	No	Yes
Zoom Turnpike Express	No	No	No	Yes
921 Middletown/Old Saybrook Express	No	Yes	No	No
Lakes Region Explorer	No	No	No	Yes
Concord Express	Yes	No	No	No

The two primary electronic fare payment systems used in the United States are the contactless SmartCard and mobile payments. The most widely use electronic fare technology in transit is the contactless SmartCard system. The SmartCard fare instrument is the size of a credit card and can be loaded with stored value or any kind of pass. A user simply taps the card on a reader and enters the vehicle. Mobile ticketing is where users pay fares from a Smartphone. Transit agencies are now starting to experiment with fare payment through cellular telephone. This technology operates as the SmartCard with the ability to store multiple pass options and fare types. It requires that riders download an application (app) onto a Smartphone. Payment is processed through the app and a transit pass is produced on the person's phone. None of the peer systems have electronic fare payment systems.

Wi-fi on board allows passengers the convenience of keeping connected while they ride in order to check email, read news and search the web. Some peers do not allow streaming of video or music in order to keep a fast connection for all. The vehicle must have a satellite or mobile broadband uplink that provides the connection to the remote network. Typically a mobile connection is used through the use of a mobile router. Three of the peers have wi-fi on board and it is free. There is no particular trend on the availability of wi-fi amongst the peers based on vehicle type, the on-board travel time, the number of trips daily, or when the service began.

6.7 Summary

Based on the peer analysis, the following generalizations can be made about peer services in New England:

- Service is bi-directional and operated primarily during peak commute periods with more service occurring into the metropolitan area in the morning and out of the metropolitan area in the afternoon and limited mid-day service options
- One-way travel time ranges from 40 to 90 minutes, with the longer trips using coach-style buses
- Commuter services provide limited intermediate stops along the route
- Parking is available at one third of stops
- Commuter services average 10.79 passengers per one-way trip and 32% farebox recovery
- A variety of fare media are available and one-way fares range from $2.70 to $5.15
- Funding sources are unique to each of the peer systems
- Technology use is limited

7. Public Outreach

The study was guided by a Project Advisory Group (PAG). The PAG included representatives from NH DOT, local communities, colleges, healthcare facilities, major employers and existing transportation providers. The PAG met monthly or bi-monthly throughout the duration of the project in person and via conference call to provide guidance and review materials. The PAG was integral in reaching out to and interacting with the community on behalf of this study.

Figure 19: Windshield Handout at Park-and-Rides

For the public outreach effort, UVLSRPC used a multifaceted approach to gather public input including a series of “public drop-in sessions” with interactive mapping stations, pop-up tables, and an online survey.

The drop-in sessions were designed to be informative, educational, and interactive for participants and were used to gather public input on where people live and work and if they would use a commuter bus along I-89. Four interactive workshops and five pop-up tables were held over the course of three days in October 2016. In addition to these events, flyers with a survey link were placed on vehicles parked in the I-89 Exit 12 and Exit 13 Park-and-Ride Lots. A meeting was also held with the Dean of the Nursing Program at Colby-Sawyer College. The dates and times of the locations of the open house workshops, pop-up tables and stakeholder meetings were:

- Wednesday, October 19 - Pop-up table at Colby-Sawyer College 11:30AM-1:00pm
- Wednesday, October 19 – Open House at Kilton Public Library 2:00pm-4:00pm
- Wednesday, October 19 – Pop-up table at River Valley Community College 4:30pm-5:30pm
- Wednesday, October 19 – Pop-up table at Lebanon City Hall 6:00pm-700pm
- Thursday, October 20 - Pop-up table outside The Hop, Hanover 7:30am-9:00am
- Thursday, October 20 – Open House at Dartmouth-Hitchcock Medical Center 10:00am-4:00pm
- Thursday, October 20 – Pop-up table outside Hanover Town Hall 4:30pm-6:00pm
- Friday, October 21 – Open House at New London Hospital 8:30am-9:30am
- Friday, October 21 – Open House at Tracy Memorial Library 10:00am-11:30am
- Thursday, November 17 – Stakeholder meeting with Dean of Nursing Program Colby-Sawyer 10:00am

To reach as many and diverse members of the public as possible, UVSLRPC prepared an outreach strategy to inform people about the upcoming open house workshops and survey. This strategy included an announcement on the UVLSRPC website, Facebook page and newsletter; flyers sent home with public school children; postings on community boards (online and in print); notices in print media; emails to distribution lists of major employers and community agencies; and word-of-mouth by the PAG during their daily interactions within the communities.

Figure 20: Goals and Objectives Board

7.1 Pubic Drop-in Sessions

Data Gathering Round

The format of the open house workshops was designed to be interactive with multiple ways in which people could provide their thoughts. Each open house workshop had 3 stations. The first station was an introduction station with information on the study and a large map of the study and participants were asked to put dots at their home and work locations. The second station gave participants the opportunity to fill out a paper version of the online survey if they had not done so already. The third station had two informative boards about the study area and analysis. The first board at Station 3 had a map showing employment density in the region. The second board showed the results of the peer analysis of similar services in other locations. The pop-up tables were less formal and consisted of a board describing the study and handouts were distributed as people walked by and they were asked to take the survey. The team also answered any questions. At the public outreach events, the team talked with over 65 people, handed out 115 flyers and collected 26 completed paper surveys (see Table 16).

Table 16: Summary of Public Outreach

Location	Date	Talked to # of People	Handed Out Online Survey Flyers	Collected Completed Hard Copy Surveys
Colby-Sawyer College	19-Oct	6	5	0
Kilton Public Library, West Lebanon	19-Oct	5	1	2
River Valley Community College, Lebanon	19-Oct	3	10	1
Lebanon City Hall	19-Oct	12	5	4
The Hop, Hanover	20-Oct	3	20	0
Dartmouth Hitchcock Medical Center	20-Oct	25	10	13
Hanover Town Hall	20-Oct	0	60	0
New London Hospital	21-Oct	5	2	3
Tracy Library, New London	21-Oct	7	2	3

Summarized below is the input received at event and the stakeholder meeting.

Colby-Sawyer College: October 19th, 11:30am-1pm

A pop-up table was placed at the main entrance to the dining hall in the Ware Student Center during lunch time in order to capture students, faculty and staff. As people walked by, study staff were available to answer questions. Many faculty and staff stated that they had already completed the survey online. Several people stopped by to talk about the study and the following comments were heard:

- A Park-and-Ride location is needed in Enfield at Exit 16 and at Exit 17
- Several people carpool to Colby-Sawyer from areas both north and south of the College

- The service should extend south to Sutton and Concord; this would capture more commuters

Kilton Public Library: October 19th, 2pm-4pm

The workshop stations were placed between the library entrance and computer stations. Individuals came up and discussed the study and survey including one member of the Lebanon Bike/Pedestrian Committee who supported the project. The following comments were heard from individuals at the library:

- The service should extend south to Concord; this would capture more riders
- West Lebanon should be served
- Efforts should be made to improve connections amongst existing services. You can walk to the Greyhound Station from the AT bus stop in West Lebanon, but it would be better for services to come together in the same location.
- Unifirst on Etna Road is another major employer

River Valley Community College: October 19th, 4:30pm-5:30pm

The pop-up table was placed at the main entrance lobby to the River Valley Community College in order to capture students as they entered and exited for evening classes. Flyers about the study, with information on how to access the survey, were handed out to individuals as they walked by. As people walked by study staff were available to answer questions. Several people stopped to talk about the study and the following comments were heard:

- Students need to take classes at campuses in Lebanon, Claremont and Keene
- Adult Education classes are in Claremont; transportation is a major challenge

Lebanon City Hall: October 19th, 6pm-7pm

This event was held prior to the City Council meeting in order to capture individuals attending the meeting. A pop-up table was placed in lobby at the main entrance to City Hall and individuals were asked to complete the survey. For those who did not have time, a flyer was handed out with information about the study and how to complete the survey online. A total of 4 paper surveys were collected at the Lebanon City Hall pop-up table. Several people stopped to talk about the study and the following comments were heard:

- Rep. Patricia Higgins from Hanover is an advocate for increased transit service
- Frequent service along Route 4 is needed between Lebanon and Canaan; there is limited existing service and a taxi costs at least $20

The Hop, Hanover: October 20th, 7:30am-9am

A pop-up table was placed at The Hop and Bookstore bus stops in order to capture individuals waiting for or getting off the bus. Individuals were asked to complete the survey. Flyers about the study, with information on how to access the survey online, were handed out to individuals. Several people stopped to talk about the study and the following comments were heard:

- AT once tried servicing Hypertherm but it was unsuccessful
- This type of service would provide transportation access and mobility for teenagers and the disabled in the suburban and rural areas outside the cities/towns
- Centrix is another major employer
- People have been asking AT to provide service along I-89 for years

Dartmouth-Hitchcock Medical Center: October 20th, 10am-4pm

Workshop stations were placed in the main lobby of the Norris Cotton Cancer Center. Individuals, both employees and patients, came up and discussed the study and survey. Many employees stated that they had already completed the survey online. Individuals who had not completed the survey were encouraged to do so. A total of 13 paper surveys were collected at DHMC. For those who did not have time, a flyer was handed out with information about the study and how to complete the survey online. The following comments were heard from individuals at DHMC:

- There needs to be service from New London and Grantham to DHMC
- There is very little room at the Exit 12 Park-and-Ride to add more service; the lot has already been expanded once
- Service is needed to the VA Hospital (VT) from Enfield

- AT is great in Hanover and Lebanon, but there isn't transit service in the neighboring communities, in New London, late nights or on the weekends
- Dartmouth Coach does not stop in Concord; service to Concord is needed
- Need service to Manchester Airport
- Employees at DHMC come from all over the state and VT
- Service should extend farther south to Warner and Concord
- More transit is a good idea
- The bus service should also serve medical trips; particularly because there are a lot of elderly people in New London who need to get to DHMC for medical services
- There is a senior community on Buck Road that would benefit from bus service for family visitors
- Bus service would help patients get to appointments without having to rely on family members to leave their own jobs to transport them
- Young nurses don't have the money to get a car
- Many employees at DHMC already arrive 10-15 minute earlier than their shift start time to get the shuttle from parking lot to the main entrance
- Having bus service that pulled up to the main building would save commute time

Hanover Town Hall: October 20th, 4:30pm-6pm

At the town hall, the primary goal was to hand out flyers to passersby with information and a link to the survey. The event occurred during the evening in hopes of capturing people leaving work or heading out for dinner. Sixty online survey flyers were handed out.

New London Hospital: October 21st, 8:30am-9:30am

The workshop stations were placed in the main lobby of the New London Hospital in order to catch both patients and employees. Individuals came up and discussed the study and survey. Several employees stated they had already taken the survey online. Individuals who had not completed the survey were encouraged to do so. For those who did not have time, a flyer was handed out with information about the study and how to complete the survey online. The following comments were heard from individuals:

- New London Hospital employees come from many communities including Sutton, Wilmot, New London, Warner, Grantham, and Sunapee
- Transit would be great for employees and patients
- Could Dartmouth Coach offer a partial fare for trips between New London and Hanover and provide service in the reverse direction?
- The Exit 12 Lot is always full; sometimes cars are parked there for extended periods of time
- Many people in New London get their medical care at DHMC
- The Council on Aging volunteer drivers will bring patients to DHMC, but a bus service would reduce pressure on finding volunteer drivers willing to make the long trip
- Many drivers in New London are worried about the winter commute on I-89
- Coordinate the bus time with the Dartmouth Coach bus that goes from Lebanon to NYC
- The bus should link up with Dartmouth Coach at their new facility
- Some students in the area attend the Kimball Union Academy in Meriden off Exit 16; one third of the students are day students and two thirds board at the school

Tracy Memorial Library, New London: October 21st, 10am-11:30am

The workshop stations were placed in the meeting room of the Tracy Memorial Library and individuals came up and discussed the study and survey. The following comments were heard from individuals:

- Service between New London and Lebanon/Hanover could provide medical, shopping and social trips for retirees
- The service should extend south to Exit 9 in Warner

Interview with Dean of Nursing Program, Colby-Sawyer College: November 17th

There are 180 undergraduate students in the nursing program. There is also a graduate program (primarily evening classes). As part of the academic program students have to complete off-campus practical experience requirements (clinicals). The Colby-Sawyer clinical program is currently conducted at DHMC on Tuesdays and Thursdays from 6:45am to 3:30pm during the school year. There are approximately 80-100 students completing clinicals during any given semester. Currently students carpool to DHMC, park offsite at DHMC and take the shuttle to the main campus. They have to be on their units and ready to go for 6:45am, so that means they have to leave Colby-Sawyer at 5:30-5:45am to meet up to carpool, drive, park off site, get the shuttle, and get to the appropriate unit. The clinical program can be cancelled due to winter weather events to avoid having students driving on I-89 in bad weather. In the final year of the nursing program, students work normal nursing schedules (7 days, all shifts) at DHMC. If they absolutely cannot get to DHMC, then they arrange for the nursing shifts to be completed at New London Hospital.

Parents of students considering the program frequently ask what transportation options are available for students to get to clinical assignments. If bus service were available, students would not need cars and it would be positive for both the sustainability of the program and safety of the students. Bus service would also allow the clinicals to continue during winter weather events.

Ideally the bus would pick up at the Colby-Sawyer campus and drop off at the entrance to the Norris Cotton Cancer Center. Students could also carpool to Exit 12 to catch the bus. The students would use WiFi onboard. Additionally, service from New London to the Manchester Airport in addition to service to Logan Airport (Boston) would be used by people in the Upper Valley including Colby-Sawyer students traveling from other states and countries.

Data Presentation Round

After the selection of a preferred alternative by the PAG, another round of public workshops was held to present the results of the study. Public drop-in sessions were advertised with the help of the PAG in the same manner as the first round of outreach, and were also advertised with print media in the Valley News and Kearsarge Shopper. Public workshops were held at the locations, dates, and times listed in Table 17.

Table 17: Summary of Second Round of Drop-in Sessions

Location	Date	Times	# Participants
Colby-Sawyer College, Lethbridge Lodge	29-Mar	4:30-7pm	18
Dartmouth Hitchcock Medical Center, East Mall	30-Mar	11:30am-2pm	23
Howe Library, Hanover	30-Mar	4:30-7pm	3

Summarized below is the input received at the events:

- There is a lot of support for commuter transit service in the corridor, including service south of the area to Concord and beyond.
- The Park-and-Ride Lot at Exit 12 is at capacity; an alternate Park-and-Ride location in New London is needed along Main Street, potentially using part of a parking lot at a retail plaza.
- Seniors, especially from New London, need a mid-day trip.
- Marketing and education will be important once the funding is secured to operate the service.
- Participants at DHMC noted that some services start shifts at 6am or earlier, so there may be demand for earlier service as the service is established.

Press Coverage

The study was covered with stories in the Valley News[4] following both rounds of public drop-in sessions. The articles provided readers in the region with an overview of the study, outreach results, a description of the preferred alternative, and a description of the overall need/support for transit service in the corridor.

7.2 Surveys

As part of the I-89 Commuter Transit Feasibility Study, AECOM surveyed potential bus users. The goal of this survey was to learn more about Upper Valley's demand for commuter bus service along I-89. The survey covered the period from September 26, 2016 to November 11, 2016. The following is an analysis of the survey results for the entire duration of the survey. Detailed survey results are contained in Appendix B.

Methodology

Survey Development and Publication

The survey questions were prepared in consultation with the PAG. This process began in late August 2016. The survey asked questions about residency, modes of travel, origin, destinations, travel frequency, travel times and fares. Targeted email blasts were sent to a large and diverse group of stakeholders with links to the survey. Flyers were posted in key locations. In addition, the link to the online survey was posted on community boards, Facebook pages, and UVLSRPC website.

The survey was conducted by distributing paper copies to stakeholder groups, holding public workshops, having pop-up tables at key locations, as well as a robust campaign to encourage people to complete the online version, produced using Survey Monkey. All of the survey promotional content included a brief description, a link to the survey, and a QR code, which when scanned provided a direct link to the survey. The data from both collection methods was combined into a single data set.

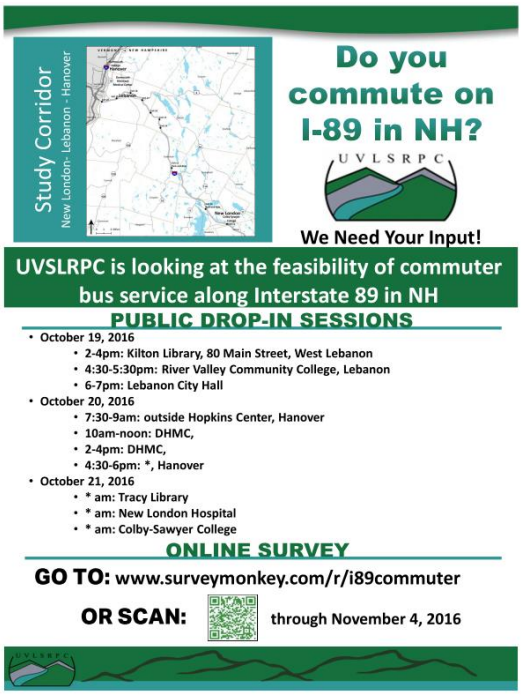


Figure 21: Promotional Flyer for the Survey

Online Survey

The online survey opened on September 26, 2016 and was available through November 11, 2016. The survey was open to all individuals who live, work, or visit the Upper Valley region. Individuals where asked where the live and where they work. Based on the response they were directed to the appropriate set of questions about travel patterns. All who lived in New Hampshire or traveled the I-89 corridor south of Lebanon were asked about their willingness to use a commuter bus. For those that responded they would use a commuter bus in the corridor, questions were asked about frequency and fares. Those that responded they would not use a commuter bus in the corridor were asked questions to inquire why.

Incentive

Survey participants were given the option of entering a raffle for a $25 Amazon® gift card. Following the close of the online survey, the names of individuals who entered were listed in Excel in the order in which their survey response

[4] http://www.vnews.com/Survey-Finds-People-Would-Use-Bus-Service-on-I-89-7580646
http://www.vnews.com/Planners-Say-I-89-Shuttle-is-Feasable-9016664

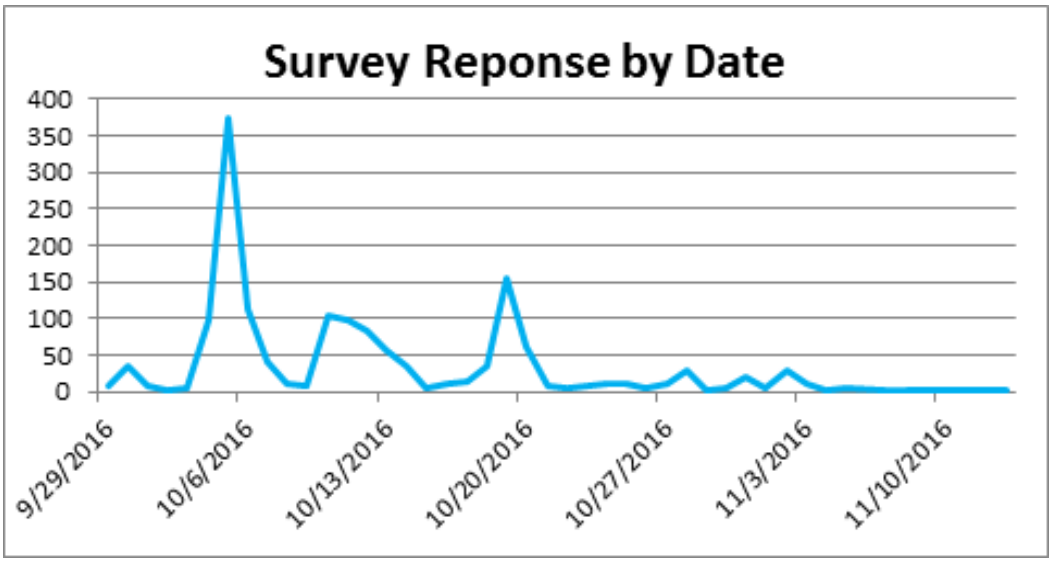
was received. Each name that entered contact information was then numbered from one to 677 (the number of raffle entries). The random number generator in Excel was run twice to identify a winning number. The individual associated with this number was contacted based on their email address on January 26, 2016.

Responses

The survey received 1,547 responses[5]. Of these, 1,521 were completed online and 26 were completed on paper and entered into the online system by study staff. The peaks in responses (Figure 22) correlate email blasts to all DHMC employees, Colby-Sawyer students, staff and faculty, and public outreach efforts. According to the latest data from the US Census Bureau (2014 American Community Survey), the population of in the region is 60,015. Therefore, in order to have a statistically significant data set, 382 respondents were needed[6]. Well over 382 surveys were completed and the actual number of completed surveys (1,547) represents a 2.5% Margin of Error.

Detailed question-by-question responses are included in Appendix B.

Figure 22: Survey Response by Date



7.3 Public Outreach Summary

Overall there is robust support for commuter service in the I-89 corridor and the survey and outreach efforts show that it would be utilized. Main points learned from the data gathering outreach effort included:

- There will need to be several deviations off the main route in order to service the areas with high demand.
- The schedules must be tailored in such a manner that they coordinate with Advance Transit, stop at multiple Park-and-Ride locations and are sensitive to work hours.
- The Park-and-Ride Lot at Exit 12 exhibited high demand but is at capacity; an alternate Park-and-Ride location in New London is needed.
- Service should not end at the Exit 12 but be extended through downtown and to Colby-Sawyer College.
- There is minimal to moderate demand to serve downtown Lebanon and downtown Hanover except at key times; these locations have the highest amount of existing transit service. As such, the schedules should be coordinated where possible to facilitate transfers to the AT Blue Route to serve these two areas.

[5] It should be noted that not all respondents answered all of the survey questions. As such, the percentages in all figures are based on the number of responses received for that question rather than on the total number of responses.
[6] A confidence interval of 95% and a Margin of error of 5% or less.

Main points learned from the data presentation outreach effort included:

- There is a lot of support for commuter transit service in the corridor, including service south of the area to Concord and beyond.
- The Park-and-Ride Lot at Exit 12 is at capacity; an alternate Park-and-Ride location in New London is needed along Main Street, potentially using part of a parking lot at a retail plaza.
- Seniors, especially from New London, need a mid-day trip.
- Marketing and education will be important once the funding is secured to operate the service.
- Participants at DHMC noted that some services start shifts at 6am or earlier, so there may be demand for earlier service as the service is established.

8. Development of Alternatives

Responses received from the public outreach effort, the market analysis, and the existing conditions in the study area were all considered when developing transit service alternatives for this study. Five alternatives were developed for evaluation. The alternatives were based on a core route connecting the origins and destinations with the highest demand at either end of the corridor and each had different service characteristics including destinations served and level of service. Characteristics applicable to all alternatives are discussed first and include:

- Routing and stops
- Technology/amenities
- Capital requirements
- Fare structure

Each alternative is then described in greater detail in terms of:

- Destinations served
- Operating hours
- Frequency of service

The primary pros and cons of each alternative are presented for evaluation purposes.

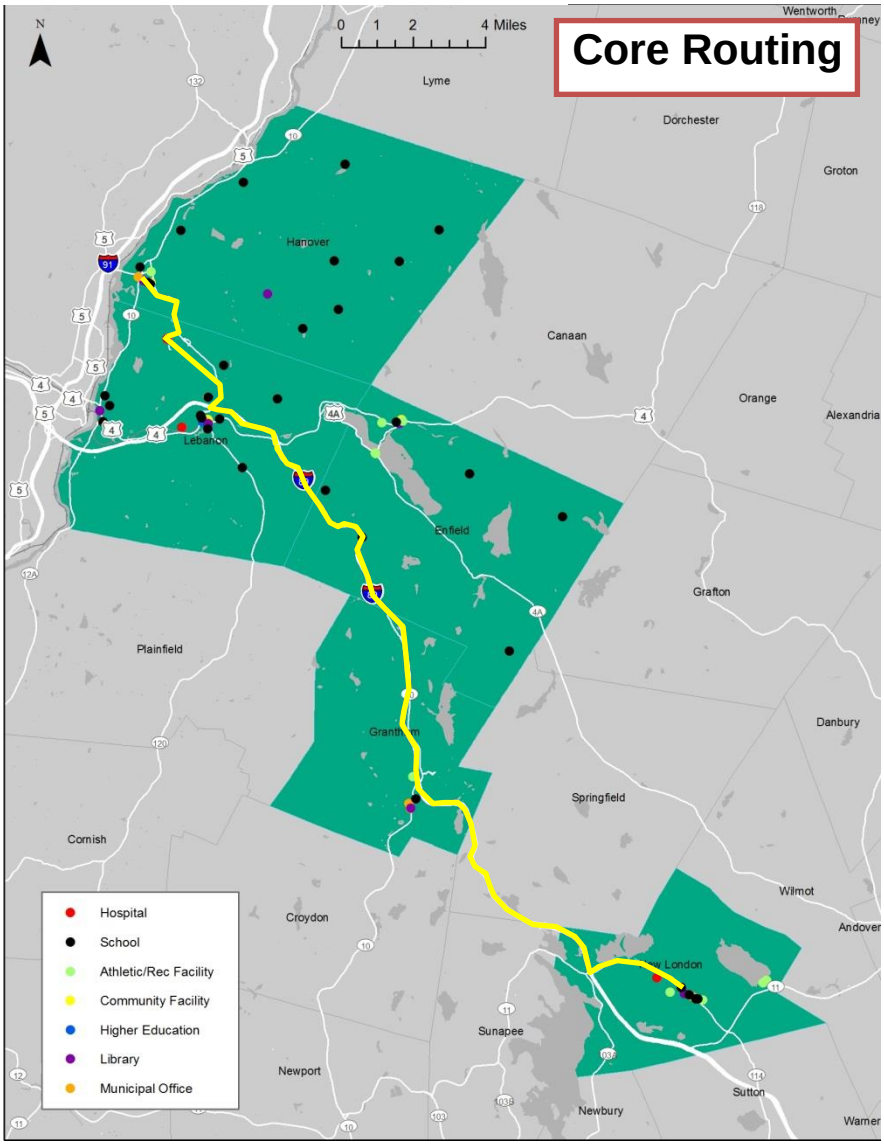
Alternative 1 includes the most amount of service, which each subsequent alternative having progressively smaller amounts of service. However, all alternatives include at least the core routing and amount of service to be successful and sustainable based on the demand identified through the study process.

8.1 Alternative Characteristics for All Alternatives

Routing

The core route would begin at Colby-Sawyer College, travel through downtown New London using flag stops[7], serve the hospital on request[8] and continue to the Exit 12 Park-and-Ride Lot. In the morning, the bus would stop at the Exit 12 Park-and-Ride on every northbound trip and by request in the southbound direction. In the afternoon the reverse would hold true. The route would then take I-89 to the Exit 13 Park-and-Ride, which would be served on every trip in both directions except the first southbound morning trip. The route would then continue on I-89 to DHMC via Exit 18, Route 120 and Heater/Mountain Support Road. Service to Centerra Parkway would be provided after serving DHMC in the morning and before serving DHMC in the afternoon. On certain trips and alternatives the bus would stop at Hyperthem on Heater Road, travel along Etna/Great Hollow Road, use Exit 17 to serve downtown Lebanon, or continue onto downtown Hanover. See Figure 23 for a map of the core route.

Figure 23: Core Routing



A one-way trip between Colby-Sawyer College and DHMC, serving both the Exit 12 and 13 Park-and-Ride Lots, and not accounting for deviations/limited service areas is 28 miles. The one-way travel time varies greatly throughout the day and is dependent on deviations, direction of travel and time of day with longer times during peak hours and directions. It ranges between 35 and 58 minutes. Time checks and layovers would be held at the Colby-Sawyer loop, the east entrance to DHMC and in downtown Hanover at the Green. The schedule is designed to have minimal layover at DHMC to avoid conflict with the 8 different routes that currently serve the East Entrance at DHMC[9]. The only conflicts at Colby-Sawyer would be occasional charter trip buses. The Hanover Inn stop in Hanover has three spaces and is served by 10 routes and several providers.

[7] The bus only stops on request - at any safe location, usually an intersection - and does not have posted stops
[8] Patrons would call ahead to request a pick-up or request a drop-off onboard the bus.
[9] The routes are: the Upper Valley Commuter, River Route, 89ER, Vermont Transit Lines Route 4, Blue Route, Lot 9 Shuttle, Lot 20 Shuttle, and the DHMC intercampus shuttle

All alternatives would serve The Green on two separate trips. The only trip that would conflict with the existing usage of The Green bus stop is the 8:55 AM trip, which would be utilizing the space at the same time the 9 AM Dartmouth Coach trip is loading. This trip terminates at the Green and could easily serve the stop without laying over. This trip does not have layover time and can serve the stop quickly. All other conflicts are avoided unless routes are running behind schedule.

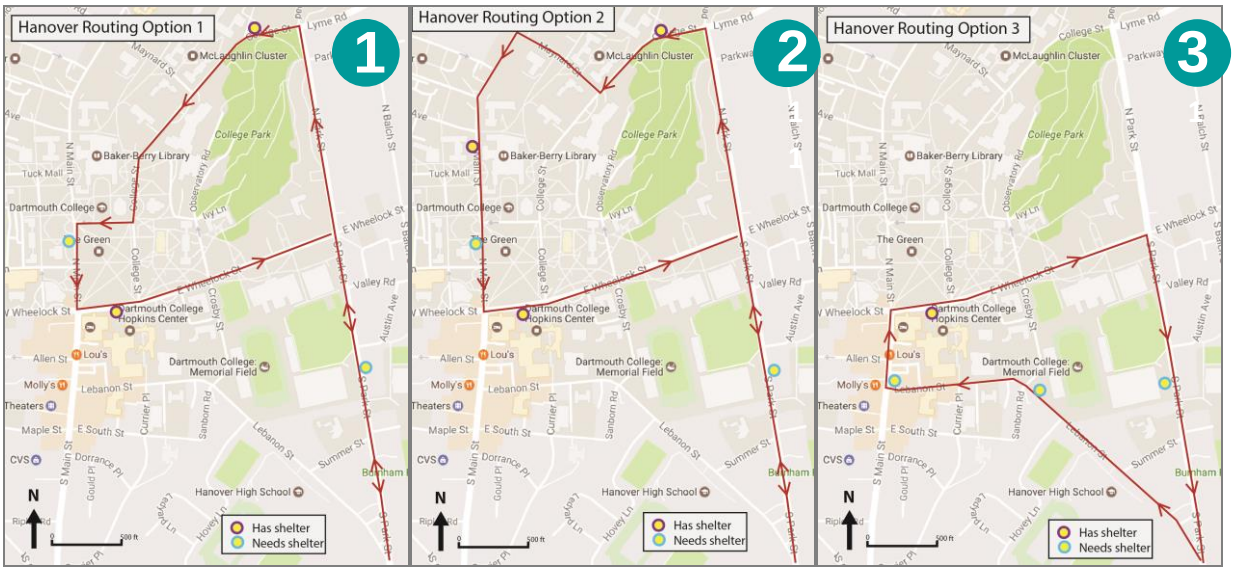
All alternatives were designed to serve many of the major employers in in Hanover, Lebanon and New London with peak-period trips that correlate to the most popular start and end times.

Hanover Routing and Stops

From DHMC, the route would use Medical Center Drive and Route 120 when heading towards Hanover, except if it is serving Centerra Parkway first. From Route 120, three options (Figure 24) have been developed for routing in downtown Hanover. All three options would stop on The Green in front of the Hopkins Center. When serving Etna Road and Great Hollow Road, flag stops would be used in place of traditional stops due to the length of the corridor and dispersal of businesses. The route would not stop along Greensboro Road.

Figure 24: Downtown Hanover Routing Options and Stops

Option 1 follows Park Street to College Street, Wentworth Street, North Main Street and East Wheelock Street back to Park Street. The loop is 2.1 miles long and would also stop at Vail DMS, Main Street and on South Park Street in front of the Athletic Center.
Option 2 follows Park Street to College Street, Maynard Street, North Main Street and East Wheelock Street back to Park Street. The loop is 2.2 miles long and would also stop at the Webster Street Bus stop in addition to those locations listed in Option 1.
Option 3 follows Lebanon Street to North Main Street, Wheelock Street, and South Park Street. The loop is 2.1 miles long and would also stop on South Park Street in front of the Athletic Center, by Crosby Street, and along South Main Street.



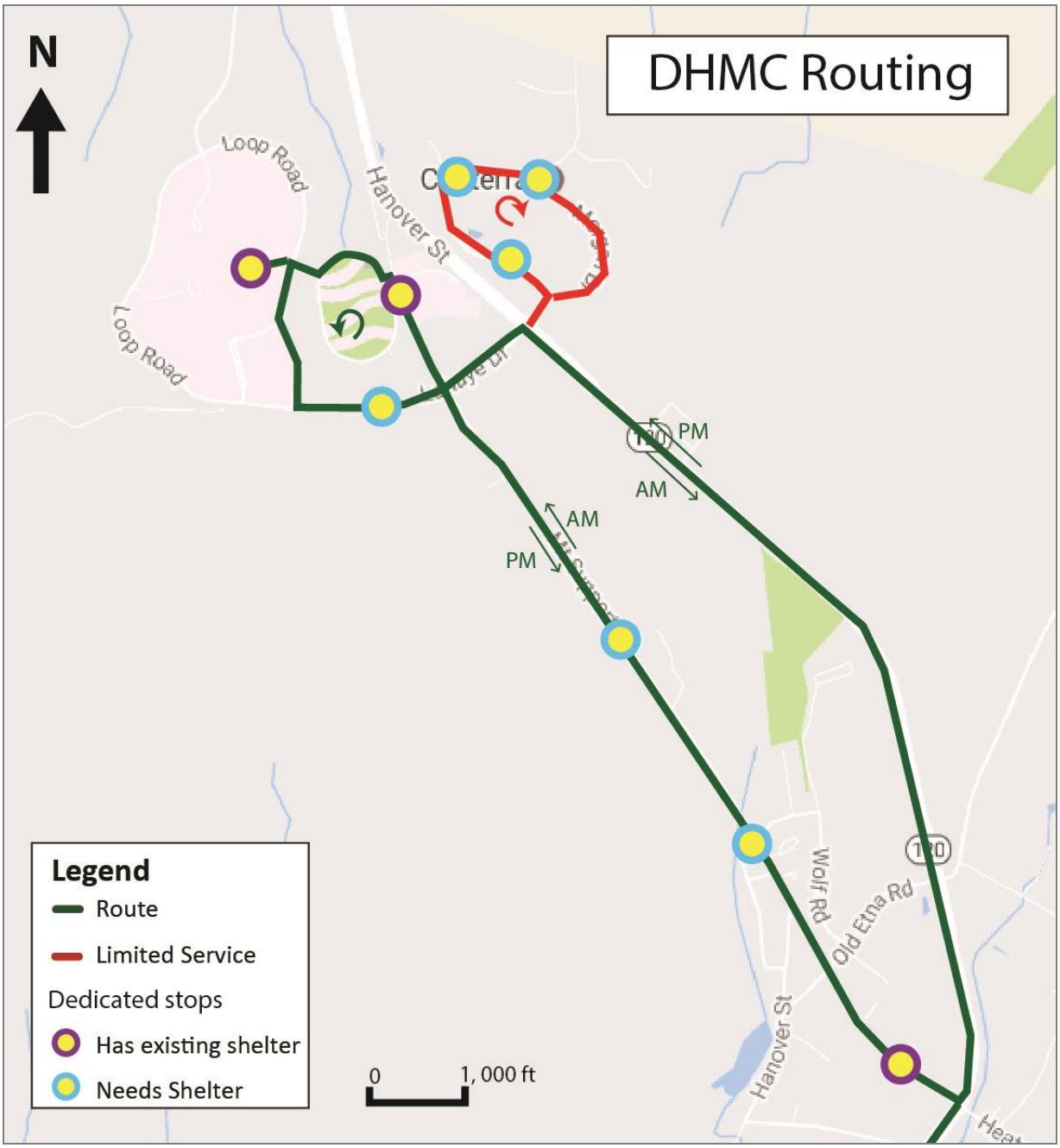
All stops listed in options 1 and 2 are existing Advance Transit (AT) stops. The Webster, Vail DMS, and Hopkins Center/Hanover Inn stops have shelters; the Green and Park Street stops do not. In option 3, the route would be traveling northbound on Lebanon Street; there are no existing stops on this street northbound and amenities would

need to be added. The stop on the corner of South Main Street and East South Street at the Hanover Post office is currently a drop-off only stop for the AT Orange Route and has no amenities.

DHMC Routing and Stops

During the morning the Route would use Mountain Support Road heading northbound and Route 120 heading southbound. The afternoon would be the opposite. At DHMC, the route would stop at Coburn Hill, the East Entrance and the Outpatient Surgery Center. Along Centerra Parkway the route would circulate clockwise and stop at the Co-Op Food Store, Evergreen 2 building, and the River Valley Club.

Figure 25: DHMC Routing and Stops



Lebanon Downtown Routing and Stops

Routing through downtown Lebanon would operate on a limited basis using Exit 17 and Routes 4 and 120. Stops would occur at the Lebanon Middle School, Spark! Community Center, Lebanon City Hall and along Hanover Street at existing AT stops.

Figure 26: Downtown Lebanon Routing and Stops

New London Downtown Routing and Stops

In New London the route would have designated stops at the Colby-Sawyer College Circle, New London Hospital, New London Shopping Center and at the Exit 12 Park-and-Ride Lot. Shelters or waiting locations would be needed at the New London Shopping Center and at Colby-Sawyer College. Between Seamans Road and Everett Park, the Route would operate using flag stops.

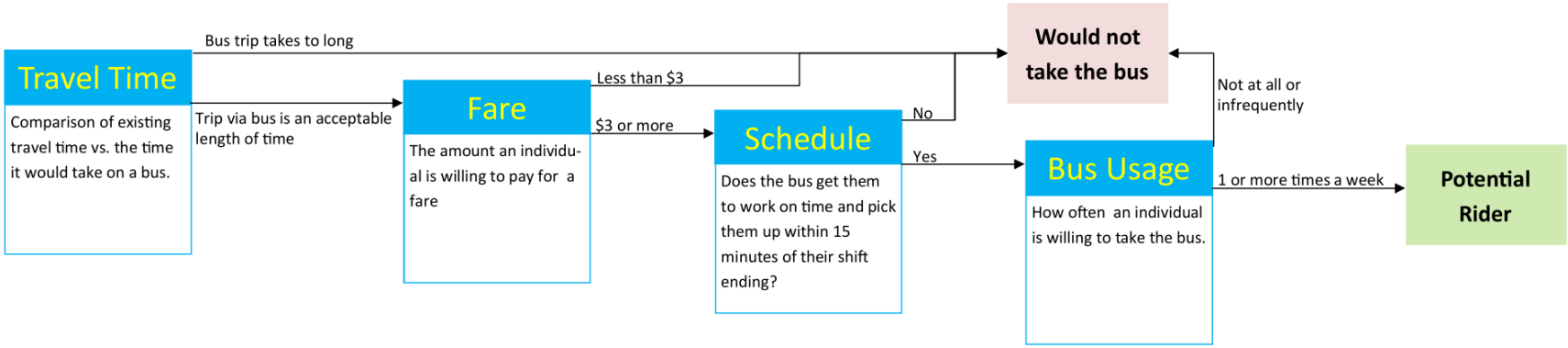
Figure 27: Downtown New London Routing and Stops

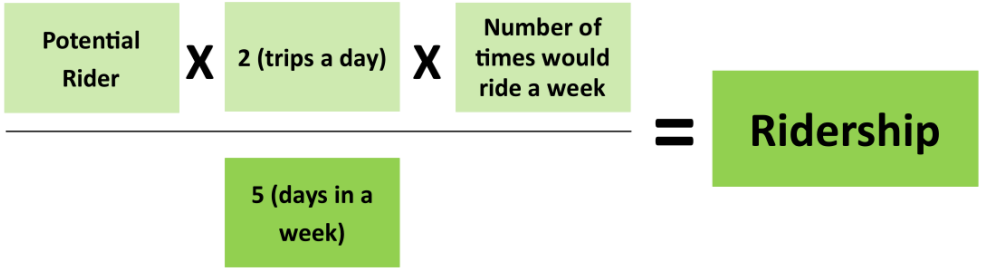
Ridership Estimation Methodology

Potential ridership estimation by alternative was calculated using the survey results and an individual's propensity to take transit. The calculations were based on an the schedule's ability to meet an individual's work hours and days, travel time, fare levels, and reported level of usage. Projected ridership levels were used to inform the number and size of vehicles recommended and the alternatives evaluation process.

To provide more detail, ridership was calculated based on survey responses on the following four factors: travel time, fare, bus schedule, and utilization (Figure 28). The travel time factor compared the existing commute time to the time it would take to make the same trip via a bus to determine if the bus trip time would be substantially longer. Total trip time, including the time to access a Park-and-Ride Lot, was used in the calculations. If the bus trip took longer than the time an individual was willing to travel, they were removed as a potential rider. Those with acceptable trip times were then evaluated based on fare sensitivity. If an individual reported they would not pay at least $3 for a trip they were removed from the list. The proposed schedule was then evaluated to determine if the bus arrived at the work place prior to the start time and within 15 after the shift ended. If the bus schedule did not meet the individuals work schedule or they only worked weekends, they were removed from the list of potential riders. The last factor looked at how often an individual reported they would take the bus. If an individual reported they would ride a potential commuter bus infrequently or not at all, they were they removed from the list. All remaining individuals were considered potential riders. Ridership was then calculated based on the number of times individuals reported they would ride per week. Assumptions included that service would be on only operated on weekdays and that when using the bus, potential riders would take it both to and from work. Detailed calculations by alternative are presented in Appendix C.

Figure 28: Ridership Estimation Flow Chart





Capital Requirements

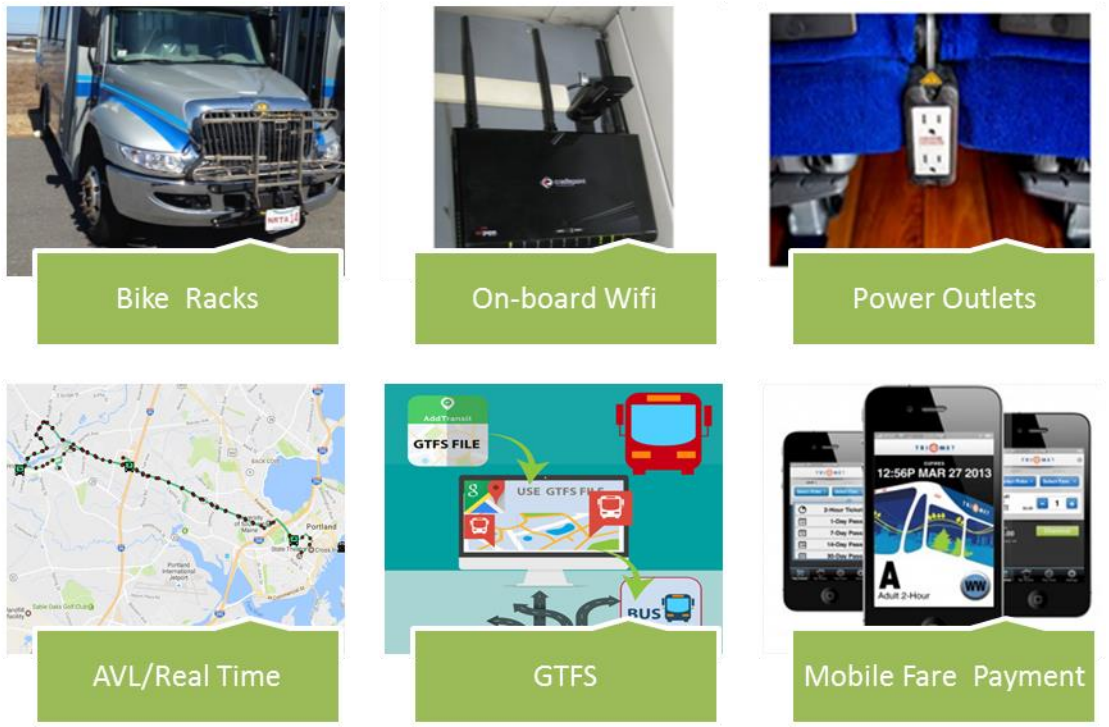
Technology/Amenities

Several technologies should be considered to improve the experience for the passengers. Front- mounted bicycle racks could be installed on all buses to link bicycling and transit to improve mobility and sustainability. The cost per bicycle rack is approximately $500[10]. Due to the commuter type of trip being taken on the bus, it should provide a comfortable ride and offer amenities for the longer trip such as internet (Wi-Fi) access and power outlets. The cost per Wi-Fi unit averages $300-$500 plus an additional monthly cost of $40-$50 for cellular service. Wi-fi can act as marketing tool to capture additional riders who want to convert their commute time into productive time.

The schedule information should be available in real-time with a mobile application so that passengers can monitor the vehicle location, minimizing wait time at the stops. The schedule should be converted to a General Transit Feed Specification (GTFS) and imported into Google Maps[11].

Mobile payments should be considered. On one mobile payment system, a rider downloads an application onto a smart phone, payment is processed through the application and a transit pass is produced on the person's phone. This technology is used by 36 transit providers across the US with several more currently in deployment. The current cost to deploy such a system for a small size transit provider ranges from $50,000-$70,000 but several of the technology providers are working to bring the cost down by offering shared platforms.

Figure 29: Transit Technologies/Amenities for Commuter Bus Service



[10] A return on investment of bikes-on-bus programs. By the National Center for Transit Research 2005. http://www.sportworks.com/assets/files/Bike_on_Bus_ROI_Study.pdf

[11] The National Rural Transit Assistant Program (RTAP) has a free GTFS builder application which helps transit providers convert their schedule information into the GTFS format.

Equipment

To implement the service, equipment and materials would need to be purchased. It is assumed that the operator of the service has a facility in the vicinity of the service area and that a new one would not be required. Equipment includes not only buses but also shelters, benches, signage, and vehicle location hardware and software. Medium-duty 25-foot cutaway buses with 18-26 seats may be appropriate for this service. The range of costs for a diesel bus of this nature is $75,000 to $100,000[12]; hybrids are closer to $175,000. Vehicles should be ADA compliant with lift access and equipped with bicycle racks, automatic vehicle location and if possibly have Wi-Fi. These additional amenities cost approximately $50,000. The bus service needs to be able to be marketed to entice commuters to use the bus instead of individual vehicles so that they can use their commute time for non-driving activities.

Figure 30: Example of 25' Cutaway Bus

Many of the stops in the proposed alternatives are already equipped with benches and waiting areas, but at some bus stops they would need to be installed as the service area experiences challenging weather conditions. Shelters and benches cost $5,000-$8,000. Also, signs would be needed to point patrons to Park-and-Ride locations and at bus stops to provide riders with scheduling and other information. Signage would cost $6,000-$8,500.

Funds should also be set aside for the production of schedules, maps, brochures and advertising of the service. The cost of the marketing, advertising, and service description material production varies based on the amount, quality and duration of the various items. An estimated range of cost for the startup of a new transit service in a region of this size for schedules/maps and marketing material would be $8,000-$12,000.

Figure 31: Example of Shelter

Parking Facilities

Park-and-Ride facilities along the corridor would provide access to the commuter bus service for most riders, except those that are able to board in a downtown location. As previously discussed, Park-and-Ride Lots are located at Exits 12 (New London) and 13 (Grantham) on I-89. Exit 12 is over utilized and Exit 13 is underutilized. Based on the input collected during the outreach effort, another Park-and-Ride Lot in Enfield or East Lebanon would be convenient in the future to allow patrons to access the commuter bus service. Currently some carpoolers use space off Exit 16 as an unofficial Park-and-Ride location. It may be possible to develop an official Park-and-Ride Lot off Exit 16 through coordination/partnership with local land owners. US Route 4 comes into I-89 at Exit 17, which may be another possible connection location. Figures 32 and 33 show the current configurations of Exits 16 and 17.

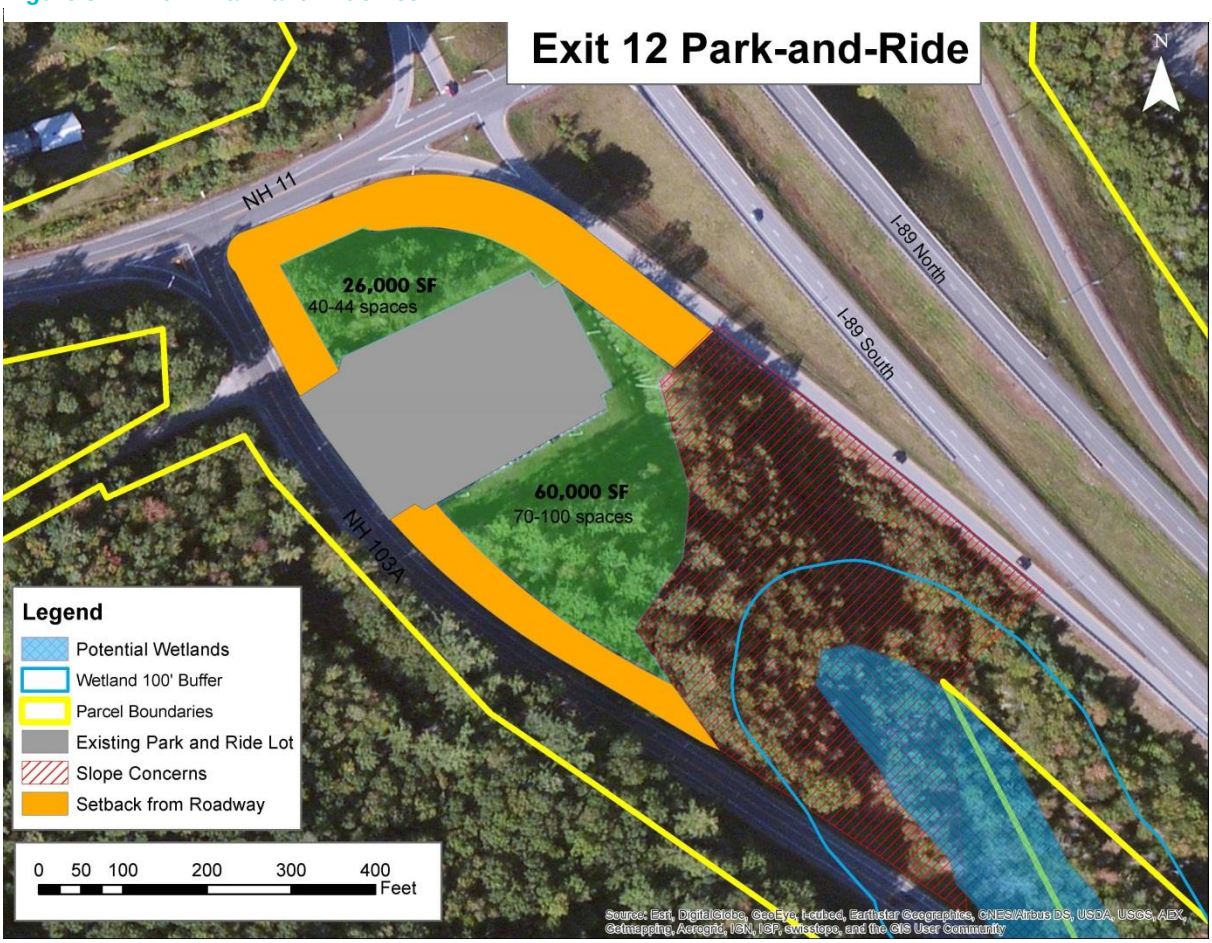
Currently the Exit 12 Park-and-Ride Lot in New London is over capacity during peak periods of travel throughout the year. There is limited capacity for expansion due to wetlands and slope constraints. However, based on a illustrative analysis of the parcel with roadway setbacks, wetland locations and buffers, and slope constraints, it appears that there is approximately 86,000 square feet of land adjacent to the existing lot that could potentially be used for parking. Based on the analysis, the lot could potentially accommodate an additional 110-144 parking spaces (see Figure 34), which is far more than would be needed for any of alternatives developed for this study.

[12] Source: Bus lifecycle cost model for federal land management agencies produced by the John A. Volpe National Transportation Systems Center

Figure 33: Exit 16 Area

Figure 32: Exit 17 Area

Figure 34: Exit 12 Park-and-Ride Lot



Fare Structure

To generate revenue from the service while offering affordable means of transportation, fares could be set up using a flat fee structure, which is simple for patrons to understand and simple to administer. As an example fare structure, the one-way single fares could be $3 with an assortment of multi-duration passes (see Table 18). A fare higher than $3 would discourage ridership as was evident from the survey responses (see Appendix B). Half-price fares should be made available to seniors and those with disabilities. In this example fare structure, the monthly pass is structured in such a way that those who take three or more round trips a week are paying less than $2.50 per trip. In general, passes should be made available for purchase at several locations and online in order to maximize convenience for patrons. This example fare structure was used to estimate projected fare revenue for each alternative.

Table 18: Possible Fare Structure

Cash Fares – Single One-way Trip	
Adult	$3.00
Seniors 65 & Older	$1.50
Individuals with Disability	$1.50
Children under 4	Free
Passes	
10-Ride	$25.00
Monthly – Adult	$60.00
Monthly – Senior or Disabled	$30.00

8.2 Alternative 1

Alternative 1 is oriented towards commuters but provides a mid-day trip for medical and shopping trips. Figure 35 presents a map of the service area; green indicates the core route and red indicates areas with limited service. Detailed routing and stop information in downtown Hanover, Lebanon and New London can be found in Section 2 of this report. On certain trips the route will stop at Hyperthem on Heater Road, travel along Etna/Great Hollow Road, use Exit 17 to serve downtown Lebanon, or continue onto downtown Hanover.

Service would be provided on weekdays only between 5:40 AM - 9:55 AM in the morning peak period and 1:20 PM - 7:00 PM in the afternoon/evening peak period. There would be 11-12 trips daily in each direction. In the morning, seven trips would be provided northbound and 4.5 southbound. In the afternoon there would be five northbound trips and seven southbound trips. Table 19 provides a preliminary schedule for each direction of travel.

Operating Requirements

The cost to operate the service annually is estimated based on the number of revenue hours the service is operated. The estimated operating cost, based on 22.5 revenue hours a day for weekday service only, exclusive of holidays, would be between $463,000 and $587,000 annually. This would include 251 days of service and is based on an average hourly operating cost between $82 and $104[13]. The average annual cost would be $525,000, which equates to $89.04 per trip.

For this alternative, five vehicles would be required during the peak period plus at least one spare. Other required start-up costs include shelters, wayfinding, marketing/advertising, and bike racks. These elements (including vehicles) would have a capital cost of $522,000 to $712,000. Optional capital equipment includes on-board Wi-Fi, power outlets, GTFS, AVL, and mobile fare technology. These elements would have a capital cost of $112,000 to $163,000. The total estimated capital cost for both the required and the optional elements is projected to be $644,000 to $875,000.

[13] The cost per revenue hour range is the peer cost per revenue hour and the average among rural reporters in New England for commuter bus service according to the National Transit Database (NTD).

Figure 35: Alternative 1 Map

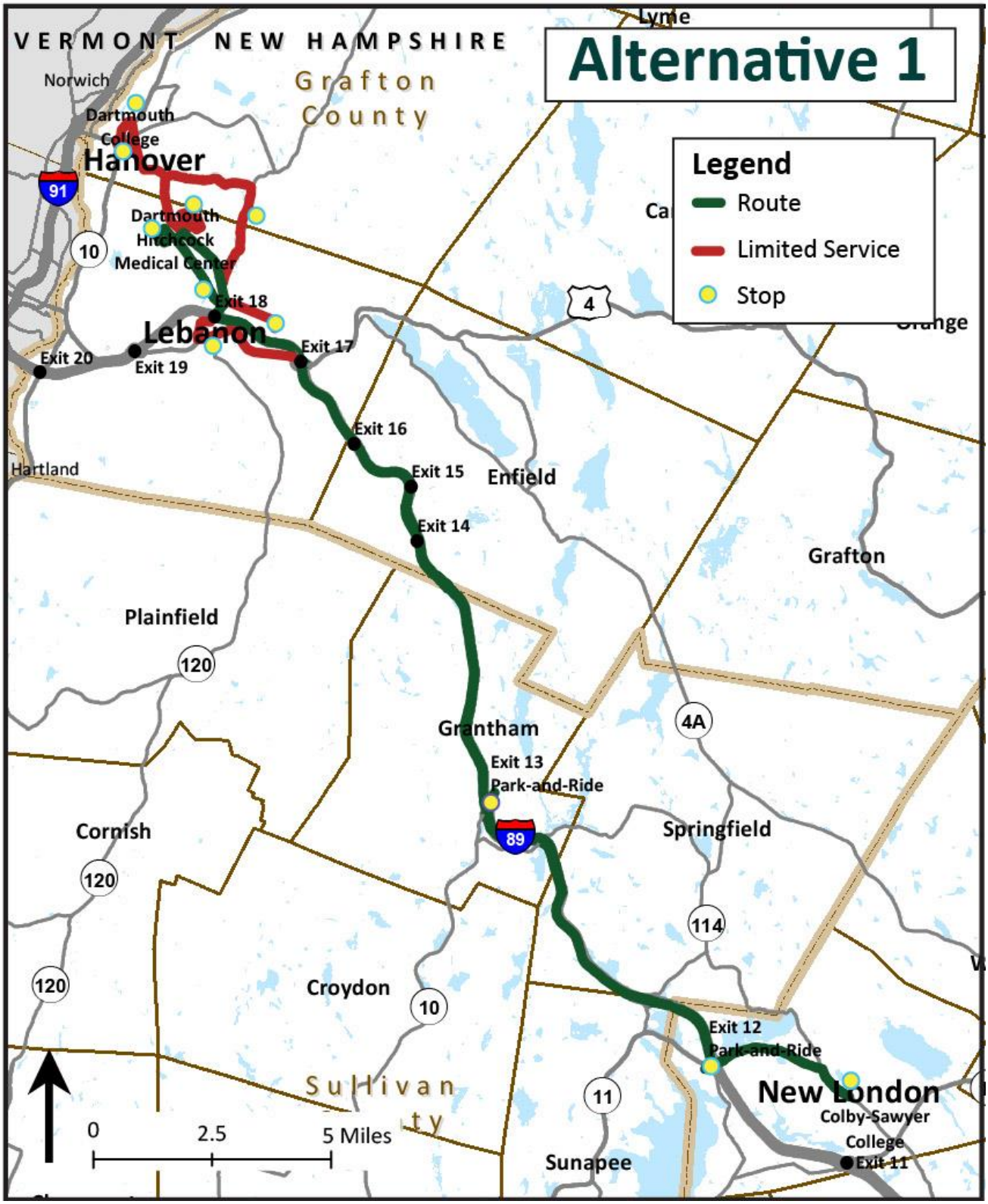


Table 19: Alternative 1 Preliminary Schedule

Northbound - Morning Peak Period

Colby-Sawyer	New London	NLH	Exit 12 PR	Exit 13 PR	Downtown Lebanon	Heater Road	Great Hollow Rd	DHMC	Centerra	Downtown Hanover
5:40 AM	Yes	No	Yes	Yes	No	No	No	6:23 AM (A)	No	No
6:00 AM	Yes	No	Yes	Yes	No	No	No	6:48 AM (A)	On Request	No
6:12 AM	Yes	No	Yes	Yes	No	No	6:55	7:10 AM	Yes	No
7:00 AM	Yes	No	Yes	Yes	No	No	No	7:51 AM (A)	Yes	No
7:15 AM	Yes	No	Yes	Yes	Yes via exit 17	Yes	No	8:10 AM	On Request	No
7:45 AM	Yes	On Request	Yes	Yes	Yes via exit 17	No	No	8:40 AM	On Request	8:55 AM
9:00 AM	Yes	On Request	Yes	Yes	No	No	No	9:45 AM (B)	No	No

Northbound - Afternoon Peak Period

Colby-Sawyer	New London	NLH	Exit 12 PR	Exit 13 PR	Heater Road	Great Hollow Rd	Centerra	DHMC	Centerra	Downtown Hanover	Downtown Lebanon
2:30 PM	Yes	On Request	Yes	Yes	No	Yes	No	3:45 PM (A)	Yes	No	No
4:05 PM	Yes	On Request	No	Yes	No	No	No	4:45 PM	Yes	5:00 PM	No
4:30 PM	Yes	On Request	On Request	Yes	No	No	Yes	5:20 PM	No	5:35 PM	No
5:10 PM	Yes	On Request	On Request	Yes	Yes	No	No	6:00 PM (A)	No	No	No
No	No	No	6:05 PM	Yes	No	No	No	6:45 PM	No	No	7:00 PM

Southbound - Morning Peak Period

Downtown Hanover	DHMC	Centerra	Heater Road	Downtown Lebanon	Exit 13 PR	Exit 12 PR	NLH	New London	Colby Sawyer
No	6:25 AM (C)	No	No	No	No	No	On Request	Yes	7:00 AM
No	6:55 AM (C)	No	No	No	Yes	No	On Request	Yes	7:45 AM
No	7:51 AM (D)	Yes	8:10 AM	---	---	---	---	---	---
No	8:10 AM	On Request	No	No	Yes	On Request	On Request	yes	8:55 AM
8:55	9:05 AM (E)	On Request	On Request	No	Yes	On request	On Request	Yes	9:55 AM

A. Transfers to AT Blue route in both directions
B. Transfer to AT Blue route from Lebanon
C. Transfer from AT Blue Route both directions
D. Transfer from AT Blue Route from Hanover
E. Transfer from AT Blue Route from Lebanon

Southbound - Afternoon Peak Period

Hanover Downtown	Great Hollow	Centerra	DHMC	Heater Road	Downtown Lebanon	Exit 13	Exit 12	NLH	New London	Colby-Sawyer
No	No	1:20 PM	1:30 PM (C)	On request	No	Yes	Yes	On Request	Yes	2:20 PM
No	3:35 PM	No	3:45 PM (D)	No	No	Yes	Yes	On Request	Yes	4:30 PM
No	No	4:04 PM	4:09 PM (C)	No	No	Yes	Yes	On Request	Yes	5:00 PM
4:30 PM	No	Yes	4:45 PM	No	No	Yes	Yes	On Request	Yes	5:35 PM
No	No	5:00 PM	5:05 PM (C)	Yes	Yes	Yes	6:05 PM	No	No	No
5:05 PM	No	Yes	5:20 PM	Yes	No	Yes	Yes	On Request	Yes	6:15 PM
5:35 PM	No	Yes	5:50 PM	Yes	No	Yes	Yes	No	Yes	6:40 PM

Ridership and Performance

Alternative 1 is projected to have between 116 and 173 passenger trips daily with an average of 145[14]. Ridership is expected to be lower during the summer months and higher during the fall and spring semesters due to the cohort of riders represented by Colby-Sawyer nursing students.

Table 20: Alternative 1 Performance Measures

Performance Measures	Alternative 1
Fare Revenue	$118,329
Passengers/ Hour	6.42
Passengers/ One-way Trip	6.15
Cost Efficiency	$11.24
Cost/ Passenger	$14.48
Farebox Recovery Ratio	22%

Transit performance measures serve as a guide to understand how a transit service is projected to perform. In the case of proposed services, they allow for the quantification of demand and determination of financial efficiency that can be compared across several alternatives based on projected ridership. Higher passengers per hour or passengers per one-way trip and lower cost efficiency and cost per passenger numbers indicate better performing alternatives. The performance measures for Alternative 1 are presented in Table 20.

Environmental Impacts

This alternative would result in removing 60 cars daily from I-89 (though they would still be operated locally to access the Park-and-Ride Lot). This correlates to a reduction in Vehicle Miles Traveled (VMT)[15] of approximately 590,000 miles annually.

From a parking perspective, this alternative would remove the need for the following number of parking spaces at each location:

- Colby-Sawyer College: 9
- Downtown Lebanon: 1.5
- DHMC: 41
- Downtown Hanover: 1.5

Pros and Cons

The pros and cons of Alternative 1 are presented in Figure 36.

Figure 36: Alternative 1 Pros and Cons

Pros

- Provides service to all major employers
- Timed to serve major start and end times
- Highest ridership
- Supplements AT service gaps in the evening
- Mid-day service
- Maximizes transfers with the AT Blue Route

Cons

- Most expensive to operate
- Requires the largest amount of capital equipment

[14] Ridership is based off the survey results and the individual's propensity to take transit was calculated based off responses. The calculations were based on an the schedule's ability to meet an individual's work hours and days, travel time, fare levels, and reported level of usage.
[15] Correlated to reduction in greenhouse gases (GHGs).

8.3 Alternative 2

Alternative 2 is similar to Alternative 1 but with four fewer trips daily. Alternative 2 is oriented towards commuters but provides a mid-day trip for medical and shopping trips. Figure 37 presents a map of the service area; green indicates the core route and red indicates areas with limited service. Detailed routing and stop information in downtown Hanover, Lebanon and New London can be found in Section 2 of this report. On certain trips the bus would stop at Hyperthem on Heater Road, travel along Etna/Great Hollow Road, use Exit 17 to serve downtown Lebanon, or continue onto downtown Hanover.

Service would be provided on weekdays only between 5:40 AM - 8:55 AM during the morning peak period and between 1:20 PM - 7:00 PM in the afternoon/evening peak period. There would be 9-10 trips daily in each direction. In the morning, six trips would be provided northbound and 4.5 southbound. In the afternoon, there would be four northbound trips and six southbound trips. Table 21 provides a preliminary schedule for each direction of travel.

Operating Requirements

The cost to operate the service annually is estimated based on the number of revenue hours the service is operated. The estimated operating cost, based on 18.5 revenue hours a day for weekday service only, exclusive of holidays, would be between $381,000 and $483,000 annually. This would include 251 days of service and is based on an hourly operating cost between $82 and $104. The average annual cost would be $432,000 which equates to $88.23 per trip.

For this alternative four vehicles would be required during the peak plus at least one spare. Other required start-up costs include shelters, wayfinding, marketing/advertising, and bike racks. These elements (including vehicles) would have a capital cost of $447,000 to $611,000. Optional capital equipment includes on-board Wi-Fi, power outlets, GTFS, AVL, and mobile fare technology. These elements would have a capital cost of $101,000 to $148,000. The total estimated capital cost for both required and optional elements is projected to be $548,000 to $759,000.

Figure 37: Alternative 2 Map

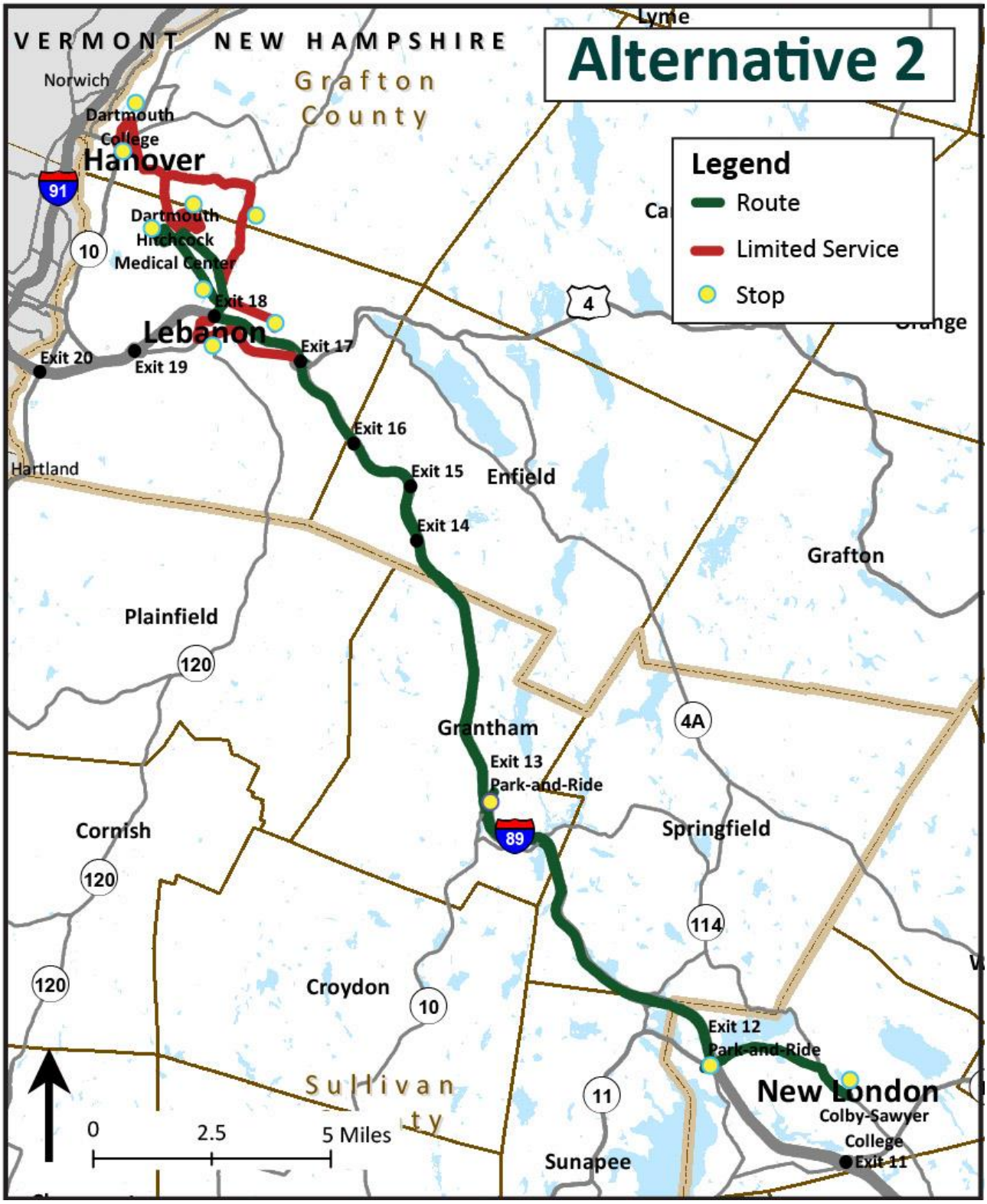


Table 21: Alternative 2 Preliminary Schedules

Northbound - Morning Peak Period

Colby-Sawyer	New London	NLH	Exit 12 PR	Exit 13 PR	Downtown Lebanon	Heater Road	Great Hollow Rd	DHMC	Centerra	Downtown Hanover
5:40 AM	Yes	No	Yes	Yes	No	No	No	6:23 AM (A)	No	No
6:00 AM	Yes	No	Yes	Yes	No	No	No	6:48 AM (A)	On Request	No
6:12 AM	Yes	No	Yes	Yes	No	No	6:55	7:10 AM	Yes	No
7:00 AM	Yes	No	Yes	Yes	No	No	No	7:51 AM (A)	Yes	No
7:15 AM	Yes	No	Yes	Yes	Yes via exit 17	Yes	No	8:10 AM	On Request	No
7:45 AM	Yes	On Request	Yes	Yes	Yes via exit 17	No	No	8:40 AM	On Request	8:55 AM

Northbound - Afternoon Peak Period

Colby-Sawyer	New London	NLH	Exit 12 PR	Exit 13 PR	Heater Road	Great Hollow Rd	Centerra	DHMC	Centerra	Downtown Hanover	Downtown Lebanon
2:30 PM	Yes	On Request	Yes	Yes	No	Yes	No	3:45 PM (A)	Yes	No	No
4:30 PM	Yes	On Request	On Request	Yes	No	No	Yes	5:20 PM	No	5:35 PM	No
5:10 PM	Yes	On Request	On Request	Yes	Yes	No	No	6:00 PM (A)	No	No	No
No	No	No	6:05 PM	Yes	No	No	No	6:45 PM	No	No	7:00 PM

Southbound - Morning Peak Period

Downtown Hanover	DHMC	Centerra	Heater Road	Downtown Lebanon	Exit 13 PR	Exit 12 PR	NLH	New London	Colby Sawyer
No	6:25 AM (C)	No	No	No	No	No	On Request	Yes	7:00 AM
No	6:55 AM (C)	No	No	No	Yes	No	On Request	Yes	7:45 AM
No	7:51 AM (D)	Yes	8:10 AM	---	---	---	---	---	---
No	8:10 AM	On Request	No	No	Yes	On Request	On Request	yes	8:55 AM
8:55	9:05 AM (E)	On Request	On Request	No	Yes	On request	On Request	Yes	9:55 AM

A. Transfers to AT Blue route in both directions
B. Transfer to AT Blue route from Lebanon
C. Transfer from AT Blue Route both directions
D. Transfer from AT Blue Route from Hanover
E. Transfer from AT Blue Route from Lebanon

Southbound - Afternoon Peak Period

Hanover Downtown	Great Hollow	Centerra	DHMC	Heater Road	Downtown Lebanon	Exit 13	Exit 12	NLH	New London	Colby-Sawyer
No	No	1:20 PM	1:30 PM (C)	On request	No	Yes	Yes	On Request	Yes	2:20 PM
No	3:35 PM	No	3:45 PM (D)	No	No	Yes	Yes	On Request	Yes	4:30 PM
No	No	4:04 PM	4:09 PM (C)	No	No	Yes	Yes	On Request	Yes	5:00 PM
4:30 PM	No	Yes	4:45 PM	No	No	Yes	Yes	On Request	Yes	5:35 PM
No	No	5:00 PM	5:05 PM (C)	Yes	Yes	Yes	6:05 PM	No	No	No
5:35 PM	No	Yes	5:50 PM	Yes	No	Yes	Yes	No	Yes	6:40 PM

Ridership and Performance

Alternative 2 is projected to have between 104 and 156 passenger trips daily with an average of 130. Ridership is expected to be lower during the summer months and higher during the fall and spring semesters due to the cohort of riders represented by Colby-Sawyer nursing students.

Table 22: Alternative 2 Performance Measures

Performance Measures	Alternative 2
Fare Revenue	$108,600
Passengers/ Hour	7.03
Passengers/ One-way Trip	6.67
Cost Efficiency	$9.93
Cost/ Passenger	$13.23
Farebox Recovery Ratio	25%

Transit performance measures serve as a guide to understand how a transit service is projected to perform. In the case of proposed services, they allow for the quantification of demand and determination of financial efficiency that can be compared across several alternatives based on projected ridership. Higher passengers per hour or passengers per one-way trip and lower cost efficiency and cost per passenger numbers indicate better performing alternatives. The performance measures for Alternative 2 are presented in Table 22.

Environmental Impacts

This alternative would result in removing 52 cars daily from I-89 (though they would still be operated locally to access the Park-and-Ride Lot). This correlates to a reduction in VMT of approximately 550,000 miles annually.

From a parking perspective, this alternative would remove the need for the following number of parking spaces at each location:

- Colby-Sawyer College: 6.5
- Downtown Lebanon: 1.5
- DHMC: 41
- Downtown Hanover: 1.25

Pros and Cons

The pros and cons of Alternative 2 are presented in Figure 38.

Figure 38: Alternative 2 Pros and Cons

Pros

- Provides service to all major employers
- Timed to serve major start and end times
- Supplements AT service gaps in the evening
- Mid-day service
- Maximizes transfers with the AT Blue Route

Cons

- No trip to/from Colby-Sawyer at popular start time (10 AM) and end time (4 PM)
- Potential crowding at 5:00 PM end time for DHMC and Centerra Parkway employees
- No service from Hanover at the most popular end times (4:30 PM & 5 PM)

8.4 Alternative 3

Alternative 3 is similar to Alternative 1 but with four fewer trips daily and no service along Etna/ Great Hollow Road. Alternative 3 is oriented towards commuters but provides a mid-day trip for medical and shopping trips. Figure 39 presents a map of the service area; green indicates the core route and red indicates areas with limited service. Detailed routing and stop information in downtown Hanover, Lebanon and New London can be found in Section 2 of this report. On certain trips the bus would stop at Hyperthem on Heater Road, use Exit 17 to serve downtown Lebanon, or continue onto downtown Hanover.

Service would be provided on weekdays only between 5:40 AM - 9:55 AM in the morning peak period and between 1:20 PM - 7:00 PM in the afternoon/evening peak period. There would be 9-10 trips daily in each direction. In the morning six trips would be provided northbound and 4.5 southbound. In the afternoon there would be four northbound trips and five southbound. Table 23 provides a preliminary schedule for each direction of travel.

Operating Requirements

The cost to operate the service annually is estimated based on the number of revenue hours the service is operated. The estimated operating cost, based on 18.25 revenue hours a day for weekday service only, exclusive of holidays, would be between $376,000 and $476,000 annually. This would include 251 days of service and is based on an hourly operating cost between $82 and $104[16]. The average annual cost would be $426,000 which equates to $87.04 per trip.

For this alternative three vehicles would be required during the peak plus at least one spare. Other required start-up costs include shelters, wayfinding, marketing/advertising, and bike racks. These elements (including vehicles) would have a capital cost of $371,000 to $511,000. Optional capital equipment includes on-board Wi-Fi, power outlets, GTFS, AVL, and mobile fare technology. These elements would have a capital cost of $91,000 to $132,000. The total estimated capital cost for both required and optional elements is projected to be $462,000 to $643,000.

[16] The cost per revenue hour range is the peer cost per revenue hour and the average among rural reporters in New England for commuter bus service according to the NTD.

Figure 39: Alternative 3 Map

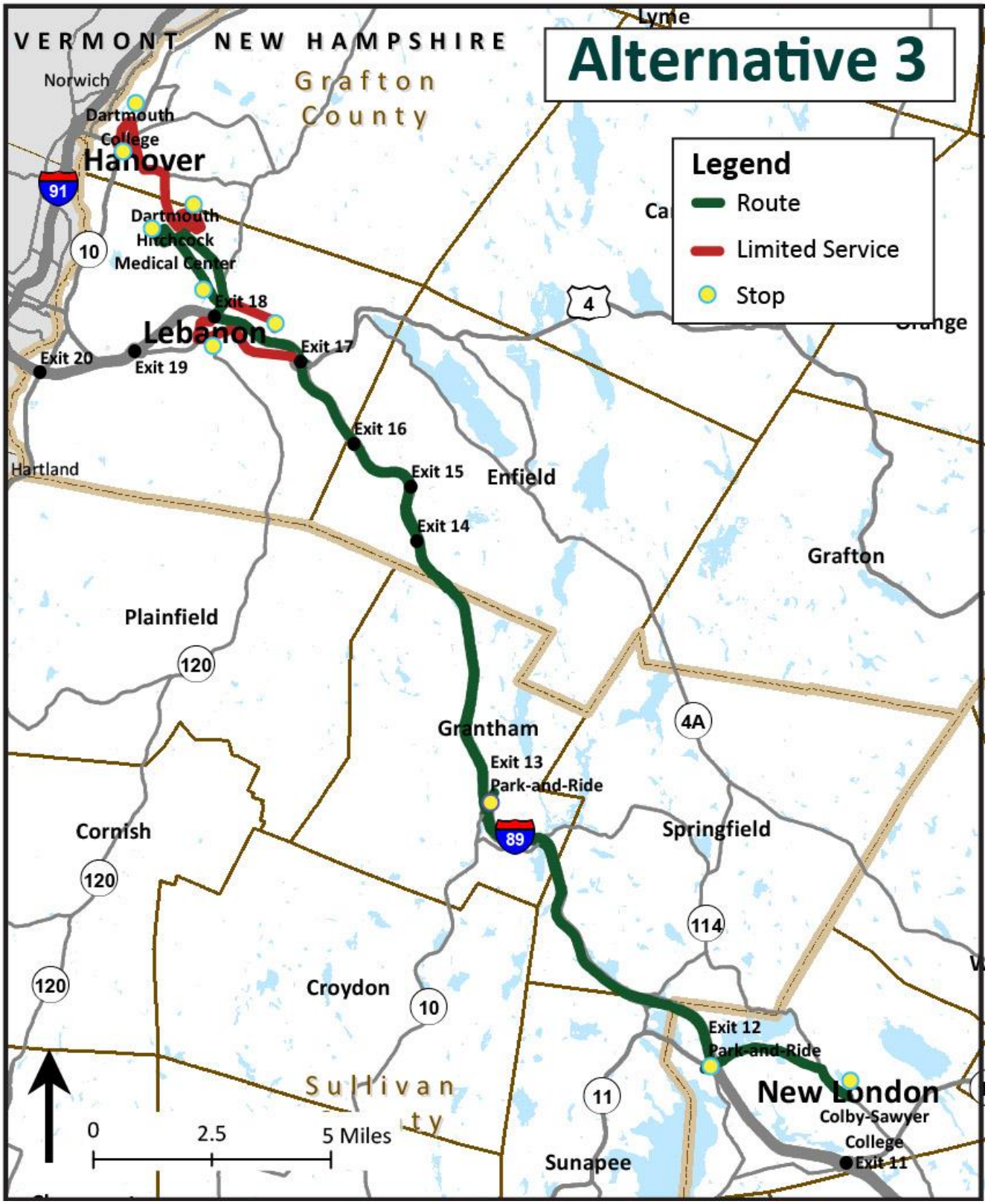


Table 23: Alternative 3 Preliminary Schedules

Northbound - Morning Peak Period

Colby-Sawyer	New London	NLH	Exit 12 PR	Exit 13 PR	Downtown Lebanon	Heater Road	Great Hollow Rd	DHMC	Centerra	Downtown Hanover
5:40 AM	Yes	No	Yes	Yes	No	No	No	6:23 AM (A)	No	No
6:00 AM	Yes	No	Yes	Yes	No	No	No	6:48 AM (A)	On Request	No
7:00 AM	Yes	No	Yes	Yes	No	No	No	7:51 AM (A)	Yes	No
7:15 AM	Yes	No	Yes	Yes	Yes via exit 17	Yes	No	8:10 AM	On Request	No
7:45 AM	Yes	On Request	Yes	Yes	Yes via exit 17	No	No	8:40 AM	On Request	8:55 AM
9:00 AM	Yes	On Request	Yes	Yes	No	No	No	9:45 AM (B)	No	No

Northbound - Afternoon Peak Period

Colby-Sawyer	New London	NLH	Exit 12 PR	Exit 13 PR	Heater Road	Great Hollow Rd	Centerra	DHMC	Centerra	Downtown Hanover	Downtown Lebanon
2:30 PM	Yes	Yes	Yes	Yes	No	No	Yes	3:45 PM (A)	Yes	No	No
4:30 PM	Yes	On Request	On Request	Yes	No	No	Yes	5:20 PM	No	5:35 PM	No
5:10 PM	Yes	On Request	On Request	Yes	Yes	No	No	6:00 PM (A)	No	No	No
No	No	No	6:05 PM	Yes	No	No	No	6:45 PM	No	No	7:00 PM

Southbound - Morning Peak Period

Downtown Hanover	DHMC	Centerra	Heater Road	Downtown Lebanon	Exit 13 PR	Exit 12 PR	NLH	New London	Colby Sawyer
No	6:25 AM (C)	No	No	No	No	No	On Request	Yes	7:00 AM
No	6:55 AM (C)	No	No	No	Yes	No	On Request	Yes	7:45 AM
No	7:51 AM (D)	Yes	8:10 AM	---	---	---	---	---	---
No	8:10 AM	On Request	No	No	Yes	On Request	On Request	yes	8:55 AM
8:55	9:05 AM (E)	On Request	On Request	No	Yes	On request	On Request	Yes	9:55 AM

A. Transfers to AT Blue route in both directions
B. Transfer to AT Blue route from Lebanon
C. Transfer from AT Blue Route both directions
D. Transfer from AT Blue Route from Hanover
E. Transfer from AT Blue Route from Lebanon

Southbound - Afternoon Peak Period

Hanover Downtown	Great Hollow	Centerra	DHMC	Heater Road	Downtown Lebanon	Exit 13	Exit 12	NLH	New London	Colby-Sawyer
No	No	1:20 PM	1:30 PM (C)	On request	No	Yes	Yes	On Request	Yes	2:20 PM
No	No	No	3:45 PM (D)	No	No	Yes	Yes	On Request	Yes	4:30 PM
No	No	4:04 PM	4:09 PM (C)	No	No	Yes	Yes	On Request	Yes	5:00 PM
No	No	5:00 PM	5:05 PM (C)	Yes	Yes	Yes	6:05 PM	No	No	No
5:35 PM	No	Yes	5:50 PM	Yes	No	Yes	Yes	No	Yes	6:40 PM

Ridership and Performance

Alternative 3 would have between 68 and 102 passenger trips daily with an average of 85. Ridership is expected to be lower during the summer months and higher during the fall and spring semesters due to the cohort of riders represented by Colby-Sawyer nursing students.

Table 24: Alternative 3 Performance Measures

Performance Measures	Alternative 3
Fare Revenue	$86,943
Passengers/ Hour	4.66
Passengers/ One-way Trip	4.36
Cost Efficiency	$15.89
Cost/ Passenger	$19.97
Farebox Recovery Ratio	20%

Transit performance measures serve as a guide to understand how a transit service is projected to perform. In the case of proposed services, they allow for the quantification of demand and determination of financial efficiency that can be compared across several alternatives based on projected ridership. Higher passengers per hour or passengers per one-way trip and lower cost efficiency and cost per passenger numbers indicate better performing alternatives. The performance measures for Alternative 3 are presented in Table 24.

Environmental Impacts

This alternative would result in removing 37 cars daily from I-89 (though they would still be operated locally to access the Park-and-Ride Lot). This correlates to a reduction in VMT of approximately 360,000 miles annually.

From a parking perspective, this alternative would remove the need for the following number of parking spaces at each location:

- Colby-Sawyer College: 7
- Downtown Lebanon: 1
- DHMC: 32
- Downtown Hanover: 0.5

Pros and Cons

The pros and cons of Alternative 3 are presented in Figure 40.

Figure 40: Alternative 3 Pros and Cons

Pros

- Provides service to most major employers
- Timed to serve major start and end times
- Supplements AT service gaps in the evening
- Mid-day service
- Maximizes transfers with the AT Blue Route

Cons

- No trip to/from Colby-Sawyer at popular end times (4 PM)
- No service to Great Hollow Road
- Potential crowding at 5:00 PM end time for DHMC and Centerra Parkway employees
- No service from Hanover at the most popular end time (5 PM)
- No service from DHMC at the most popular end time (4:30 PM)

8.5 Alternative 4

Alternative 4 similar to Alternative 3 but with six fewer trips daily, no service along Etna/ Great Hollow Road, and no mid-day service. Figure 41 presents a map of the service area; green indicates the core route and red indicates areas with limited service. Detailed routing and stop information in downtown Hanover, Lebanon and New London can be found in Section 2 of this report. On certain trips the route would stop at Hyperthem on Heater Road, use Exit 17 to serve downtown Lebanon, or continue onto downtown Hanover.

Service would be provided on weekdays only between 5:40 AM - 9:45 AM during the morning peak period and between 3:00 PM - 6:40 PM in the evening peak period. There would be 6-7 trips daily in each direction. In the morning four trips would be provided northbound and 2.5 southbound. In the afternoon there would be three northbound trips and four southbound trips. Table 25 provides a preliminary schedule for each direction of travel.

Operating Requirements

The cost to operate the service annually is estimated based on the number of revenue hours the service is operated. The estimated operating cost, based on 13 revenue hours a day for weekday service only, exclusive of holidays, would be between $266,000 and $339,000 annually. This would include 251 days of service and is based on an hourly operating cost between $82 and $104[17]. The average annual cost would be $303,000 which equates to $89.56 per trip.

For this alternative, three vehicles would be required during the peak period plus at least one spare. Other required start-up costs include shelters, wayfinding, marketing/advertising, and bike racks. These elements (including vehicles) would have a capital cost of $371,000 to $511,000. Optional capital equipment includes on-board Wi-Fi, power outlets, GTFS, AVL, and mobile fare technology. These elements would have a capital cost of $91,000 to $132,000. The total estimated capital cost for both required and optional elements is projected to be $462,000 to $643,000.

[17] The cost per revenue hour range is the peer cost per revenue hour and the average among rural reporters in New England for commuter bus service according to the NTD.

Figure 41: Alternative 4 Map

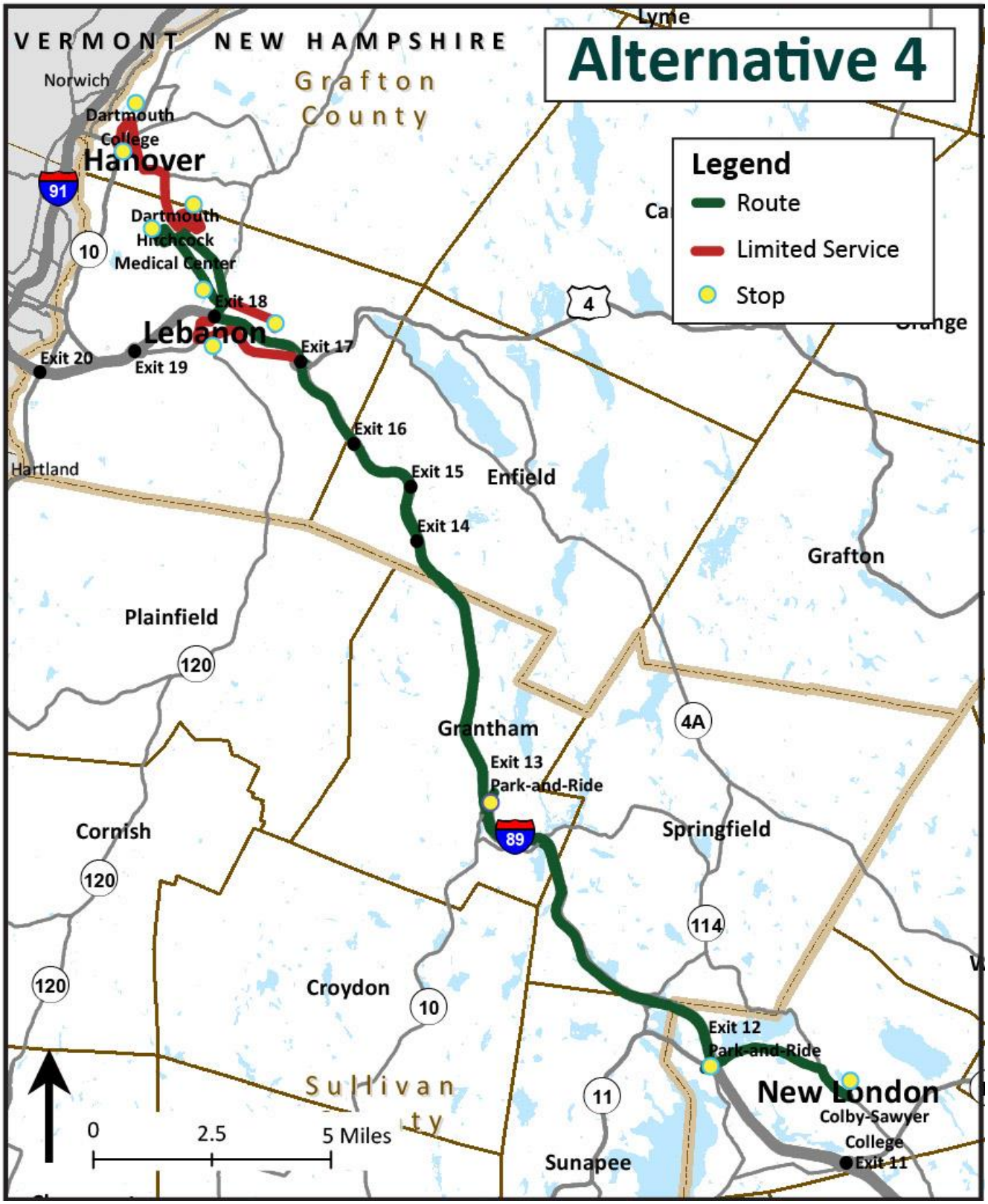


Table 25: Alternative 4 Preliminary Schedules

Northbound - Morning Peak Period

Colby-Sawyer	New London	NLH	Exit 12 PR	Exit 13 PR	Downtown Lebanon	Heater Road	Great Hollow Rd	DHMC	Centerra	Downtown Hanover
5:40 AM	Yes	No	Yes	Yes	No	No	No	6:23 AM (A)	No	No
6:00 AM	Yes	No	Yes	Yes	No	No	No	6:48 AM (A)	On Request	No
7:00 AM	Yes	No	Yes	Yes	No	No	No	7:51 AM (A)	Yes	No
7:45 AM	Yes	On Request	Yes	Yes	Yes via exit 17	No	No	8:40 AM	On Request	8:55 AM

Northbound - Afternoon Peak Period

Colby-Sawyer	New London	NLH	Exit 12 PR	Exit 13 PR	Heater Road	Great Hollow Rd	Centerra	DHMC	Centerra	Downtown Hanover	Downtown Lebanon
3:00 PM	Yes	On Request	Yes	Yes	No	No	No	3:45 PM (A)	Yes	No	No
4:30 PM	Yes	On Request	On Request	Yes	No	No	Yes	5:20 PM	No	5:35 PM	No
5:10 PM	Yes	On Request	On Request	Yes	Yes	No	No	6:00 PM (A)	No	No	No

Southbound - Morning Peak Period

Downtown Hanover	DHMC	Centerra	Heater Road	Downtown Lebanon	Exit 13 PR	Exit 12 PR	NLH	New London	Colby Sawyer
No	6:25 AM (C)	No	No	No	No	No	On Request	Yes	7:00 AM
No	6:55 AM (C)	No	No	No	Yes	No	On Request	Yes	7:45 AM
No	7:51 AM (D)	Yes	8:10 AM	---	---	---	---	---	---

A. Transfers to AT Blue route in both directions
B. Transfer to AT Blue route from Lebanon
C. Transfer from AT Blue Route both directions
D. Transfer from AT Blue Route from Hanover
E. Transfer from AT Blue Route from Lebanon

Southbound - Afternoon Peak Period

Hanover Downtown	Great Hollow	Centerra	DHMC	Heater Road	Downtown Lebanon	Exit 13	Exit 12	NLH	New London	Colby-Sawyer
No	No	No	3:45 PM (D)	No	No	Yes	Yes	On Request	Yes	4:30 PM
No	No	4:04 PM	4:09 PM (C)	No	No	Yes	Yes	On Request	Yes	5:00 PM
No	No	5:00 PM	5:05 PM (C)	Yes	Yes	Yes	6:05 PM	No	No	No
5:35 PM	No	Yes	5:50 PM	Yes	No	Yes	Yes	No	Yes	6:40 PM

Ridership and Performance

Alternative 4 would have between 56 and 84 passenger trips daily with an average of 70. Ridership is expected to be lower during the summer months and higher during the fall and spring semesters due to the cohort of riders represented by Colby-Sawyer nursing students.

Table 26: Alternative 4 Performance Measures

Performance Measures	Alternative 4
Fare Revenue	$70,091
Passengers/ Hour	5.38
Passengers/ One-way Trip	5.19
Cost Efficiency	$13.28
Cost/ Passenger	$17.27
Farebox Recovery Ratio	23%

Transit performance measures serve as a guide to understand how a transit service is projected to perform. In the case of proposed services, they allow for the quantification of demand and determination of financial efficiency that can be compared across several alternatives based on projected ridership. Higher passengers per hour or passengers per one-way trip and lower cost efficiency and cost per passenger numbers indicate better performing alternatives. The performance measures for Alternative 4 are presented in Table 26.

Environmental Impacts

This alternative would result in removing 30 cars daily from I-89 (though they would still be operated locally to access the Park-and-Ride Lot). This correlates to a reduction in VMT of approximately 290,000 miles annually.

From a parking perspective, this alternative would remove the need for the following number of parking spaces at each location:

- Colby-Sawyer College: 0
- Downtown Lebanon: 0
- DHMC: 28
- Downtown Hanover: 0

Pros and Cons

The pros and cons of Alternative 4 are presented in Figure 42.

Figure 42: Alternative 4 Pros and Cons

Pros

- Provides service to most major employers
- Timed to serve major start and end times
- Maximizes transfers with the AT Blue Route

Cons

- No service to Great Hollow Road
- No morning service to Heater Road for the most popular start time (8 AM)
- No trip to/from Colby-Sawyer at popular start time (9 AM) and end time (4 PM)
- Potential crowding at 5:00 PM end time for DHMC and Centerra Parkway employees
- No service from Hanover at the most popular end time (5pm)
- No service along Hanover Street/Downtown Lebanon at 8 AM when 42% survey respondents start work
- No service from DHMC at the most popular end time (4:30 PM)
- No mid-day service
- No service for 7 PM nursing shifts
- Does not supplement AT service gaps in the evening

8.6 Alternative 5

Alternative 5 is similar to Alternative 4 but with three fewer trips daily. There is no service along Etna/ Great Hollow Road and no mid-day service. Figure 43 presents a map of the service area; green indicates the core route and red indicates areas with limited service. Detailed routing and stop information in downtown Hanover, Lebanon and New London can be found in Section 2 of this report. On certain trips the bus would stop at Hyperthem on Heater Road, use Exit 17 to serve downtown Lebanon, or continue on to downtown Hanover.

Service would be provided on weekdays only between 5:40 AM - 9:45 AM in the morning peak period and between 3:45 PM - 7:00 PM in the evening peak period. There would be 5-6 trips daily in each direction. In the morning four trips would be provided northbound and two southbound. In the afternoon there would be two northbound trips and three southbound trips. Table 27 provides a preliminary schedule for Alternative 5.

Operating Requirements

The cost to operate the service annually is estimated based on the number of revenue hours the service is operated. The estimated operating cost, based on 10.25 revenue hours a day for weekday service only, exclusive of holidays, would be between $211,000 and $268,000 annually. This would include 251 days of service and is based on an hourly operating cost between $82 and $104[18]. The average annual cost would be $239,000, which equates to $86.66 per trip.

For this alternative, two vehicles would be required during the peak plus at least one spare. Other required start-up costs include shelters, wayfinding, marketing/advertising, and bike racks. These elements (including vehicles) would have a capital cost of $296,000 to $410,000. Optional capital equipment includes on-board Wi-Fi, power outlets, GTFS, AVL, and mobile fare technology. These elements would have a capital cost of $81,000 to $117,000. The total estimated capital cost for both required and optional elements is projected to be $377,000 to $527,000.

[18] The cost per revenue hour range is the peer cost per revenue hour and the average among rural reporters in New England for commuter bus service according to the NTD.

Figure 43: Alternative 5 Map

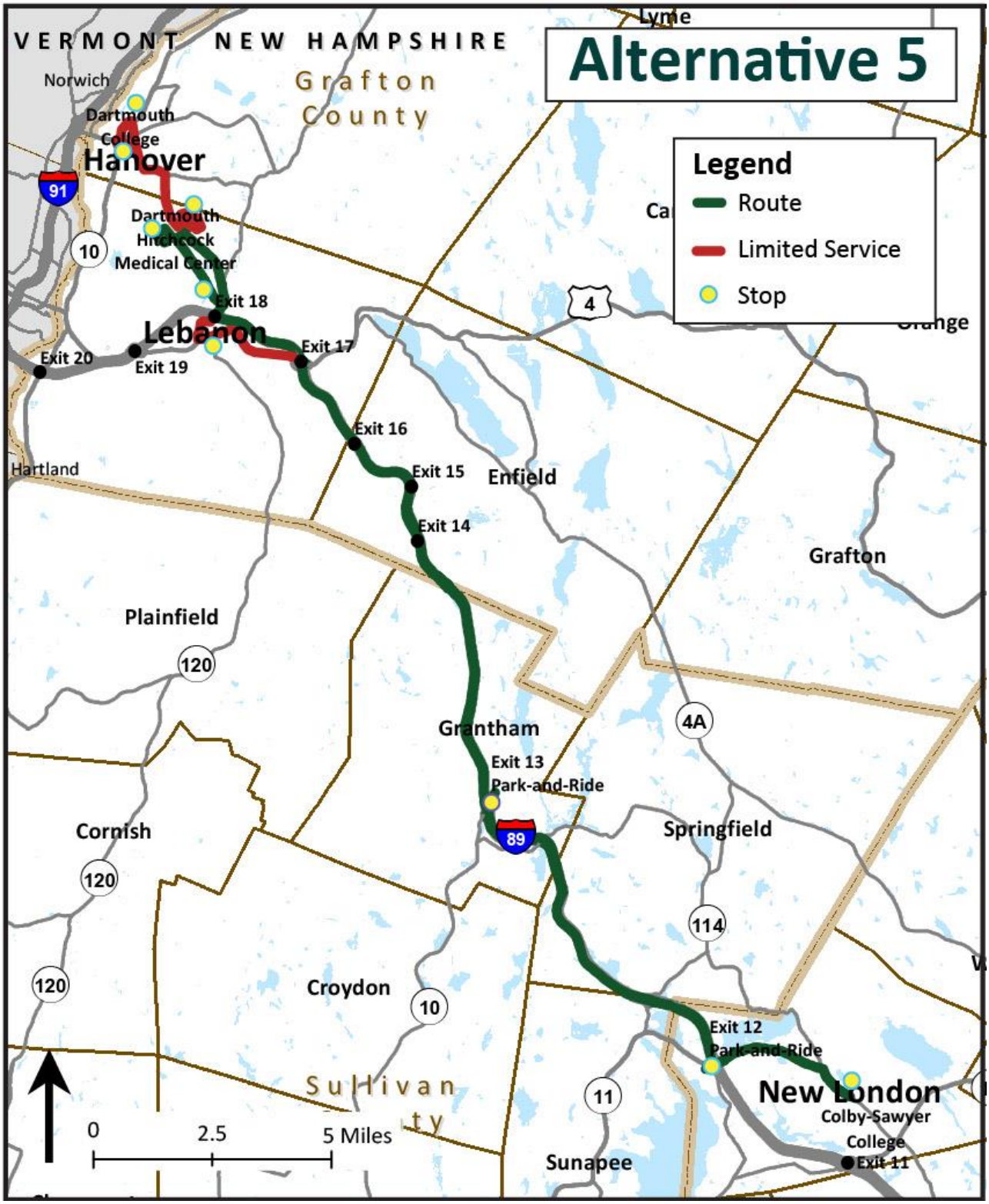


Table 27: Alternative 5 Preliminary Schedules

Northbound - Morning Peak Period

Colby-Sawyer	New London	NLH	Exit 12 PR	Exit 13 PR	Downtown Lebanon	Heater Road	Great Hollow Rd	DHMC	Centerra	Downtown Hanover
5:40 AM	Yes	No	Yes	Yes	No	No	No	6:23 AM (A)	No	No
6:00 AM	Yes	No	Yes	Yes	No	No	No	6:48 AM (A)	On Request	No
7:00 AM	Yes	No	Yes	Yes	No	No	No	7:51 AM (A)	Yes	No
7:45 AM	Yes	On Request	Yes	Yes	Yes via exit 17	No	No	8:40 AM	On Request	8:55 AM

Northbound - Afternoon Peak Period

Colby-Sawyer	New London	NLH	Exit 12 PR	Exit 13 PR	Heater Road	Great Hollow Rd	Centerra	DHMC	Centerra	Downtown Hanover	Downtown Lebanon
4:30 PM	Yes	On Request	On Request	Yes	No	No	Yes	5:20 PM	No	5:35 PM	No
No	No	No	6:05 PM	Yes	No	No	No	6:45 PM	No	No	7:00 PM

Southbound - Morning Peak Period

Downtown Hanover	DHMC	Centerra	Heater Road	Downtown Lebanon	Exit 13 PR	Exit 12 PR	NLH	New London	Colby-Sawyer
No	6:25 AM (C)	No	No	No	No	No	On Request	Yes	7:00 AM
No	6:55 AM (C)	No	No	No	Yes	No	On Request	Yes	7:45 AM

A. Transfers to AT Blue route in both directions
B. Transfer to AT Blue route from Lebanon
C. Transfer from AT Blue Route both directions
D. Transfer from AT Blue Route from Hanover
E. Transfer from AT Blue Route from Lebanon

Southbound - Afternoon Peak Period

Hanover Downtown	Great Hollow	Centerra	DHMC	Heater Road	Downtown Lebanon	Exit 13	Exit 12	NLH	New London	Colby-Sawyer
No	No	No	3:45 PM (D)	No	No	Yes	Yes	On Request	Yes	4:30 PM
No	No	5:00 PM	5:05 PM (C)	No	Yes	Yes	6:05 PM	No	No	No
5:35 PM	No	Yes	5:50 PM	No	No	Yes	Yes	No	Yes	6:40 PM

Ridership and Performance

Alternative 5 will have between 44 and 66 passenger trips daily with an average of 55. Ridership is expected to be lower during the summer months and higher during the fall and spring semesters due to the cohort of riders represented by Colby-Sawyer nursing students.

Table 28: Alternative 5 Performance Measures

Performance Measures	Alternative 5
Fare Revenue	$62,662
Passengers/ Hour	5.37
Passengers/ One-way Trip	5.00
Cost Efficiency	$12.79
Cost/ Passenger	$17.33
Farebox Recovery Ratio	26%

Transit performance measures serve as a guide to understand how a transit service is projected to perform. In the case of proposed services, they allow for the quantification of demand and determination of financial efficiency that can be compared across several alternatives based on projected ridership. Higher passengers per hour or passengers per one-way trip and lower cost efficiency and cost per passenger numbers indicate better performing alternatives. The performance measures for Alternative 5 are presented in Table 28.

Environmental Impacts

This alternative would result in removing 23 cars daily from I-89 (though they would still be operated locally to access the Park-and-Ride Lot). This correlates to a reduction in VMT of approximately 220,000 miles annually.

From a parking perspective, this alternative would remove the need for the following number of parking spaces at each location:

- Colby-Sawyer College: 0
- Downtown Lebanon: 0
- DHMC: 25
- Downtown Hanover: 0

Pros and Cons

The pros and cons of Alternative 5 are presented in Figure 44.

Figure 44: Alternative 5 Pros and Cons

Pros

- Provides service to most major employers
- Timed to serve major start and end times
- Maximizes transfers with the AT Blue Route
- Supplements a few AT service gaps
- Provides service for 7 PM nursing shifts
- Least expensive

Cons

- No service to Great Hollow Road
- No service to Heater Road east of Rt 120
- No trip to/from Colby-Sawyer at popular start time (9 AM) and end times (4 PM, 5 PM)
- Potential crowding at 5:00 PM end time for DHMC and Centerra Parkway employees
- No service from Hanover at the most popular end time (5 PM)
- No service along Hanover Street/Downtown Lebanon at 8 AM when 42% of survey respondents start work
- No service from DHMC at popular end times (4 PM, 4:30 PM)
- No mid-day service

8.7 Alternatives Evaluation

For direct comparison purposes, Table 29 summarizes the main service characteristics of each alternative. In order to evaluate the alternatives, potential performance measures were developed based on the proposed operating characteristics; each were described in the previous sections on individual alternatives and are summarized in Figure 45. Based on the color coding in Figure 43, the green shaded measures for each alternative are the best performers and the red shaded measures are the worst performers across all five alternatives. Based on the performance measures used for this study, Alternative 2 is projected to perform better than Alternative 1 even though Alternative 1 provides a higher level of service. Alternative 5, even though it has the smallest level of service, is a better performer than the Alternatives with higher levels of service in some measures. Alternative 3 is the worst performer. Table 30 summarizes the pros and cons of each alternative.

Table 29: Alternatives Quantitative Comparison

ALT	Span of Service	# Daily Trips	Daily Revenue Hours of Service	Annual Average Operating Cost	Peak Vehicles Required	Capital Cost Range (Required – Optional)	Projected Average Daily Ridership	Projected Fare Revenue
1	5:40 – 9:55 AM 1:20 – 7:00 PM	23.5	22.5	$525,000	5	$522,000-$875,000	145	$118,329
2	5:40 – 8:55 AM 1:20 – 7:00 PM	19.5	18.5	$432,000	4	$447,000-$759,000	130	$108,600
3	5:40 – 9:55 AM 1:20 – 7:00 PM	19.5	18.25	$426,000	3	$371,000-$643,000	85	$86,943
4	5:40 – 9:45 AM 3:00 – 6:40 PM	13.5	13	$303,000	3	$371,000-$643,000	70	$70,091
5	5:40 – 9:45 AM 3:45 – 7:00 PM	11	10.25	$239,000	2	$296,000-$527,000	55	$62,662

Figure 45: Alternative Evaluation – Performance Measures

	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Operating Cost	$525k	$432k	$426k	$303k	$239k
Capital Cost	$754k	$653k	$552k	$552k	$451k
Daily Ridership	145	130	85	70	55
Annual Ridership	36,270	32,630	21,335	17,570	13,805
Cost per Trip	$89.04	$88.23	$87.04	$89.56	$86.66
Passengers/Hour	6.42	7.03	4.66	5.38	5.37
Passengers/ Trip	6.15	6.67	4.36	5.19	5.00
Cost Efficiency	$11.22	$9.91	$15.89	$13.28	$12.79
Cost/Passenger	$14.48	$13.23	$19.97	$17.27	$17.33
Farebox Recovery	22.5%	25.1%	20.4%	23.1%	26.2%

Best Performer — Worst Performer

Table 30: Alternatives Qualitative Comparison

ALT	Pros	Cons
1	• Provides service to all major employers • Highest ridership • Supplements AT service gaps in the evening • Mid-day service • Timed to serve major start and end times • Maximizes transfers with the AT Blue Route	• Most expensive to operate • Requires the largest amount of capital equipment
2	• Provides service to most major employers • Supplements AT service gaps in the evening • Mid-day service • Timed to serve major start and end times • Maximizes transfers with the AT Blue Route	• No trip to/from Colby-Sawyer at popular start time (10 AM) and end time (4 PM) • Potential crowding at 5:00 PM end time for DHMC and Centerra Parkway employees • No service from Hanover at the most popular end times (4:30 PM & 5 PM)
3	• Provides service to most major employers • Supplements AT service gaps in the evening • Mid-day service • Timed to serve major start and end times • Maximizes transfers with the AT Blue Route	• No trip to/from Colby-Sawyer at popular end times (4 PM) • No service to Great Hollow Road • Potential crowding at 5:00 PM end time for DHMC and Centerra Parkway employees • No service from Hanover at the most popular end time (5 PM) • No service from DHMC at the most popular end time (4:30 PM)
4	• Provides service to most major employers • Timed to serve major start and end times • Maximizes transfers with the AT Blue Route	• No service to Great Hollow Road • No morning service to Heater Road for the most popular start time (8 AM) • No trip to/from Colby-Sawyer at popular start time (9 AM) and end time (4 PM) • Potential crowding at 5:00 PM end time for DHMC and Centerra Parkway employees • No service from Hanover at the most popular end time (5pm) • No service along Hanover Street/Downtown Lebanon at 8 AM when 42% survey respondents start work • No service from DHMC at the most popular end time (4:30 PM) • No mid-day service • No service for 7 PM nursing shifts • Does not supplement AT service gaps in the evening
5	• Provides service to most major employers • Supplements a few AT service gaps • Provides service for 7 PM nursing shifts • Timed to serve major start and end times • Maximizes transfers with the AT Blue Route • Least expensive	• No service to Great Hollow Road • No service to Heater Road east of Rt 120 • No trip to/from Colby-Sawyer at popular start time (9 AM) and end times (4 PM, 5 PM) • Potential crowding at 5:00 PM end time for DHMC and Centerra Parkway employees • No service from Hanover at the most popular end time (5 PM) • No service along Hanover Street/Downtown Lebanon at 8 AM when 42% of survey respondents start work • No service from DHMC at popular end times (4 PM, 4:30 PM) • No mid-day service

9. Preferred Alternative

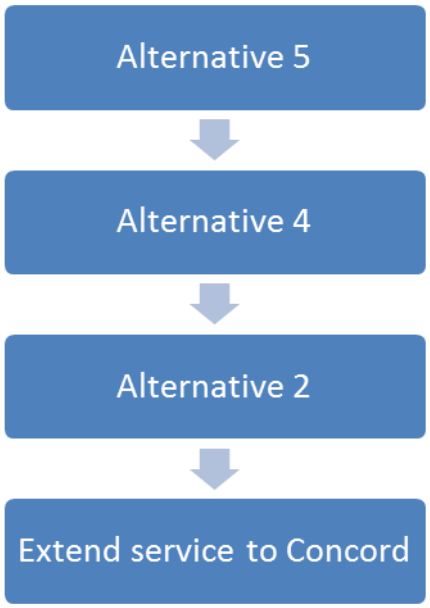
9.1 Selection of a Preferred Alternative

The Project Advisory Group met on February 8, 2017 to discuss the alternatives and choose a preferred alternative to move forward. After discussing the pros and cons of each alternative, with a particular focus on performance measures, public input, destinations served, and cost (both operating and capital), Alternative 2 was chosen as the preferred alternative. This is considered to be the ideal level of service for the corridor based on the information collected, both qualitative and quantitative, and analyzed for this study. However, the projected operating and capital costs associated with Alternative 2 were considered too high given the current funding climate in New Hampshire, so the team discussed the idea of starting with a core level of service to show 'proof of concept' and building to the preferred alternative as the service is implemented and shows success and growth. To that end, the idea of a phased implementation was discussed and Alternative 5, representing the core level of service, was determined to be the best place to start an implementation plan for service in the I-89 corridor.

9.2 Potential Phasing of Implementation

In order to get to a preferred alternative (ideal) level of service, sometimes a phased approach to implementation may be appropriate. A phasing plan is presented in Figure 46 where a core level of service (represented by Alternative 5 here) is implemented first and service is added and expanded as awareness of the service and ridership grows until the ideal level of service is reached (represented here by Alternative 2). Additionally, although not explicitly part of this study, there were many requests throughout the outreach process to also implement service between the study corridor and Concord. In this phased scenario, select trips could be added to Concord as an expansion on the Preferred Alternative as funding and demand permit.

Figure 46: Possible Phased Approach to Service Implementation



9.3 Operating and Capital Plans for Core Service

An operational description and capital requirements and options for the core service as well as a description of phased implementation are presented in this section.

Operating Plan

A map of the core service is provided in Figure 43. Service would be provided on weekdays only between 5:40 AM - 9:45 AM in the morning peak period and between 3:45 PM - 7:00 PM in the evening peak period using 2 vehicles. There would be 5-6 trips daily in each direction. In the morning four trips would be provided northbound and two southbound. In the afternoon there would be two northbound trips and three southbound trips. A detailed schedule for the core service is presented in Table 31 and Table 32.

The estimated operating cost, based on 10.25 revenue hours a day for weekday service only, exclusive of holidays, would be between $211,000 and $268,000 annually. This would include 251 days of service and is based on an hourly operating cost between $82 and $104[19]. The average annual cost would be $239,000, which equates to $86.66 per trip.

Because the service would only be operated during peak commuting periods with no mid-day trip in the core service scenario, ridership may not be as robust as the alternatives with higher levels of service. A guaranteed ride home program like others already offered in the study area would alleviate some potential rider concerns and help build ridership.

Capital Requirements

For the core service, two vehicles would be required during the peak plus at least one spare. Other required start-up costs include shelters, wayfinding, marketing/advertising, and bike racks. These elements (including vehicles) would have a capital cost of $296,000 to $410,000. The Exit 12 Park-and Ride Lot is currently over capacity during peak travel periods, so additional spaces would be needed in New London to accommodate the increased demand for Park-and-Ride spaces created by the I-89 commuter transit service[20].

Optional capital equipment includes on-board Wi-Fi, power outlets, GTFS, AVL, and mobile fare technology. These elements would have a capital cost of $81,000 to $117,000. The total estimated capital cost for both required and optional elements is projected to be $377,000 to $527,000.

Phased Implementation

As the service is implemented, awareness builds, demand for additional service is demonstrated, and funding sources are identified, service could be expanded as follows:

- Add 3 peak trips and service to Heater Road (Alternative 4)
- Add 4 peak trips, a mid-day trip in each direction, and service to Great Hollow Road (Preferred Alternative)
- Extend select trips to Concord

[19] The cost per revenue hour range is the peer cost per revenue hour and the average among rural reporters in New England for commuter bus service according to the NTD.
[20] Once identified or constructed, the lot/spaces would need to be maintained, which would be another annual operating expense.

Table 31: Core Service Morning Peak Schedule

Northbound - Morning Peak Period

Colby Sawyer	Tracy Library	NLH	Exit 12 PR	Exit 13 PR	Downtown Lebanon	Heater Road	Great Hollow Rd	DHMC	Centerra	The Hop
5:40 AM	5:44 AM	---	5:52 AM	6:02 AM	---	---	---	6:23 AM (A)	---	---
6:00 AM	6:04 AM	---	6:12 AM	6:22 AM	---	---	---	6:48 AM (A)	6:54 AM	---
7:00 AM	7:04 AM	---	7:12 AM	7:22 AM	---	---	---	7:51 AM (A)	7:57 AM	---
7:45 AM	7:49 AM	On Request	7:58 AM	8:08 AM	8:26 AM	---	---	8:40 AM	8:46 AM	8:58 AM

Southbound - Morning Peak Period

The Hop	DHMC	Centerra	Heater Road	Downtown Lebanon	Exit 13 PR	Exit 12 PR	NLH	Tracy Library	Colby Sawyer
---	6:25 AM (C)	---	---	---	---	---	On Request	6:57 AM	7:00 AM
---	6:58 AM (C)	---	---	---	7:22 AM	---	On Request	7:39 AM	7:42 AM

Table 32: Core Service Afternoon Peak Schedule

Northbound - Afternoon Peak Period

Colby Sawyer	Tracy Library	NLH	Exit 12 PR	Exit 13 PR	Heater Road	Great Hollow Rd	Centerra	DHMC	Centerra	The Hop	Downtown Lebanon
4:30 PM	4:34 PM	On Request	On Request	4:52 PM	---	---	5:16 PM	5:20 PM	---	5:35 PM	---
---	---	---	6:05 PM	6:15 PM	---	---	---	6:45 PM	---	---	7:00 PM

Southbound - Afternoon Peak Period

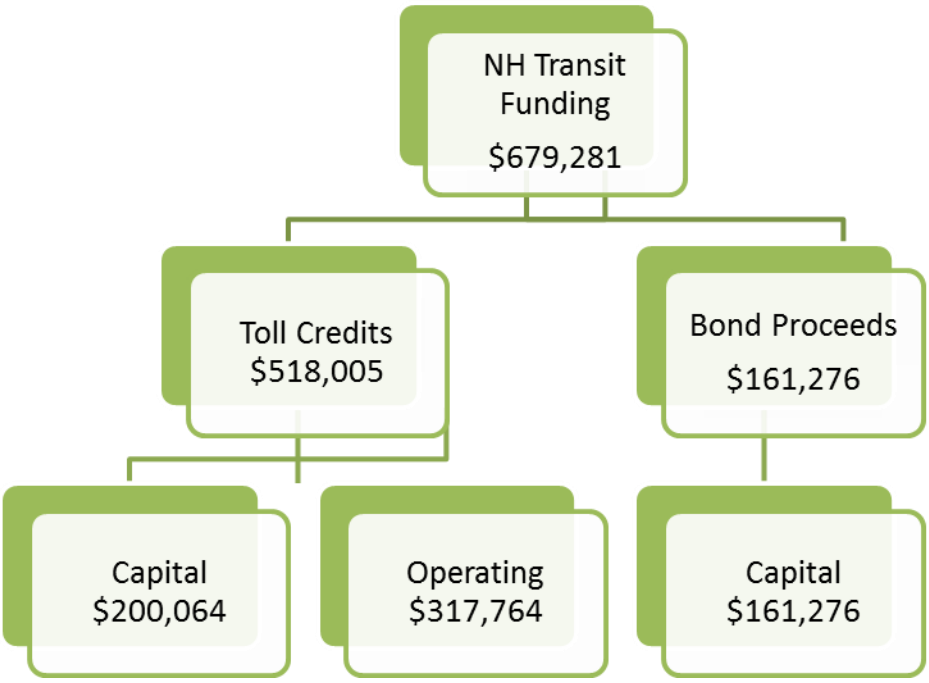
The Hop	Great Hollow	Centerra	DHMC	Heater Road	Downtown Lebanon	Exit 13	exit 12	NLH	Tracy Library	Colby Sawyer
---	3:35 PM	---	3:45 PM (D)	---	---	4:09 PM	4:19 PM	On Request	4:27 PM	4:30 PM
---	---	5:00 PM	5:05 PM (C)	5:15 PM	5:25 PM	5:45 PM	5:55 PM	---	---	---
5:35 PM	---	5:47 PM	5:51 PM	6:01 PM	---	6:19 PM	6:29 PM	On Request	6:37 PM	6:40 PM

10. Funding Strategies

10.1 Funding Overview

Transportation funding in New Hampshire comes from tolls, gas taxes, vehicle fees, court fines, the general fund, and general revenue bonds. State funding for transit in New Hampshire comes from Transportation Development Credits (Toll Credits) and bond proceeds. Funding in FY 2014 was $679,281 for New Hampshire with 23.7% spent on the state capital match for bus procurements, 29.4% spent on other capital expenditures and the remaining 53.1% on operations (Figure 47). New Hampshire has the third lowest funding for transit amongst the states and DC (not including the five states which do not fund transit). Per capita funding is $0.51, the lowest in New England and the fifth lowest nationally for states which support transit.

Figure 47: New Hampshire State Funding for Transit in FY2014



Source of data: Survey of State Funding – Public Transportation, American Association of State Highway and Transportation Officials, 2016

Each state funds (or does not fund) transit services differently. State legislation is the primary driver in determining how local funds can be generated to support transit service provision. Historically funds generated locally were primarily generated in order to provide local match to receive federal funds. However, in recent years as federal and state transit funds have been reduced, funds are being generated locally to support new/expanded services in addition to fulfilling local match requirements. A national review of innovative funding options was conducted as part of this study. Many of these methods would require state legislative change in New Hampshire in order for them to be adopted, but they are not out of the realm of possibility. Therefore, innovative funding options used across the country are described in this section, divided into the following categories: federal programs, fees, taxes, partnerships and special districts.

10.2 Federal Funding Options

The Federal Transit Authority (FTA) has a variety of programs used to fund public transportation (see Table 33 for a summary of the programs with relevance to commuter transit service in the I-89 corridor). In December 2015 the Fixing America's Surface Transportation (FAST) Act[21,22] was signed into law. The Act supports transit funding through 2020. It reauthorizes FTA programs and includes changes/improvements for mobility, capital projects, and safety. The Act includes a predictable five-year formula funding program so that agencies can better manage long-term assets and address state of good repair issues. The Act also includes a competitive grant program. The competitive grant program includes grants for buses and facilities, innovative transportation coordination, workforce training, and public transportation research.

Table 33: Federal Funding Sources

Federal Funding Source	Requirement	Corridor Eligible
FHWA FHPP	Along NHS corridors; reduces delays; travel time savings on the NHS; cost effective	Yes
CMAQ	transportation focus; reduce air Emissions; located in or benefit a nonattainment or maintenance area	No
TIGER	Minimum capital cost of $1 million	No
5309	Fixed guide way or BRT	No
5311F	Intercity bus	No
5339	Capital	Yes
5310	Benefits elderly and/or disabled	Yes

FHWA National Highway Performance Program

The FHWA National Highway Performance Program (NHPP) provides fund to support the national highway system (NHS). The funds can be used on public transportation projects which are along NHS corridors which reduce delays and result in travel time savings on the NHS that are more cost effective than an NHS improvement such as widening the corridor. NHPP funds are apportioned to states based on a formula. A state can transfer up to 50% of NHPP funds each fiscal year to the National Highway Freight Program, Surface Transportation Block Grant Program, Transportation Alternatives, Highway Safety Improvement Program, and Congestion Mitigation and Air Quality Improvement Program Route I-89 is considered part of the NHS and implementing bus service along the corridor may be eligible for NHPP funding.

Flexible Federal Highway Funds

Flexible highway funds are legislatively defined and can be used for either highway or transit purposes. Funding sources include the Surface Transportation Program (STP), Congestion Mitigation and Air Quality Improvement Program (CMAQ) and FTA Urban Formula Funds. They allow the local areas to choose certain federal funds based on local priorities, the sections below describe each type of flexible fund available.

Congestion Mitigation and Air Quality

The Congestion Mitigation and Air Quality (CMAQ) Improvement Program is administered by the Federal Highway Administration (FHWA) and requires a 20% local match. To be eligible projects must have a transportation focus, reduce air emissions and be located in or benefit a nonattainment or maintenance area. Funds can be used to support startup costs of new services, expand service, procure vehicles, and act as fare subsidies such as free transit or reduced fares. Funding for the states are formula based on the severity of air quality programs and can be used for

[21] Federal Transit Administration. Grant Programs. https://www.transit.dot.gov/grants, 2016.

[22] Federal Transit Administration. FAST Act. https://www.transit.dot.gov/FAST, 2016.

both capital and operating costs (for a limited period of time)[23]. In Vermont service expansion for transit are funded with CMAQ, the transit provider applies for New Starts grants through the state.

In FY2016 New Hampshire received $10,309,073 in CMAQ funding[24]. The I-89 corridor between Lebanon and New London is not in a nonattainment or maintenance area, the closest community would be Hooksett, this project is therefor most likely not eligible for CMAQ funding.

The Surface Transportation Block Grant Program

The Surface Transportation Block Grant (STBG) program replaced the Transportation Alternatives Program (TAP) with the authorization of the FAST Act. It is flexible funding which can be used on capital costs for transit projects.

Transportation Investment Generating Economic Recovery (TIGER) Grants

TIGER Grants are a competitive discretionary grants program administered by the FTA on an annual basis for capital projects. TIGER Grants fund investments in transportation infrastructure, both transit and roadway, that will have a significant impact on the nation, a metropolitan area, or region. The TIGER Grant program focuses on capital projects that generate economic development and improve access to reliable, safe and affordable transportation for communities. Eligible applicants include state and local governments, transit agencies, port authorities, and metropolitan planning organizations, several jurisdictions and also join together to submit multi-state or multi-jurisdictional applications. The TIGER grants may be used for up to 80% of the total project cost in urban areas and up to 100% in rural. The minimum award for projects in an urban area is $5 million and $1 in a rural area. The I-89 corridor would be considered a rural area but infrastructure/capital requirements are less than $1 million and therefore the project is ineligible.

5309 New Starts/Small Starts

The FTA section 5309 capital investment grant program for new or small starts fund major capital investments for fixed guideway or bus rapid transit projects. To be eligible for Small Starts the project must be under $300 million and seeking less than $100 million in addition to the operating requirements of stations, substantial weekday service, bidirectional, and frequent service. This project does not meet the eligibility requirements for New or Small Starts 5309 funding.

5311F Intercity Bus

5311F is the formula funding program for intercity bus service and is a subset of the Section 5311[25] rural funding program. Under 5311F, each state must allocate at least 15% of its annual 5311 appointment to support intercity bus transportation. Eligible projects under 5311F include capital equipment such as vehicles, shelters, marketing material; operating assistance for services and demonstration projects, and administrative costs. Capital projects require a 20% local match and 5311F can be used to fund up to 50% of the operating cost. Transit funding in NH is a reimbursement program and must be applied for through a grant application.

New Hampshire receives approximately $600,000 in 5311F funding. Unfortunately commuter bus service is not eligible for 5311F. For this service to be eligible for 5311F funding it must be regularly scheduled (typically means there is mid-day and weekend service), have limited stops, connect two or more urban areas, have the capacity to transport luggage, and make meaningful connections with already scheduled intercity bus service. While the core service does not meet the Section 5311F criteria, it is possible that a future iteration with a higher level of service may qualify for the program.

[23] Federal Highway Administration. CMAQ and Public Transportation https://www.fhwa.dot.gov/environment/air_quality/cmaq/reference/cmaq_public_transportation/ 2017

[24] Federal Highway Administration 2016 CMAQ program funds https://www.fhwa.dot.gov/fastact/comptables2016/table7p1.cfm. 2016

[25] 5311 provides funding for public transit in nonurbanized areas with populations under 50,000

5339 Buses and Bus Facilities

The Buses and Bus Facilities program (5339) is a federal program which provides funding for capital equipment including the replacement, rehabilitation and purchases of vehicles and related equipment and the construction of new bus related facilities. Funding is formula based, distributed to eligible direct recipients (fixed route operators in urban areas and state/local governments), and provides up to 80% of the net cost and 85% for ADA-accessible vehicles[26].

The Upper Lake Sunapee region is nonurbanized and all funding under 5339 in this region would be funneled through the state and granted to subrecipients. Eligible subrecipients in New Hampshire include both public and non-profit transit providers and funding is competitive. To receive funding an application must be submitted to the state stating the need, fiscal responsibility and commitment to the service. Under the state management plan the emphasis is to replace ageing vehicles over expanding.

In FY2016 New Hampshire received $1,750,000 in 5339 funding for statewide/rural areas, this plus the $326,955 carryover from the previous fiscal year makes available $2,076,955 in 5339 funding for FY2017[27]. Commuter service along I-89 would be eligible for 5339 funding to procure equipment for the startup of the service. The operator of the service would need to apply to the state and have the local match of 15% (ADA accessible vehicle) available. If the application meets the minimum score of 70% or higher it will be deemed eligible for 5339. Should more requests for 5339 funding are made than funding available, those with the highest scores will have priority in receiving funding. As part of the application, scoring emphasis is placed on replacing aging vehicles over expanding service per the NHDOT State Management Plan. Since the service is an expansion and not replacement it is likely that it would only be funded if the state does not receive more applications than funding available.

5310 Enhanced Mobility of Seniors and Individuals with Disabilities

The FTA Enhanced Mobility of Seniors and Individuals with Disabilities (5310) program provides formula funding to states to increase the mobility of seniors and persons with disabilities. Funding is spent on capital projects, Regional Coordination Council (RCC) or purchase of services (POS) to meet the transportation needs of this population. Five transit providers in New Hampshire received 5310 funding in FY2015 for capital and/or operations (
Table 34).

Table 34: 5310 Funding for NH Transit Providers FY2015

Provider	FY2015
Greater Derry Salem Cooperative Alliance for Regional Transportation	$67,214 Operations
Community Alliance of Human Services, Inc.	$23,297 Operations
VNA Home Healthcare, Hospice & Community Service	$36,733 Operations $110,503 Capital
Belknap-Merrimack CAP/Concord Area Transit	$30,794 Operations
Tri-County CAP, Inc./North Country Transit	$21,346 Capital

Funding for POS is distributed to each region in New Hampshire via a formula based on census data plus a base of $20,000 per region. The RCC then solicits for and selects projects within its region, eligible activities include the purchase of trip as at the fully allocated cost. The funds are available for two years and after that placed back into the statewide pot as carryover funds. The annual budget for POS is $800,000 (FHWA transfer) plus any carryover funds.

[26] Federal Transit Administration. Buses and Bus Facilities Grants Program. https://www.transit.dot.gov/funding/grants/buses-and-bus-facilities-grants-program-5339. 2017.

[27] NHDOT Bureau of Rail & Transit, FTA Section 5339 Program Guidance State Fiscal Year 2017. https://www.nh.gov/dot/org/aerorailtransit/railandtransit/documents/sfy17_nhdot_5339_guidance.pdf 2017

RCC formula funded programs are awarded similarly to POS funds but after the contract has expired any unused funds go into the statewide pot as carryover funds. Eligible projects include mobility management, capital procurement, operating expenses and purchased trips. The annual budget for RCC is $650,000 (FHWA transfer) plus any carryover funds. Annual funding for 5310 capital funds require agencies to directly apply. Eligible capital equipment includes accessible vehicles, fare boxes, computers, hardware & software and other miscellaneous capital equipment. Vehicles are purchased through the state and recipients must enter into a Vehicle Use Agreement. The statewide budget for 5310 capital funds was $500,000[28].

10.3 Innovative Funding Options

A detailed review of innovative funding strategies from around the country is presented in Appendix D. Table 35 is a summary of potential state and federal funding sources, potential revenue and the requirements in order to implement the measure and generate the revenue. Many of the state and local funding sources would require state and/or local legislation to enact.

Table 35: State and Local Funding Sources

Source	Revenue Potential	Requirements
Mortgage Recording Fee	Unknown	Raise mortgage recording fee by $1 and dedicate to transit
Development Impact Fees	Unknown	A redefinition of authorized use under RSA 674:21, V. and the adoption of set legislation in municipality zoning
Paid Parking	$90,000	Hanover raises rates by 5%
Vehicle Registration, Title and License Fees	$41,100-$176,100	Assessment of Fee by New London and Grantham, increase in maximum fee from $5 to $10 via state legislation
Tolls	$0	Implementation of tolls along I-89
Motor Carrier/Limo Fee	$163,600	Assessment of $100 annual fee on motor carriers
Underground Storage Fee	$30,000	Assessment of fee of 1¢ per gallon to tanks
Vehicle Lease Fee	$781,000; $130,000; $976,000	Assessment of 50¢ monthly fee to all leased vehicles; $1 annual; 3%
Ad Valorem Fee	$3M- $30.3M	Assessment of 1% to a 10% fee increase at state and Municipal level
New Tire Fee	$54,100, $81,200, $108,200	Allow new tire fee collected during vehicle registration at the local level to be used for transit. Asses fee of 50¢; 75¢; $1
Real-estate Transfer Tax	$946,000	A 1% increase in real estate transfer taxes to homes worth more than $1 million
Parking Taxes	Very little due to community sizes and densities	Local tax enabling legislation
Property Taxes	$535,000	Special assessment or local mill levy for transit. Increase tax rate by 0.1 mills in Grantham, Lebanon, Hanover, and New London
Sales Tax	$38 million	Change in state legislation to implement a sales tax.
Gas tax	$3.3 million	Increase the gas tax by 0.5¢ and dedicate to transit

[28] NHDOT Transit Grants Workshop: FTA Section 5310 Programs. https://www.nh.gov/dot/org/aerorailtransit/railandtransit/documents/sfy18_grants_wkshp_5310.pdf

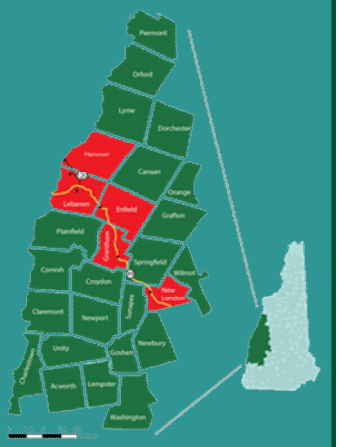
Source	Revenue Potential	Requirements
Car Rental Tax	$484,000	Increase the Meal and Rooms tax by ½ a percent
Alcohol Tax	$1 million	Every 1¢ in the excise tax dedicated to transit
Utility Tax	$163,000 - $653,000	Legislative action and levy adopted by municipalities
Occupational Tax	Unknown	Legislative action
Income Tax	Unknown	Imposing a tax on income in NH.
Hospitality Fee	$4 million	$1 per occupied room per night
Gambling/Lottery Tax	$82,000 per each 1%	Legislative action
Corporate Income Tax	$4.9 million; $12.3 million; $24.6 million; $49.2 million	Increase the Business Profit tax by 0.10%, 0.25%, 0.50%, 1% and dedicate to transit
Cigarette Tax	$1.1 million	Raise the rate by 1¢ and dedicate to transit
Payroll Tax	Unknown	Legislation enabling a payroll tax
Corporate Franchise Tax	Unknown	Legislative action
Partnerships – Colby-Sawyer	$64,800	Transportation fee of $180 each semester to all nursing students

Appendix A: Executive Summary

Interstate 89 Commuter Transit Service Feasibility Study

Study Description

The purpose of this study is to evaluate the demand for commuter bus service along the Interstate 89 (I-89) corridor in New Hampshire connecting New London to Lebanon/Hanover and to develop alternatives for service. This is a heavily traveled road with no commuter transit services between these major destinations. The corridor has been identified in numerous documents, such as Long Range Transportation Plans and Human Service Transportation Coordination Plans, as having a need for a transit connection. It has also been documented that the overall regional transportation network would be greatly improved if there was a transit connection.



Study Goals

1. Identify existing transportation systems, level of service, and demand for commuter service in the study area
2. Develop commuter transit service options that connect New London to Lebanon and Hanover
3. Identify coordination and connection opportunities with existing transportation services
4. Identify coordination and partnership opportunities with institutions, agencies and employers in the region

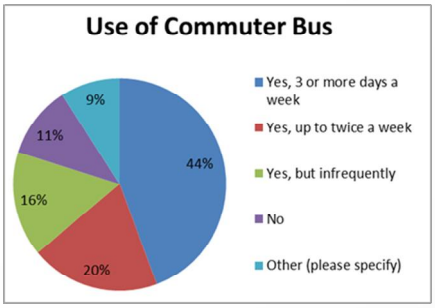
Outreach Results

For the public outreach effort, the study team used a multifaceted approach to gather public input. The effort included a series of "public drop-in sessions" with interactive mapping stations, pop-up tables, and an online survey. Approximately 65 people participated in the public drop in sessions. The survey also proved to be extremely successful.

1,521 surveys were completed

Survey questions were designed to get actionable responses from participants. Results of the survey are described below and in the sidebar to the right.

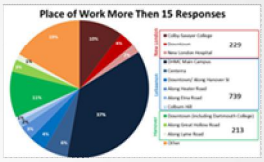
The survey asked how often individuals would use a commuter bus. Eighty percent of respondents said they would use a commuter bus along I-89. Respondents were also asked how frequently they would use a commuter bus service.



Most respondents (78%) were willing to add 15 minutes to their commute to take a bus and were interested in using the Exit 12 or 13 Park and Ride.

"There is a huge need for a bus that runs regularly between New London and the Upper Valley!"

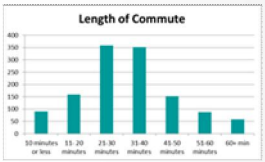
37% of respondents work at DHMC



79% of respondents primarily commute using I-89

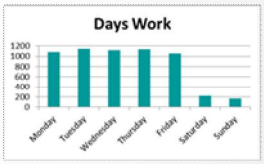
85% drive alone, this is higher than the state average (81.1%)

The average commute time for respondents was 32 minutes



Lack of transit is a top concern for DHMC employees

82% work on weekdays only



92% start work between 6 AM and 10 AM

62% leave work between 4 PM and 5:30 PM

Alternatives

The responses received from the public outreach effort, the market, existing services, and peer analyses were used to develop transit service alternatives. The five alternatives are based on a core route connecting the origins and destinations with the highest demand at either end of the corridor and each have different service characteristics including destinations served and level of service. The trips times are based on work time responses from the survey and maximizing connections with other transit systems.

	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Daily Ridership	145	130	85	70	55
Annual Ridership	36,270	32,630	21,335	17,570	13,805
Cost per Hour	$89.04	$88.23	$87.04	$89.56	$86.66
Passengers/Hour	6.42	7.03	4.66	5.38	5.37
Passengers/ Trip	6.15	6.67	4.36	5.19	5.00
Cost Efficiency	$11.22	$9.91	$15.89	$13.28	$12.79
Cost/Passenger	$14.48	$13.23	$19.97	$17.27	$17.33
Farebox Recovery	22.5%	25.1%	20.4%	23.1%	26.2%

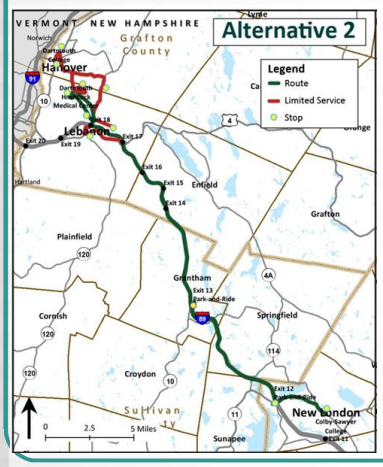
Best Performer — Worst Performer

Alternative	Days of Operation	Service Hours	Trips (AM/PM) Northbound	Trips (AM/PM) Southbound	Mid-day Trip	Vehicles Required
1	Mon-Fri	5:40 AM -9:55 AM 1:20 PM - 7:00 PM	7/5	4.5/7	Yes	5
2	Mon-Fri	5:40 AM -8:55 AM 1:20 PM - 7:00 PM	6/4	3.5/6	Yes	4
3	Mon-Fri	5:40 AM -9:55 AM 1:20 PM - 7:00 PM	6/4	4.5/5	yes	3
4	Mon-Fri	5:40 AM -9:45 AM 3:00 PM - 6:40 PM	4/3	2.5/4	No	3
5	Mon-Fri	5:40 AM -9:45 AM 3:45 PM - 6:40 PM	4/2	2/3	No	2

To evaluate the alternatives, performance measures were used to compare how each alternative ranked. The performance measures evaluate the service effectiveness, financial efficiency, and cost effectiveness of each alternative. High service effectiveness (ridership, passengers/hour and passengers/trip) and farebox recovery and low financial/cost efficiency values (cost per hour, cost/passenger, cost efficiency) indicate a better performing alternative.

Recommendation

The recommended alternative is Alternative 2. However, using a phased approach to build to this level of service was deemed most appropriate. The core level of service (represented by Alternative 5 here) is implemented first and service is added and expanded as awareness of the service and ridership grows until the ideal level of service is reached. An expansion of the Exit 12 Park and Ride would be required under any alternative. Additionally, although not explicitly part of this study, there were many requests throughout the outreach process to include service between the study corridor and points south, including Concord. In this phased scenario, select trips could be added to Concord as an expansion of the Preferred Alternative.



Fares

Cash Fares – Single One-way Trip	
Adult	$3.00
Seniors 65 & Older	$1.50
Individuals with Disability	$1.50
Children under 4	Free
Passes	
10-Ride	$25.00
Monthly – Adult	$60.00
Monthly – Senior or Disabled	$30.00

Phasing

- Alternative 5
  - Base line service
- Alternative 4
  - Additional PM peak trips
  - Service to Heater Road
- Alternative 2
  - Additional trips during peak hours
  - Add mid-day service
  - Service to Great Hollow Road
- Extend service to Concord
  - Select trips extended to Concord

Revenue/Funding

Capital Funding - Federal

- FHWA National Highway Performance Program
- Flexible Federal Highway Funds
- Bus and Bus Facilities (FTA 5339)
- Enhanced Mobility (FTA 5310)

The cost to operate the initial level of service (Alternative 5) would be $239K annually plus an additional $353K in capital costs to purchase vehicles and equipment. Fares are projected to cover 26% of the cost; an additional $175K would be needed annually to cover the operational cost of the service. There are several innovative ways to fund transit, which have been used nationwide but in New Hampshire, many would require state legislative changes.

Toll Revenue

Taxes: Sales tax, Gas tax, Property tax, Hospitality tax, Excise tax, Utility tax, Income tax, Lottery

Parking

Fees: Vehicle fees, Development impact fee, Mortgage recording fee, Underground tank fee

Partnerships with private organizations

Federal formula funding

Fares

Appendix B: Survey Responses by Question

Responses to each survey question are detailed in this appendix.

Question 1 - What state do you live in?

This question allowed responded to select New Hampshire, Vermont or write in another state for residence. The largest group of respondents (92%) was New Hampshire residents (Figure 48). Vermont residents made up 5% of the response. Vermont residents were then asked if they work in New London to determine if they use the I-89 corridor. Fourteen and a half percent of Vermont respondents said worked in New London (Figure 49). Three percent of individuals responded "Other." The highest "Other" response was Massachusetts followed by Maine (Table 36). Those who responded with "Other" or Vermont but not working in New London were then directed to the end of the survey.

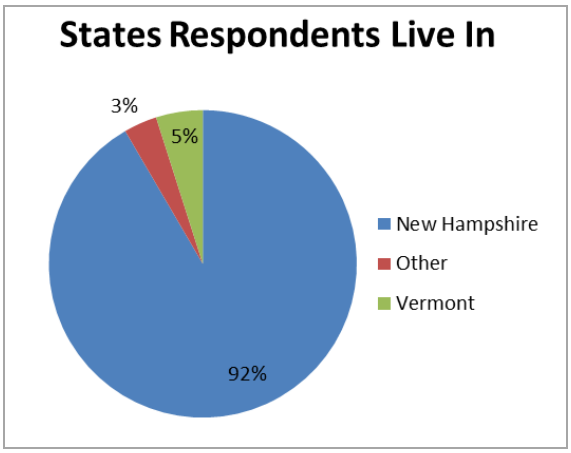


Figure 48: State of Residence

"Other" State Live In	Responses
Alaska	1
Texas	1
California	2
Connecticut	4
Massachusetts	34
New Jersey	2
Maine	8
Maryland	1
Total	53

Table 36: "Other" State of Residence

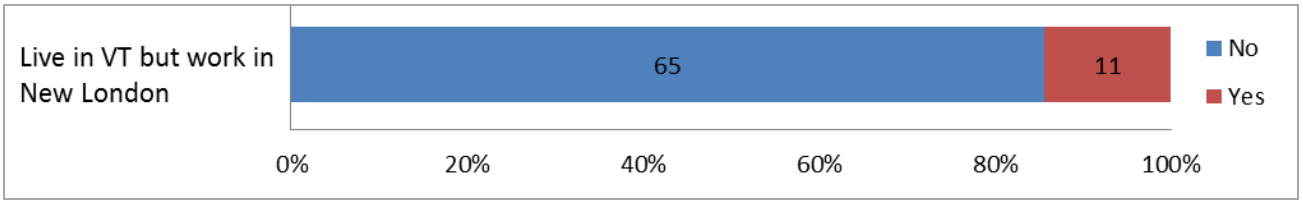


Figure 49: Live in VT but Work in New London

Question 2 - Which community do you live in?

Respondents live in 70 different communities throughout New Hampshire. Overall, the greatest percentage of respondents in the Upper Valley Region live in New London (26.9%) followed by Grantham (19.6) and the least in Orange (0.1%) as shown in Table 38. Seven communities had over 50 respondents and seven had between 20 and 49. A high percentage of respondents responded "Other". "Other" was comprised of 50 different communities, primarily those south and/or east of the region, from as far as Keene, Concord, and Manchester. Four "Other" communities had more than 10 responses; these included Concord (28), Warner (19), Hopkinton (14), and Croydon (10).

Figure 50 shows a map of respondents by residence. As expected based on the focus of the survey distribution, communities located along the I-89 corridor had the largest responses and those outside had the smallest.

Residence	Responses	% of Responses
Andover	24	1.7%
Canaan	21	1.5%
Danbury	4	0.3%
Eastman	61	4.3%
Enfield	59	4.2%
Etna	6	0.4%
Grafton	12	0.8%
Grantham	238	16.8%
Hanover	47	3.3%
Lebanon	74	5.2%
Lyme	3	0.2%
New London	382	26.9%
Newbury	36	2.5%
Newport	72	5.1%
Orange	1	0.1%
Other	162	11.4%
Plainfield	7	0.5%
Springfield	49	3.5%
Sunapee	87	6.1%
Sutton	41	2.9%
Wilmot	33	2.3%
Total	**1419**	

Table 37: Residence Community

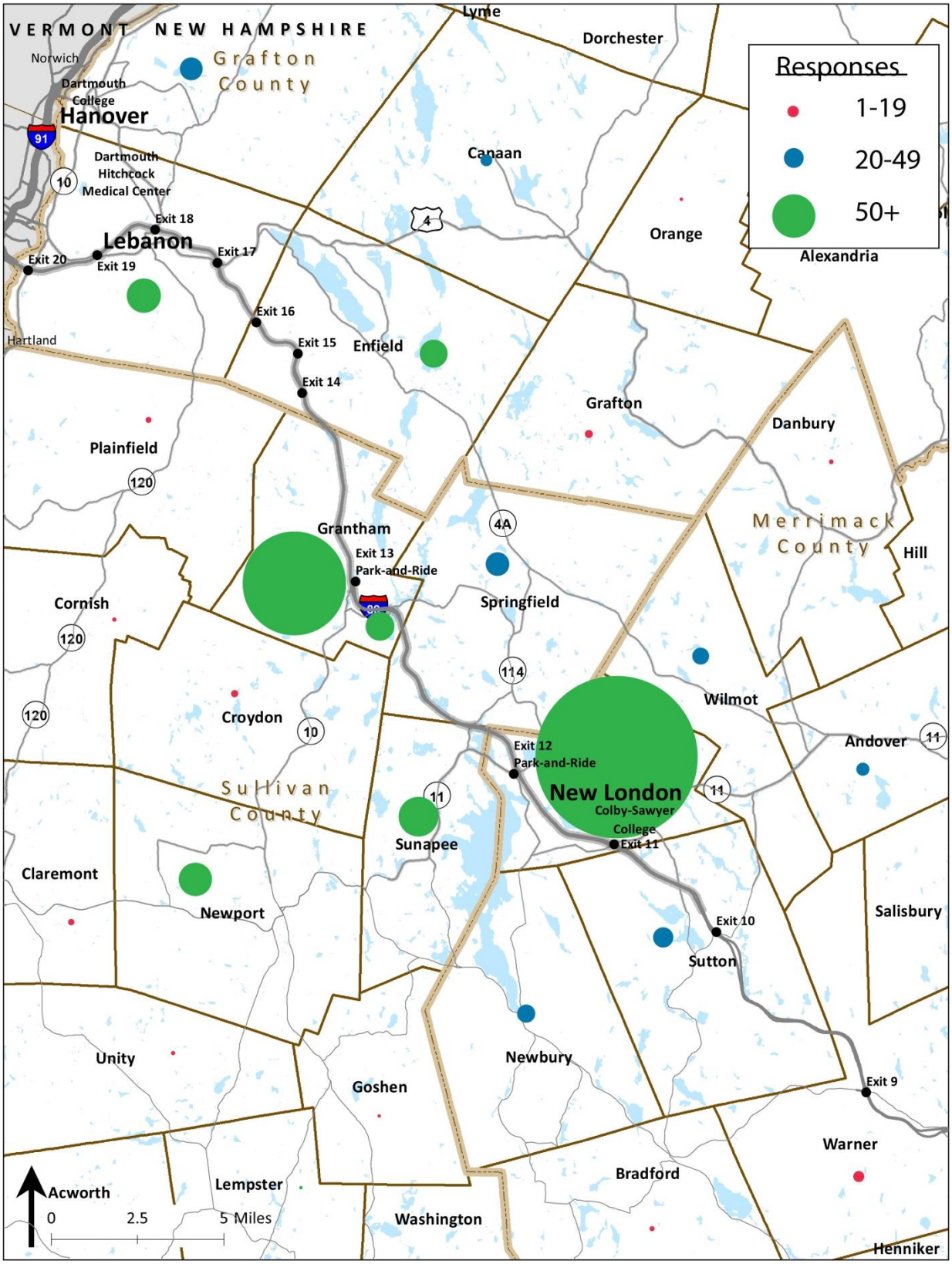


Figure 50: Responses by Community

Question 3 – In which community do you work/go to class?

The majority (89%) of respondents work in one of the three largest employment cluster communities (New London, Hanover and Lebanon). Over half of the respondents work in Lebanon followed by New London and Hanover with 18% and 17% respectively (Figure 51). Eleven percent work in other communities; the greatest responses came from those who were retired or working in Concord (Table 38).

Work Community	Responses
Retired	22
Concord	21
White River Junction	19
Grantham	8
Grantham	8
Boston	7
Manchester	6

Table 38: "Other" Community for Place of Work with more than five responses

There were responses from 12 places of employment with 15 or more responses. Figure 52 shows a breakdown by place of work for employment locations where more than 15 responses were collected. By place of work the greatest number of responses (37%) came from Dartmouth-Hitchcock Medical Center (DHMC) employees, followed by employees working in downtown Hanover including Dartmouth College. Other responses (19%) included places of employment in one of the three main employment communities in the region but there were fewer than 15 responses, or places of employment in other communities.

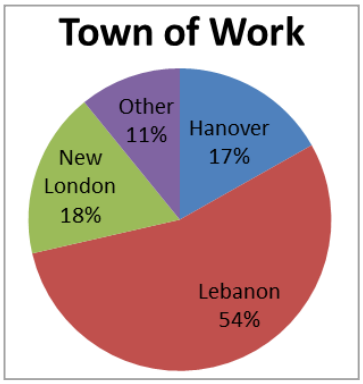


Figure 51: Town Work In

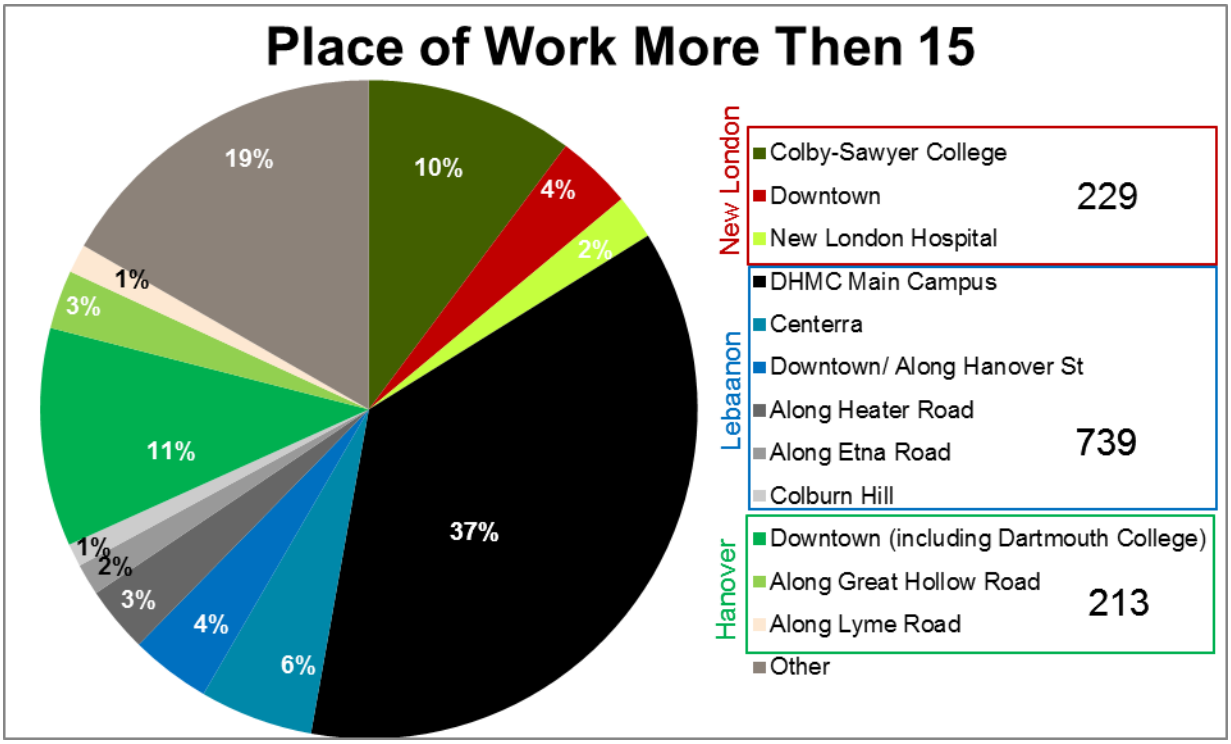


Figure 52: Place of Employment with 15+ Responses

Two hundred and sixty-three respondents stated they work in New London, of which 87% worked either downtown, at the New London Hospital or at Colby-Sawyer College. Those who worked in New London came from 33 different communities. The largest percentage of respondents (47.5%) live and work in New London and 21% live in communities along the I-89 corridor north of New London (Figure 53). Three communities had between 10 and 25

respondents but the majority of communities had 9 or less. The largest employer with respondents working in New London is Colby-Sawyer College (63%), as shown in Figure 54.

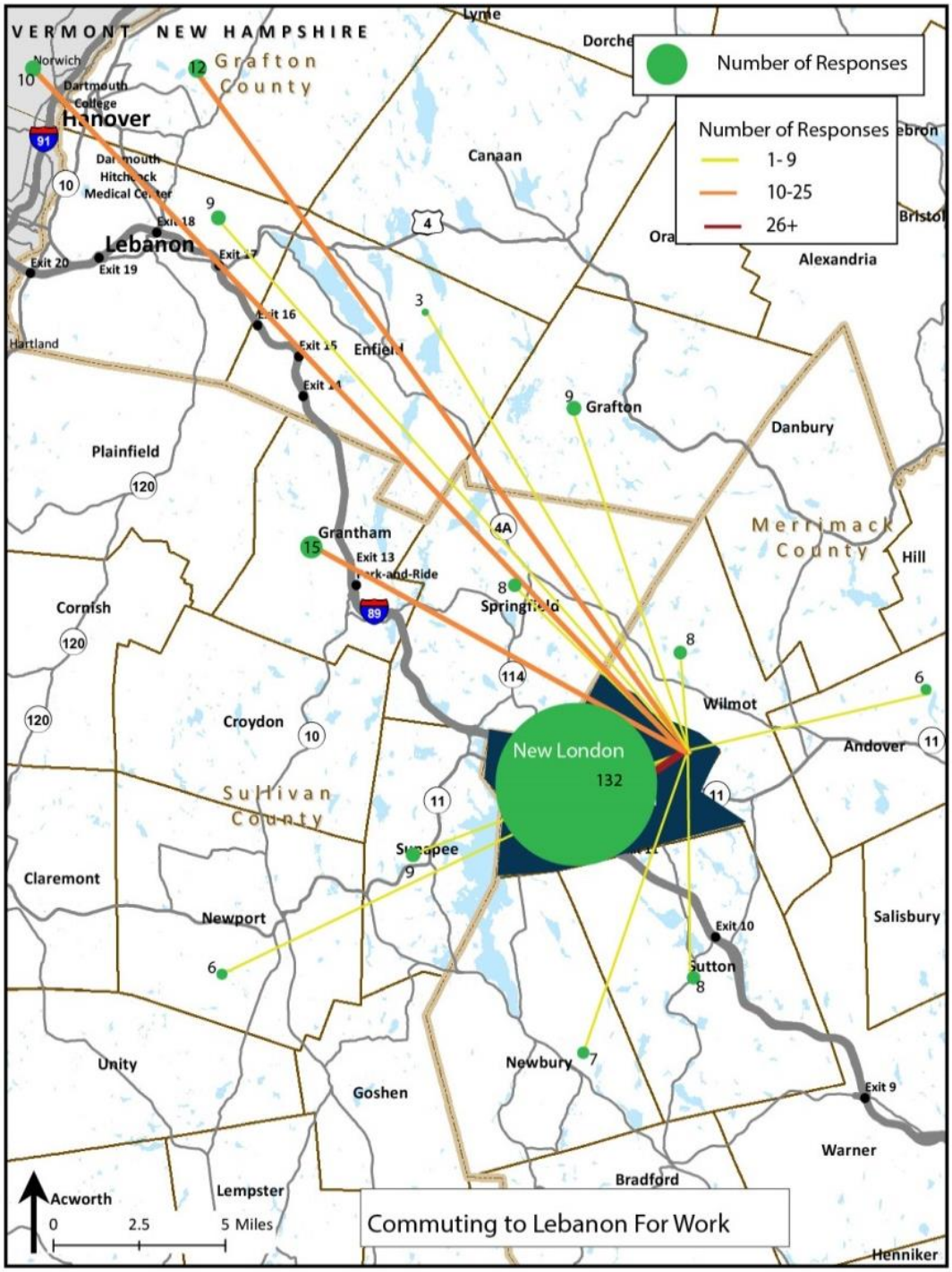


Figure 53: New London Employees Place of Residence

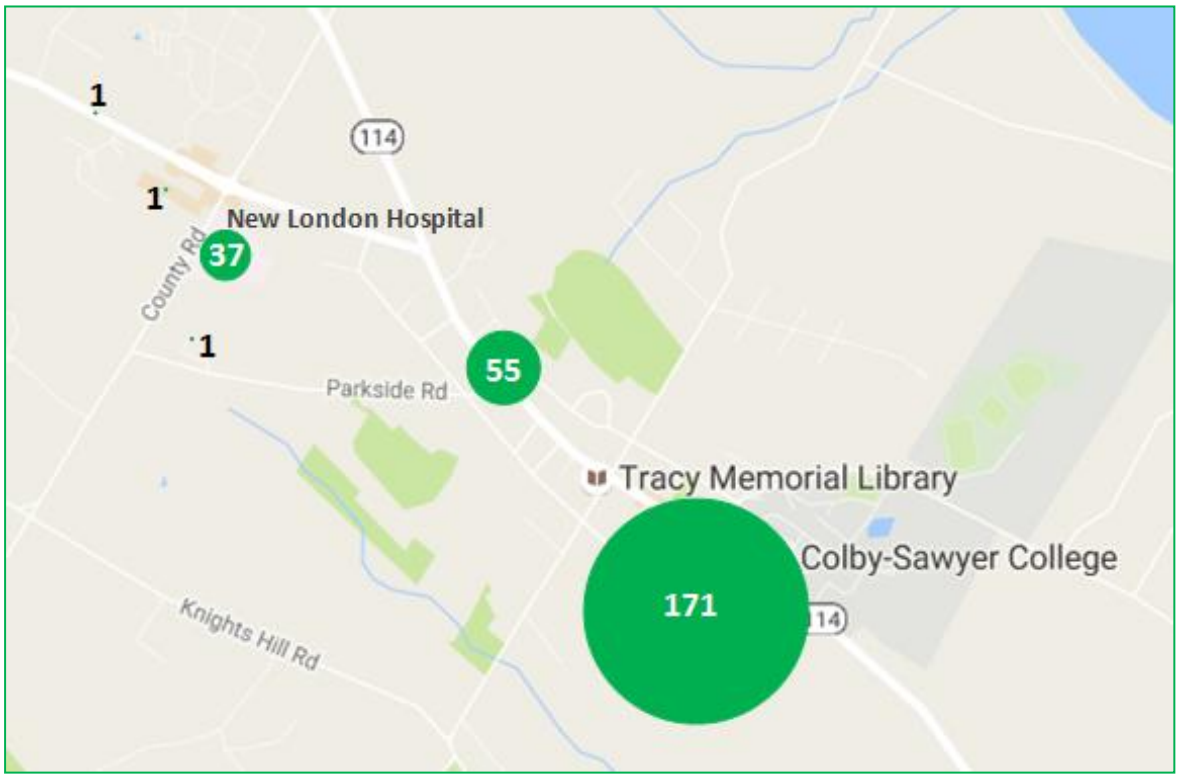


Figure 54: Number of Employees by Place of Employment - New London

Seven hundred and eighty-three respondents stated they work in Lebanon, of which 93.1% worked either downtown or at one of the major employers. Those who worked in Lebanon came from 56 different communities. The largest percentage of respondents (18.4%) live in Grantham, followed by New London (16.5%), as shown in Figure 55. Only 5.6% live and work in Lebanon. Fifty-three percent live in communities along the I-89 corridor between Lebanon and Sutton and 3.6% live north of Lebanon. The remaining 37.4% live other communities, some as far as Manchester and Keene. Six communities had more than 25 respondents and another six had between 10 and 25 respondents, but the majority of communities had 9 or less.

The largest employer with respondents working in Lebanon is DHMC with 560 responses plus an additional 21 who work at either the Colburn Hill Campus or Outpatient Surgical Center (Figure 56). Seventy-nine indicated they work in the Centerra office park; 36.7% of these respondents work in DHMC buildings (Evergreen 1, Evergreen 2, Novell Building) at Centerra. Downtown Lebanon/Hanover Road and Heater Road both were the next largest employment areas with 46 responses each. There were 22 responses from Etna Road, 14 from West Lebanon, six from mechanic Street and five from Alice Peck Day Hospital (Figure 57).

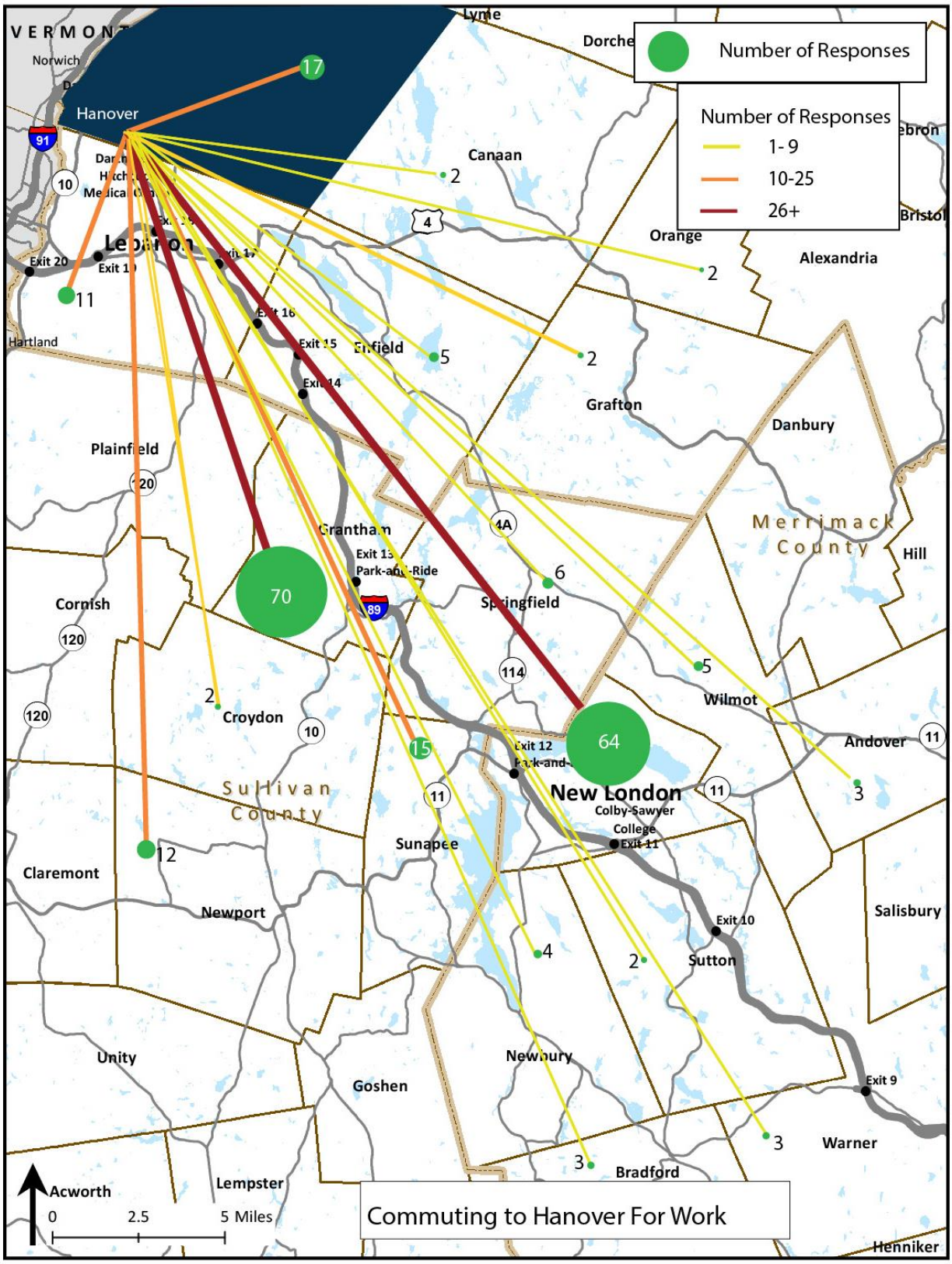


Figure 55: Lebanon Employees Place of Residence

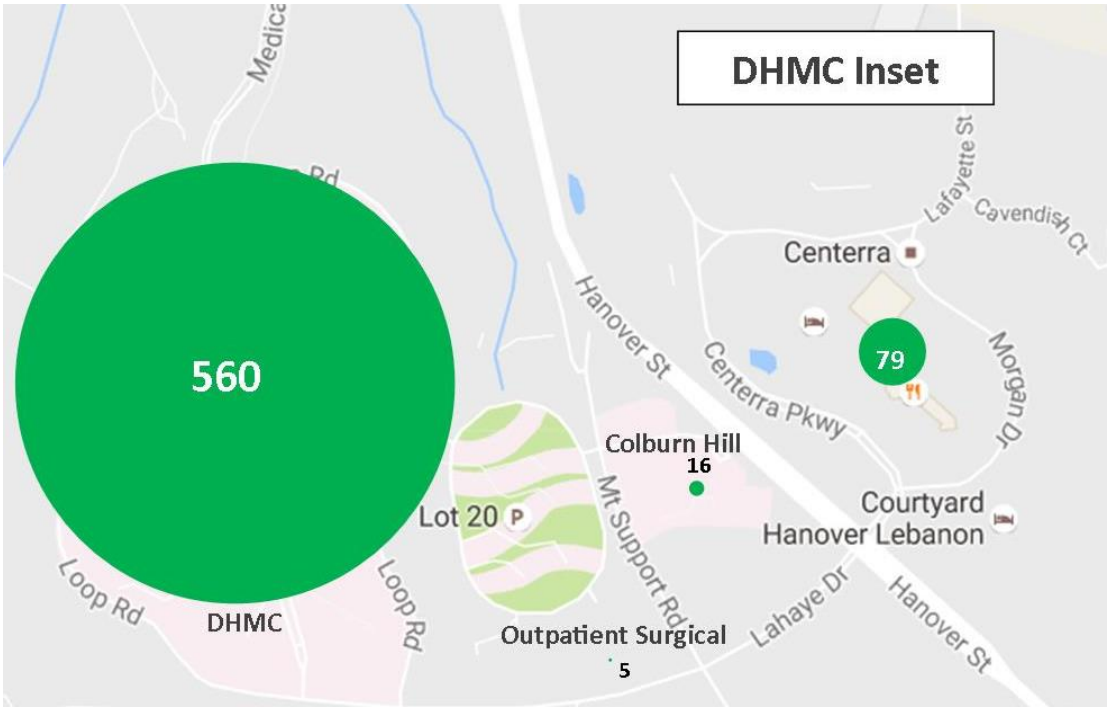


Figure 56: DHMC Employment

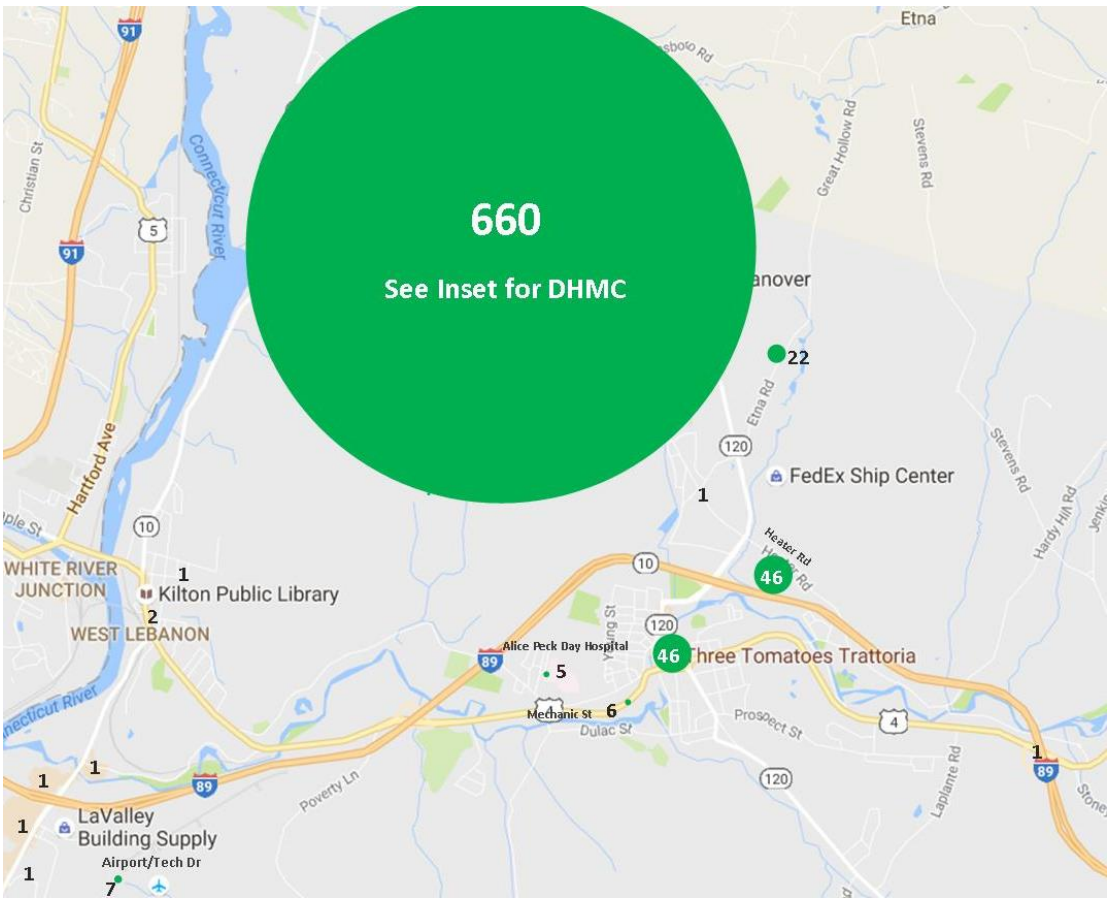


Figure 57: Number of Employees by Place of Employment - Lebanon

Two hundred and thirty-two respondents stated they work in Hanover; the largest percentage (65.5%) work in downtown Hanover or at Dartmouth College. Those who worked in Hanover came from 23 different communities. The largest percentage of respondents (27.6%) live in New London, followed by Grantham (22.4%) as shown in Figure 55. Only 7.3% live and work in Hanover. Sixty-eight percent live in communities along the I-89 corridor between Hanover and Sutton. The remaining 24.3% live in other communities. Two communities had more than 25 respondents and four had between 10 and 25 respondents, but the majority of communities had 9 or less.

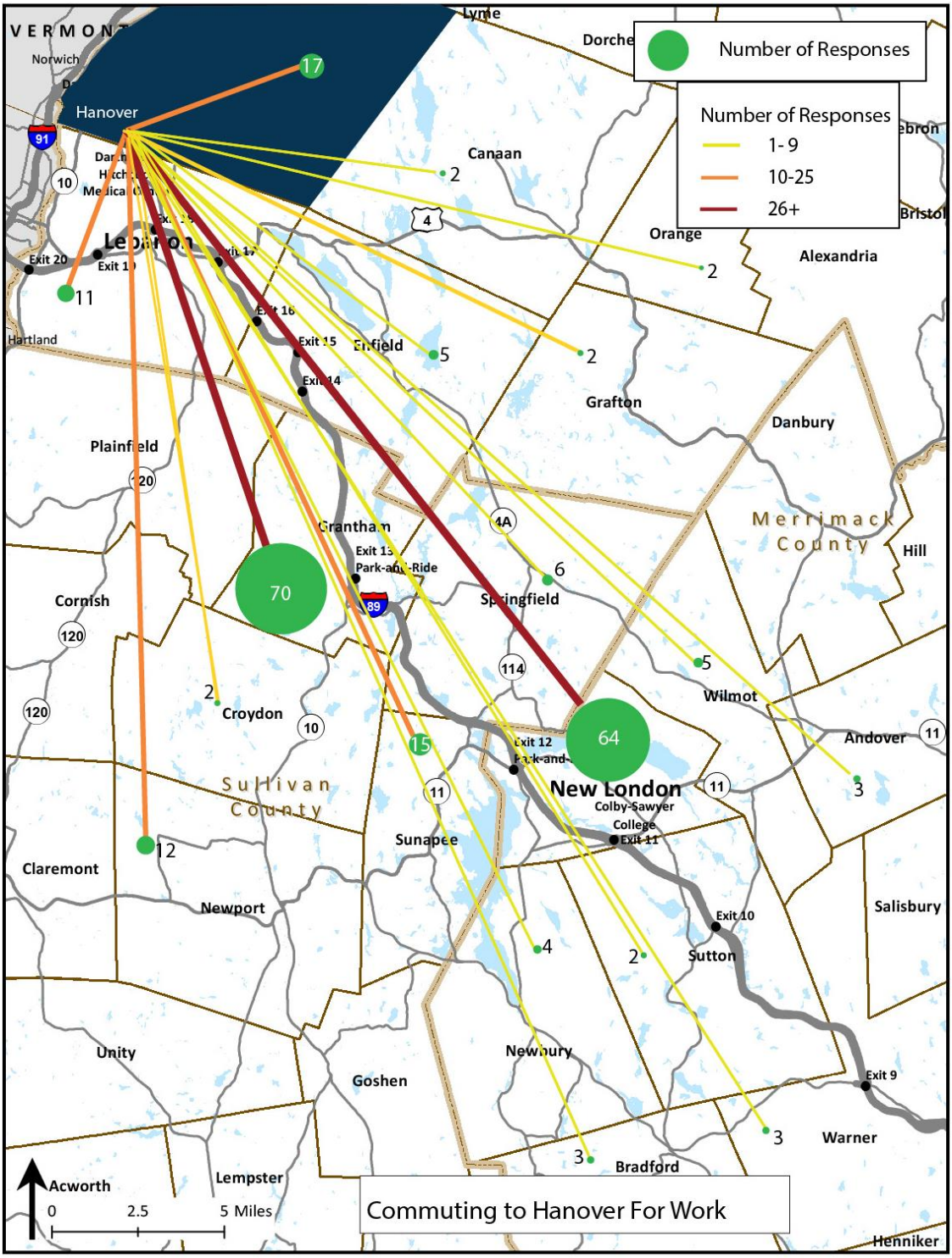


Figure 58: Hanover Employees Place of Residence

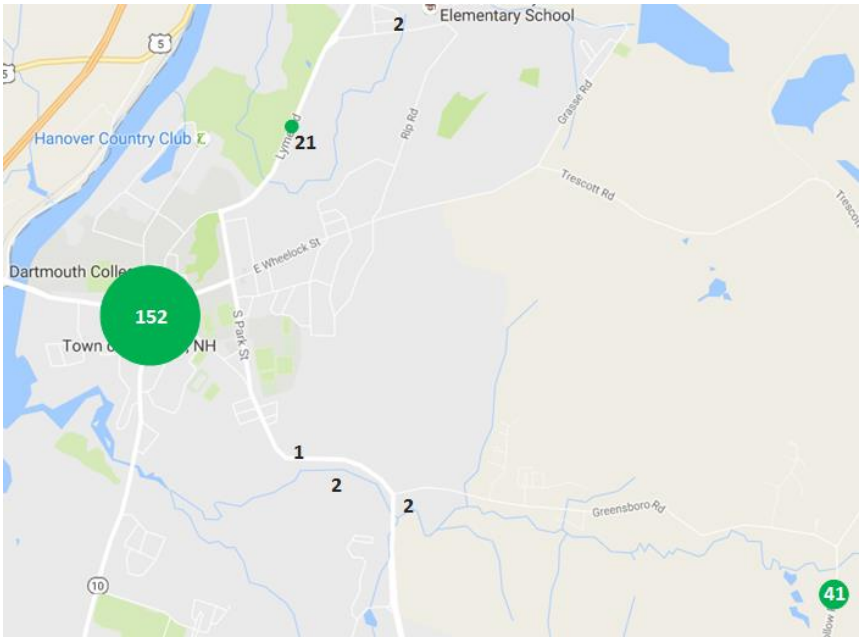


Figure 59: Number of Employees by Place of Employment - Hanover

Question 4 - Which Corridors do you use to get to work/class?

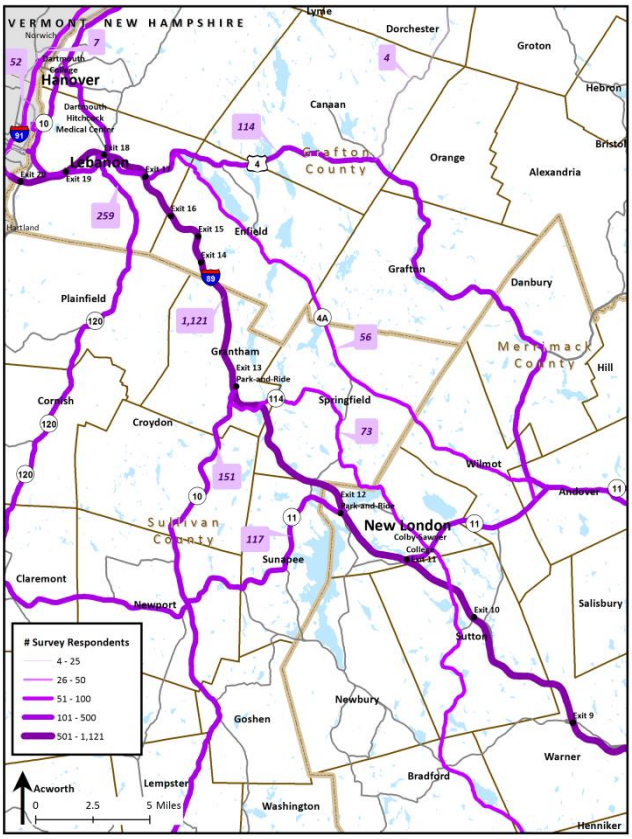


Figure 60: Commuting Corridors

For this question the respondents selected all of the responses that applied. The most heavily used corridor is the I-89 corridor, with 79% (1,121) of respondents indicating they use it for their commute. Average daily traffic on Route I-89 between Exits 18 and 19 is 35,100; the survey respondents represent 6.4% of daily vehicles on I-89[29]. Route 120 had 259 responses, this road connects Route I-89 to Hanover, Lebanon and DHMC. Route 110, which connects with I-89 at Exit 13 had 151 responses. Route 11, which connects with I-89 at Exit 11 and runs concurrently until Exit 12 in New London had 117 responses. US-4 is a 24-mile road between Andover and Lebanon and is an alternate route to Route 4A. It had 114 responses.

6.4% of daily I-89 users responded to the survey

[29] Average daily traffic (ADT) includes bi-directional traffic, the 1,121 was doubled to account for round trips. ADT data is from https://www.nh.gov/dot/org/operations/traffic/tvr/locations/documents/lebanon.pdf

Question 5 - How do you most often get to work/class?

Eighty-five percent of respondents drive alone, 10% carpool, and the remaining five modes make up less than 2% each (Figure 61). The least popular mode of transport was bike at 0.2%. Over half (56%) of the carpools are going to DHMC, 12% are going to downtown Hanover/Dartmouth College and 7% each are going to either Centerra or Colby-Sawyer College. Of those carpooling, 95% are taking I-89. The vanpools are primarily traveling from New London to downtown Hanover and all vanpools are commuting on I-89. Respondents using public transit (1%) are predominantly going to work in Lebanon and coming from either Enfield, Hanover or Lebanon.

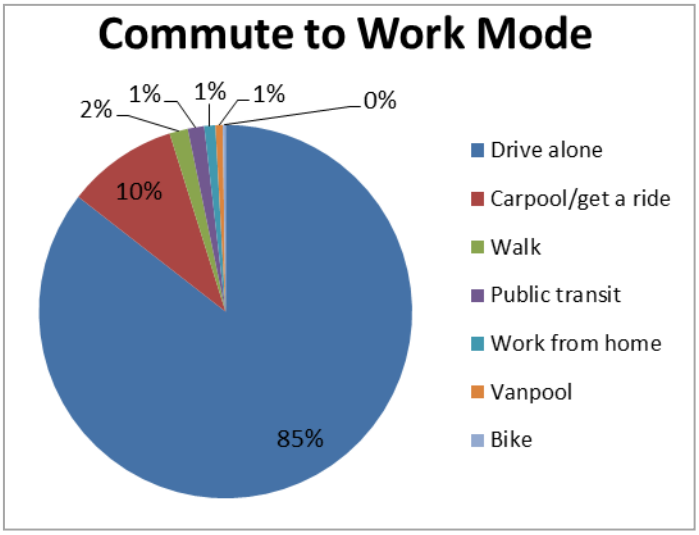


Figure 61: Commute to Work Mode of Transport

Question 6 - How long is your current commute/trip to class?

The majority of commuters (57%) have a travel time between 21 and 40 minutes (Figure 62). For the cohort of respondents that travel along I-89, 62% have a travel time between 21-40 minutes indicating that those using I-89 experience longer travel times than those using alternate routes. The average travel time for respondents was 32 minutes, but those traveling along I-89 experience a slightly higher travel time of 34 minutes. The average travel time for a commute over 60 minutes was 76 minutes. Most of these respondents live outside the region and work at DHMC or live in the region and work in Boston.

Those traveling along I-89 have longer commute times than those using alternate routes

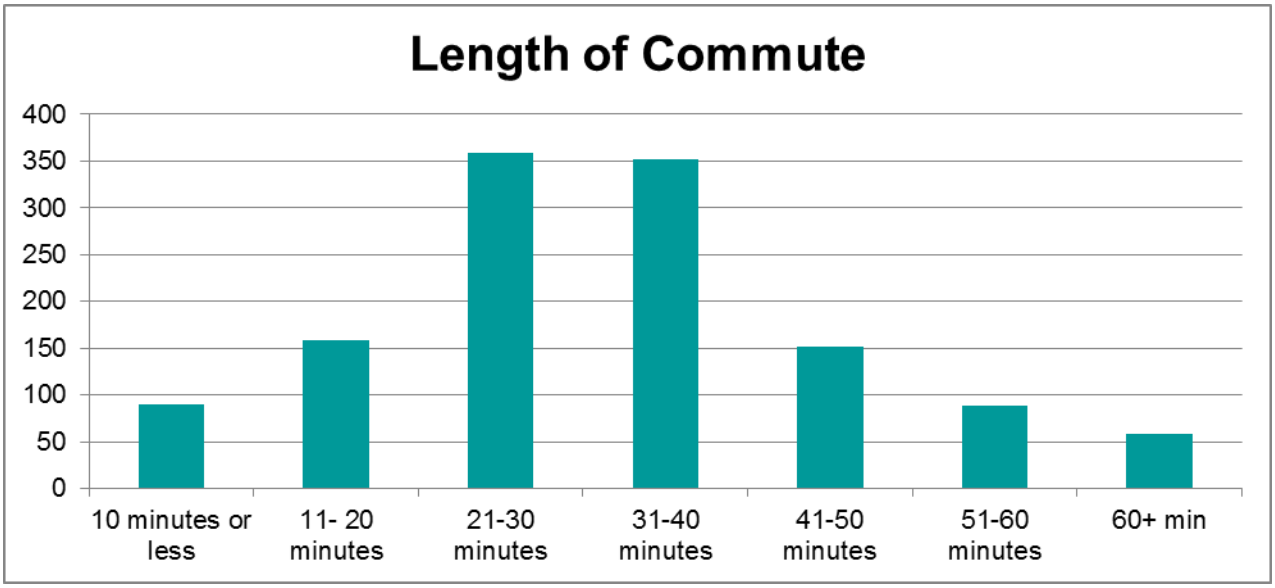


Figure 62: Commute Time

Question 7 - Which issues do you experience in your commute?

For this question the respondents selected all of the responses that applied. The greatest issue reported was spending too much money on fuel and maintenance (56%) as shown in Figure 63. This was particularly common amongst those who had commutes over 40 minutes and those who used I-89. Eighty-six percent of respondents that stated they were spending too much on fuel and maintenance were I-89 travelers. Traffic and congestion was the second most popular issue with 48% of the response. Half of all I-89 users stated traffic and congestion as an issue.

I-89 commuters are spending too much money on fuel and maintenance

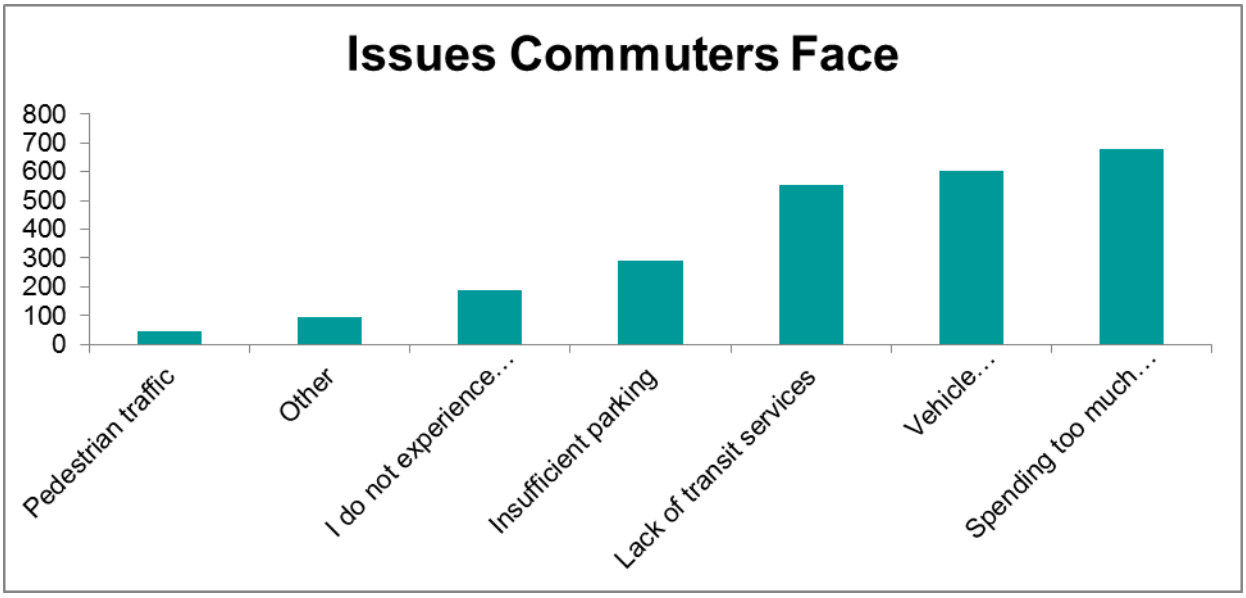


Figure 63: Issues Faced by Commuters

Lack of transit was the third major concern for commuters (44%). This was a top concern for those who work in Hanover (55.8% of Hanover employees), Lebanon (45.5% of Lebanon employees) and New London (22.9% of New London Employees). Of those that stated lack of transit as a concern, 45% were employees at DHMC. By residence, New London and Grantham were the highest communities to report lack of transit as an issue with over 100 responses from each community (Figure 64). Insufficient parking was an issue for 23% of respondents. The largest groups that indicated the lack of parking issue were DHMC employees (29%) and those that work in downtown Hanover/Dartmouth College (47%). In the "Other" category, the most common response had to do with bad weather (33%).

Lack of transit is a top concern for DHMC employees

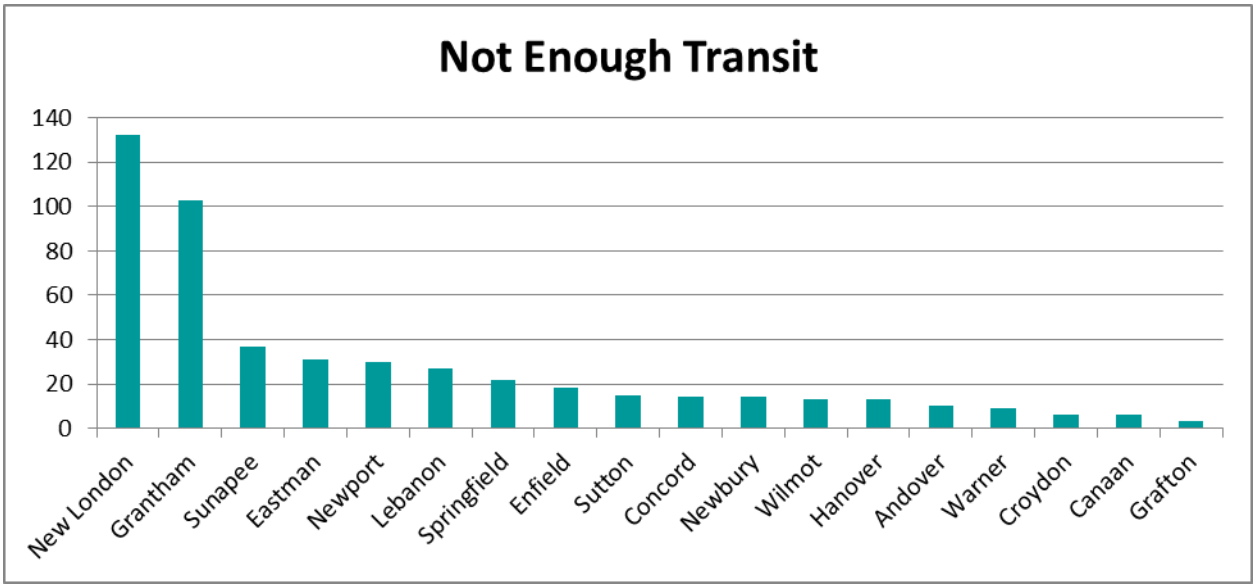


Figure 64: Lack of Transit as an Issue for Communities with 10+ Respondents

Question 8 - Which days do you typically work/go to class?

For this question, respondents were able to select all days that applied; the majority of respondents (80.2%) work on weekdays only 0.8% work just weekends (Figure 65). For those that worked on the weekend, the largest percentage (55%) worked in Lebanon (Figure 66). Forty-four percent of all of those who work on the weekend work at DHMC.

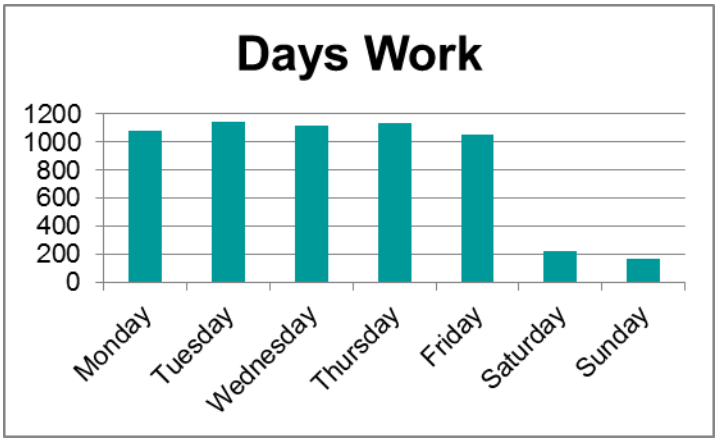


Figure 65: Days which Respondents Work

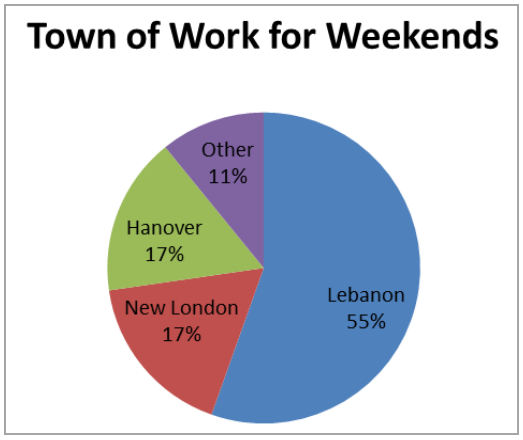


Figure 66: Community Work in for Those Who Work on Weekends

Question 9 - What hours do you typically work/go to class?

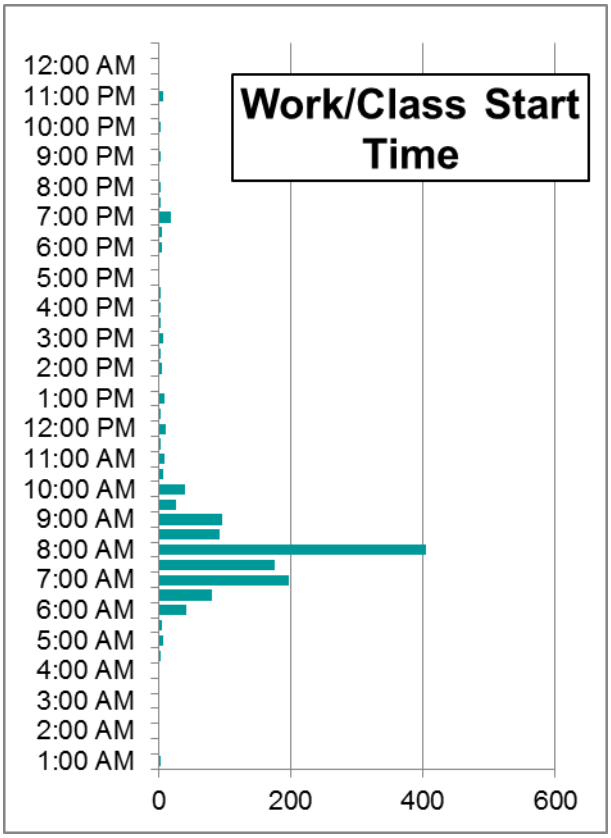


Figure 67: Start Times

Respondents were asked what times they begin and end work. Start times varied but 92% begin between 6 AM and 10 AM (Figure 67). Almost one third of respondents begin at 8am. The time period with the greatest amount of start times was 7:00 to 8:30am. During the mid-day there are very few start times. At 7 PM there is a slight increase in start time; this is correlated to those working at DHMC who end at 7 am, primarily nurses.

Table 39 shows the places of employment and the number of employees who start at each half hour between 6 AM and 10 AM. Those who start at 6:30 are mainly working at DHMC and coming from New London; this correlates with the start time for Colby- Sawyer nursing students. At most places of employment, the majority start at 8am with the exception of New London Hospital (7:30am), Lyme Road (7:30am), downtown Hanover/Dartmouth College (9:00am) and Great Hollow Road (7:00am).

Location	6:00 AM	6:30 AM	7:00 AM	7:30 AM	8:00 AM	8:30 AM	9:00 AM	9:30 AM	10:00 AM
Colby-Sawyer College	1	6	5	12	39	5	14	6	15
Downtown New London	0	0	5	3	13	6	3	0	3
New London Hospital	0	2	6	7	5	3	1	0	0
Along Lyme Road	1	2	3	6	5	2	0	0	0
Great Hollow Road	1	2	15	5	10	2	2	0	0
Downtown Hanover/Dartmouth College	1	4	4	16	30	22	31	7	7
Along Etna Road	1	1	2	7	8	1	0	0	0
Along Heater Road	2	0	5	11	21	2	2	0	0
Centerra	0	0	11	15	40	8	3	0	0
Colburn Hill	0	0	1	4	7	3	1	0	0
DHMC Main Campus	27	55	113	73	161	18	11	3	2
Downtown/Hanover St	0	1	5	0	18	10	4	0	1

Table 39: Start Time by Place of Work

End times are more dispersed than start times; 81% end between 3pm and 7pm (Figure 68). The departure time with the greatest number of respondents is 5pm with 28%. The time period with the greatest amount of end times is 4:00 to 5:30pm. During the mid-day there are a few end times. Between 7 and 7:30am there is a slight increase in end times; this is correlated to those working at DHMC and who begin at 7pm, primarily nurses.

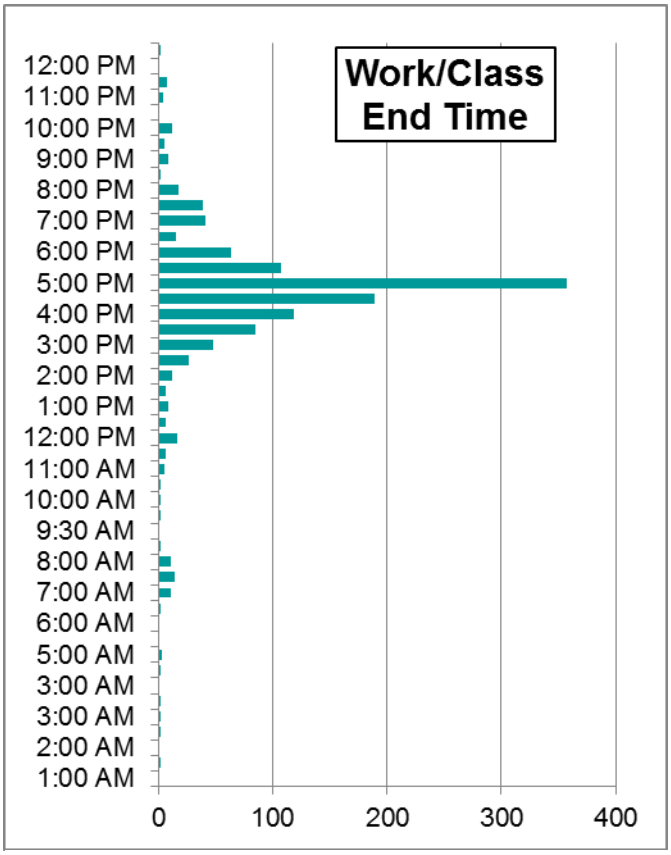


Figure 68: End Times

Table 40 shows the places of employment and the number of employees who end at each half hour between 3pm and 7pm. Those who end at 3:30pm are mainly at DHMC and are heading towards New London; this correlates with the end time for Colby-Sawyer nursing students. At most places of employment, the majority end at 5pm with the exception of Lyme Road (4:00pm), Heater Road (4:30pm), and Colburn Hill (4:30pm) and Great Hollow Road (3:30pm).

Location	3:00 PM	3:30 PM	4:00 PM	4:30 PM	5:00 PM	5:30 PM	6:00 PM	6:30 PM	7:00 PM
Colby-Sawyer College	6	7	18	4	34	11	4	2	3
Downtown New London	2	2	2	4	11	5	2	0	2
New London Hospital	0	1	2	4	6	4	1	1	5
Along Lyme Road	2	2	5	4	4	1	0	0	0
Great Hollow Road	4	11	2	9	7	2	1	0	0
Downtown Hanover/Dartmouth College	8	8	7	23	35	9	10	1	3
Along Etna Road	0	1	4	6	8	0	0	0	0
Along Heater Road	0	3	1	14	13	5	3	0	0
Centerra	0	3	7	14	42	6	2	0	2
Colburn Hill	0	1	1	6	5	3	0	0	0
DHMC Main Campus	16	33	42	74	137	42	27	9	20
Downtown/Hanover St	0	1	2	6	17	1	4	0	3

Table 40: End Time Place of Work

Question 10 - If available, would you use a commuter bus service to travel within the corridor between New London and Lebanon/Hanover for work/class trips?

Forty-four percent of respondents said they would use a commuter bus three or more times a week; this was the greatest percent of respondents (Figure 69). An additional 20% said they would use it up to two times a week. While 9% indicated "Other," many of these commented that it would depend on the bus schedule and how it fits their existing schedule, the fare charged and the reliability of service. Newport residents are most likely to use the bus three or more times a week followed by Sunapee (Figure 70). Eastman and Springfield residents are most likely to take the bus at least once a week. Ten communities had 50% or more of respondents who said they would take the bus at least once a week. Hanover and Lebanon residents are least likely to take the bus at least once a week.

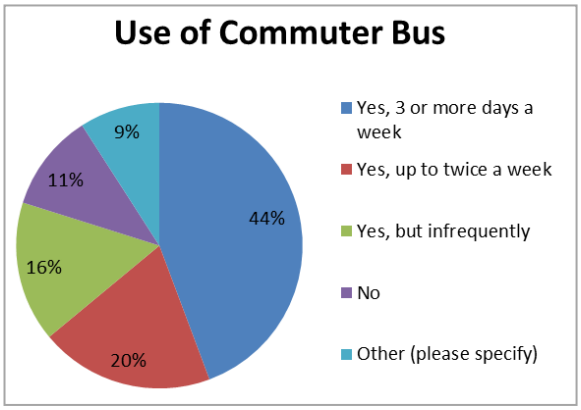


Figure 69: Use of Commuter Bus

By place of employment, Colburn Hill employees are most likely (by percentage) to take at least 3 roundtrips via commuter bus and New London Hospital employees are the least likely. Etna Road and DHMC employees are most likely to take the bus at least once a week (Figure 71). Overall, those working in New London are least likely to use the bus. By raw numbers DHMC employees would generate the greatest number of passengers with 293 reporting they would use it 3 or more days a week (Table 41).

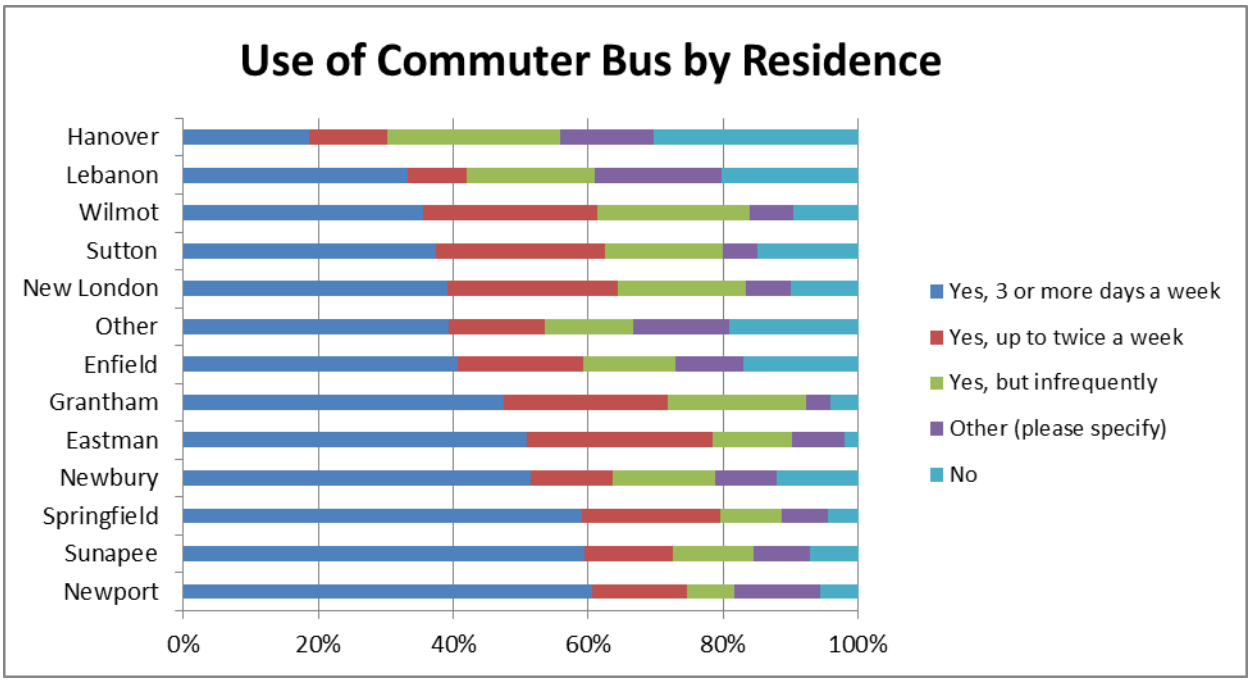


Figure 70: Comparison of Use of Commuter Bus by Residence

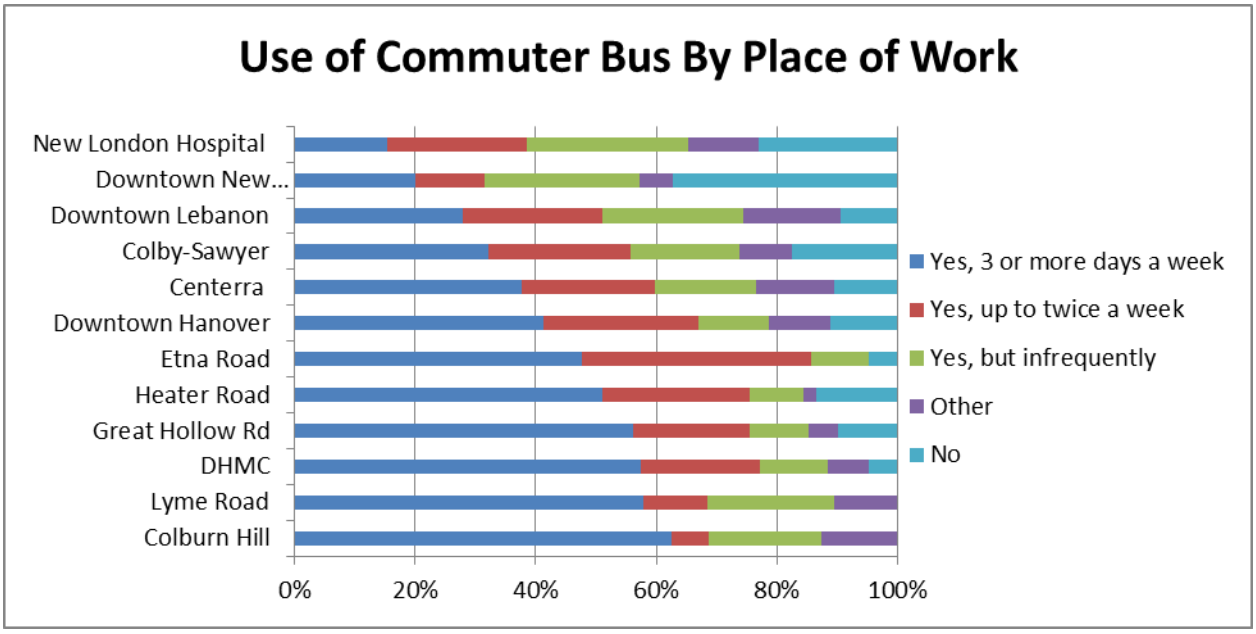


Figure 71: Comparison of Use of Commuter Bus by Place of Work

	Colburn Hill	Lyme Road	DHMC	Great Hollow Rd	Heater Road	Etna Road	Downtown Hanover	Centerra	Colby-Sawyer	Downtown Lebanon	Downtown New London	New London Hospital
Yes, 3 or more days a week	10	11	293	23	23	10	56	29	37	12	7	4
Yes, up to twice a week	1	2	101	8	11	8	35	17	27	10	4	6
Yes, but infrequently	3	4	57	4	4	2	16	13	21	10	9	7
Other	2	2	35	2	1		14	10	10	7	2	3
No			24	4	6	1	15	8	20	4	13	6
Total	**16**	**19**	**510**	**41**	**45**	**21**	**136**	**77**	**115**	**43**	**35**	**26**

Table 41: Level of Usage By Place of Work

Question 11 - What is the maximum one-way fare you would be willing to pay for commuter transit service?
Respondents were asked about the maximum one-way fare they'd be willing to pay for commuter service. Seventy-seven percent responded they would not pay more than $3 and 45% would not pay more than $2 (Figure 72). The peer average fare was $4.15; $3.18 was the average fare respondents were willing to pay from the survey. This value is skewed upwards by a handful of responses who were willing to pay more than $8. There was no correlation between existing commute time and maximum fare payment but there was one between how often respondents said they would use the bus. Those less likely to use it are willing to pay more per trip. By place of residence, Hanover residents are willing to pay the highest average fare ($3.90) and Enfield residents the lowest ($2.26). Those who work in New London are willing to pay the highest fares; $2 more than any others. Downtown New London employees are willing to pay the highest average fare of $7.50. Those along Lyme Road said they were willing to pay the lowest average fare of $2.74.

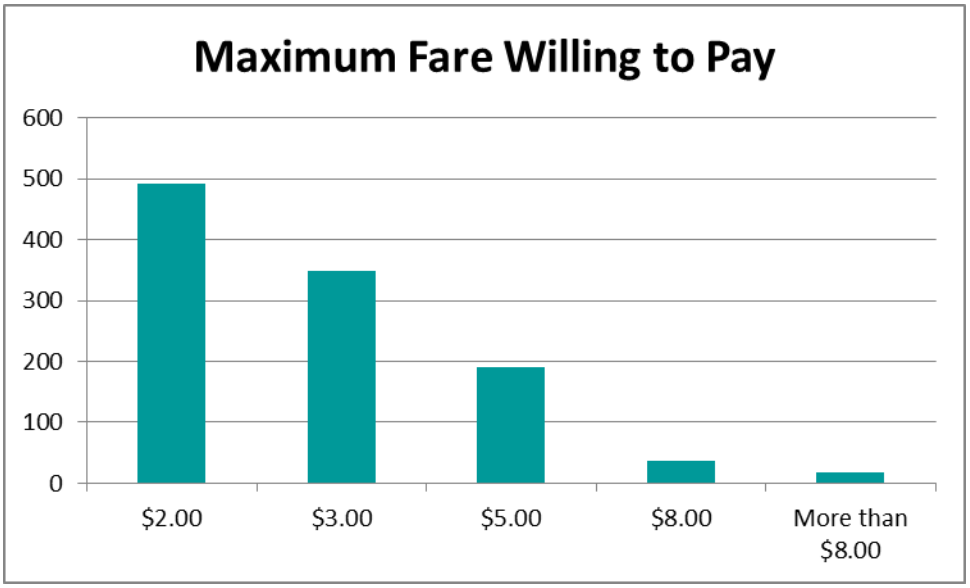


Figure 72: Maximum One-way Fare Willing to Pay

Question 12 - How much longer are you willing to travel (per trip) to take transit rather than driving to work/school?

The majority of respondents are willing to add up to 15 minutes to their commute to take a bus (Figure 73); these are correlated heavily to those whose trips are currently less than 30 minutes or more than an hour. Those traveling between 30 and 60 minutes are more likely to add more time to their trip. A correlation was also found between those willing to add 30 minutes or more to their commute to take a bus and frustration with lack of transit and spending too much money on their commute.

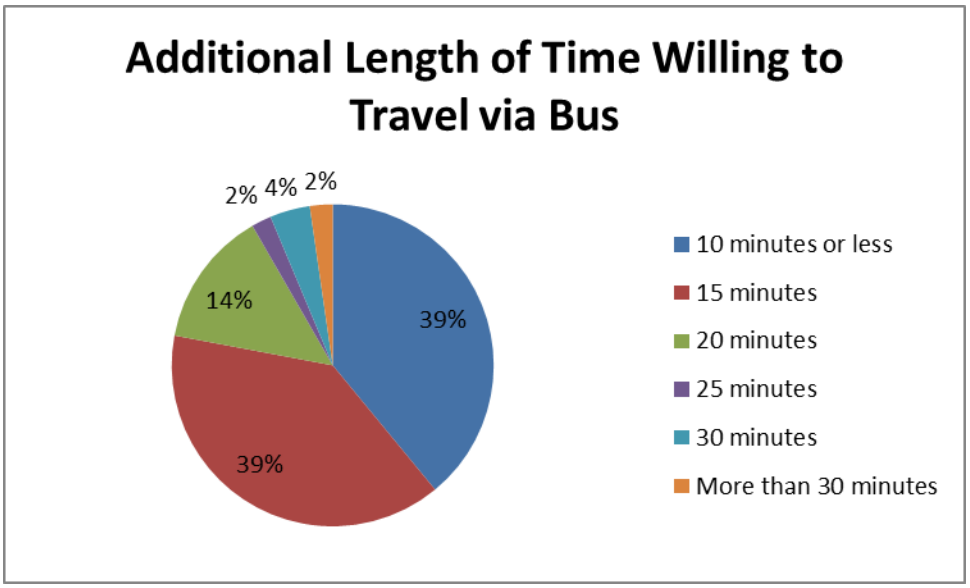


Figure 73: Additional Travel Time

Question 13 - Which intermediate locations between New London and Lebanon/Hanover would be most useful for your commute? (select all that apply)

For this question respondents were able to select all locations that applied. The greatest number of responses, 519, was for the Exit 12 Park-and-Ride Lot followed by the Grantham Exit 13 Park-and-Ride (Figure 74). Slightly over a third of respondents (36.2%) indicated that they could use more than one location for a Park-and-Ride. Ten percent suggested alternative locations they would use such as Exit 9 in Warner, Exit 12A, and Exit 11.

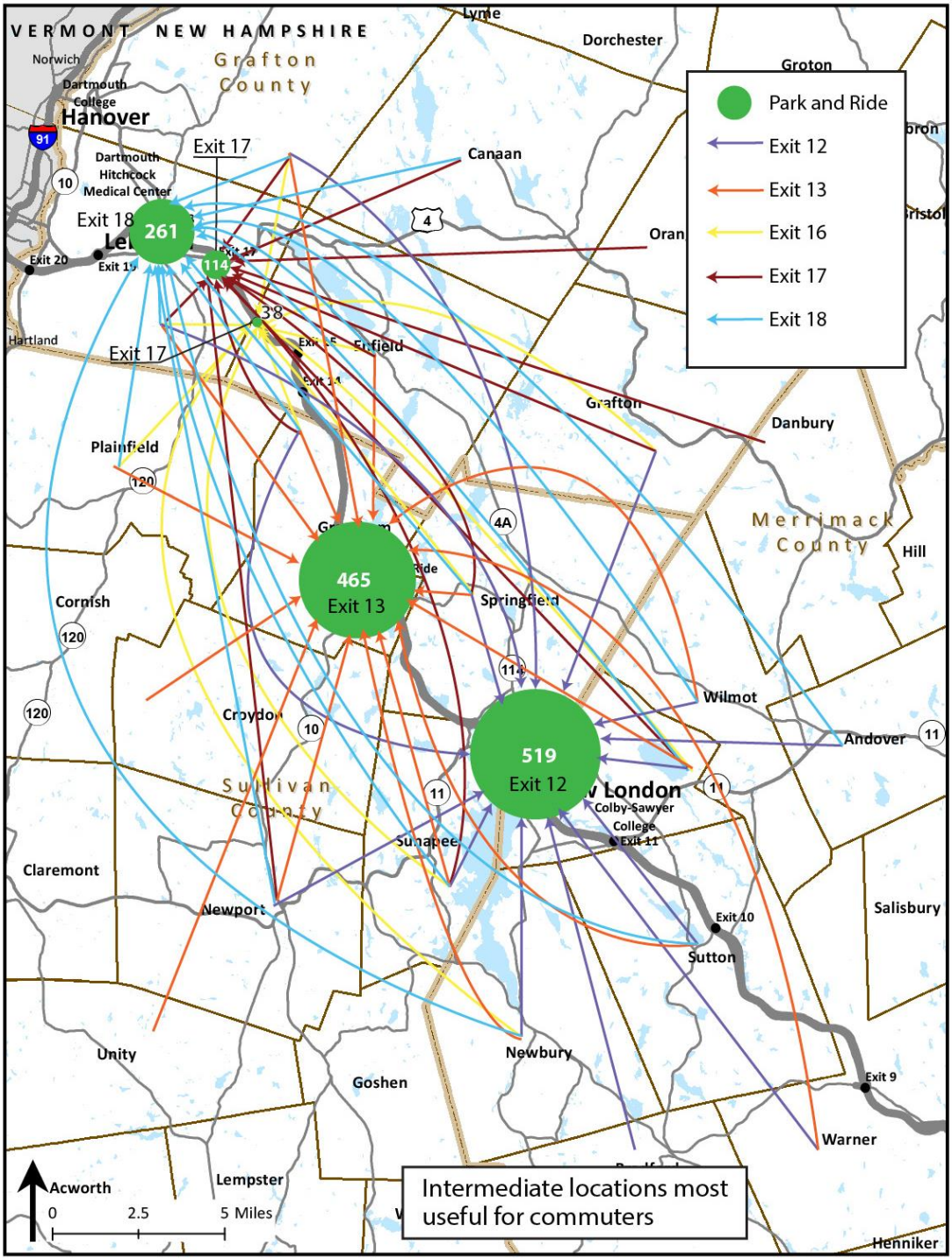


Figure 74: Potential Park And Ride Usage Locations

Question 14 - Why would you not use the commuter bus service?

For those who would not use the bus, the greatest response (34%) was that it would not go where they needed it to go (Figure 75). These individuals either don't travel on I-89, travel south of New London for work, or work in Vermont. Twenty-nine percent provided other reasons, which included many who do not commute for work. Those who make other stops during their commute (8%), do so every day. Most who responded that it would not fit their schedule work odd hours, late shifts or have varying schedules.

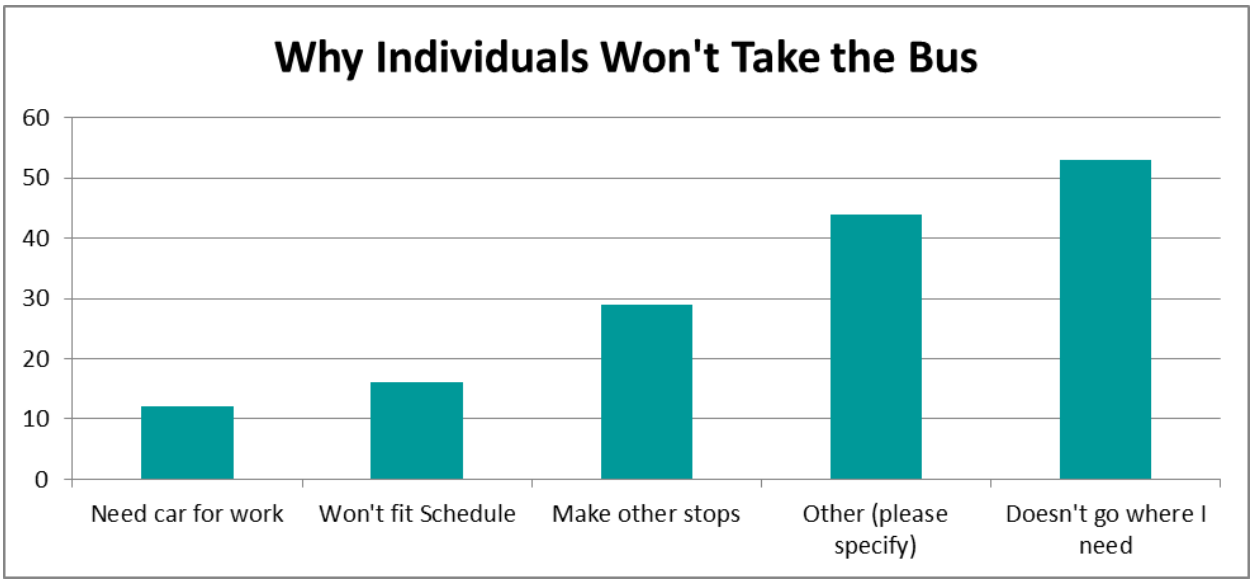


Figure 75: Reasons Why Individuals Cannot Use a Commuter Bus

Question 15 - Do you have any other comments or thoughts related to commuting in the I-89 corridor?
Four-hundred and thirty individuals (27.8% of all survey respondents) left comments and overwhelmingly most were positive. Positive comments ranged from people encouraging and wanting commuter bus service, citing the criticalness of public transportation, to those that may not use it but understand the need for it. There were some comments that were not related to the survey but either comments on existing Dartmouth Coach or Advance Transit services, highway/roadway conditions or wanting service farther south to Sutton or Concord. There were only four negative comments provided, these individuals did not think it was needed or that tax dollars should be spent on it. Overall, however, comments were positive and individuals would like to see commuter bus service operated in the I-89 corridor.

"This is a great idea!"

"A bus service from New London to DHMC is a fabulous idea!"

"There is a huge need for a bus that runs regularly between New London and the Upper Valley!"

Appendix C: Demand Calculations by Alternative

Alternative 1

Table 42: Alternative 1 Demand by Shift Start Time

Location	6:00 AM	6:30 AM	7:00 AM	7:30 AM	8:00 AM	8:30 AM	9:00 AM	9:30 AM	10:00 AM
Colby Sawyer College	1	6	5	12	39	5	14	6	15
Downtown New London	0	0	5	3	13	6	3	0	3
New London Hospital	0	2	6	7	5	3	1	0	0
Along Lyme Road	1	2	3	6	5	2	0	0	0
Great Hollow Road	1	2	15	5	10	2	2	0	0
Downtown Hanover/Dartmouth College	1	4	4	16	30	22	31	7	7
Along Etna Road	1	1	2	7	8	1	0	0	0
Along Heater Road	2	0	5	11	21	2	2	0	0
Centerra	0	0	11	15	40	8	3	0	0
Colburn Hill	0	0	1	4	7	3	1	0	0
DHMC Main Campus	27	55	113	73	161	18	11	3	2
Downtown Lebanon/Hanover St		1	5	0	18	10	4	0	1

Provides direct service to this location Service available via transfer to the AT Blue Route

Table 43: Alternative 1 Demand by Shift End Time

Location	3:00 PM	3:30 PM	4:00 PM	4:30 PM	5:00 PM	5:30 PM	6:00 PM	6:30 PM	7:00 PM
Colby Sawyer College	6	7	18	4	34	11	4	2	3
Downtown New London	2	2	2	4	11	5	2	0	2
New London Hospital	0	1	2	4	6	4	1	1	5
Along Lyme Road	2	2	5	4	4	1	0	0	0
Great Hollow Road	4	11	2	9	7	2	1	0	0
Downtown Hanover/Dartmouth College	8	8	7	23	35	9	10	1	3
Along Etna Road	0	1	4	6	8	0	0	0	0
Along Heater Road	0	3	1	14	13	5	3	0	0
Centerra	0	3	7	14	42	6	2	0	2
Colburn Hill	0	1	1	6	5	3	0	0	0
DHMC Main Campus	16	33	42	74	137	42	27	9	20
Downtown Lebanon/Hanover St	0	1	2	6	17	1	4	0	3

Provides direct service to this location Service available via transfer to the AT Blue Route

Alternative 2

Table 44: Alternative 2 Demand by Shift Start Time

Location	6:00 AM	6:30 AM	7:00 AM	7:30 AM	8:00 AM	8:30 AM	9:00 AM	9:30 AM	10:00 AM
Colby Sawyer College	1	6	5	12	39	5	14	6	15
Downtown New London	0	0	5	3	13	6	3	0	3
New London Hospital	0	2	6	7	5	3	1	0	0
Along Lyme Road	1	2	3	6	5	2	0	0	0
Great Hollow Road	1	2	15	5	10	2	2	0	0
Downtown Hanover/Dartmouth College	1	4	4	16	30	22	31	7	7
Along Etna Road	1	1	2	7	8	1	0	0	0
Along Heater Road	2	0	5	11	21	2	2	0	0
Centerra	0	0	11	15	40	8	3	0	0
Colburn Hill	0	0	1	4	7	3	1	0	0
DHMC Main Campus	27	55	113	73	161	18	11	3	2
Downtown Lebanon/Hanover St		1	5	0	18	10	4	0	1

Provides direct service to this location Service available via transfer to the AT Blue Route

Table 45: Alternative 2 Demand by Shift End Time

Location	3:00 PM	3:30 PM	4:00 PM	4:30 PM	5:00 PM	5:30 PM	6:00 PM	6:30 PM	7:00 PM
Colby Sawyer College	6	7	18	4	34	11	4	2	3
Downtown New London	2	2	2	4	11	5	2	0	2
New London Hospital	0	1	2	4	6	4	1	1	5
Along Lyme Road	2	2	5	4	4	1	0	0	0
Great Hollow Road	4	11	2	9	7	2	1	0	0
Downtown Hanover/Dartmouth College	8	8	7	23	35	9	10	1	3
Along Etna Road	0	1	4	6	8	0	0	0	0
Along Heater Road	0	3	1	14	13	5	3	0	0
Centerra	0	3	7	14	42	6	2	0	2
Colburn Hill	0	1	1	6	5	3	0	0	0
DHMC Main Campus	16	33	42	74	137	42	27	9	20
Downtown Lebanon/Hanover St	0	1	2	6	17	1	4	0	3

Provides direct service to this location Service available via transfer to the AT Blue Route

Alternative 3

Table 46: Alternative 3 Demand by Shift Start Time

Location	6:00 AM	6:30 AM	7:00 AM	7:30 AM	8:00 AM	8:30 AM	9:00 AM	9:30 AM	10:00 AM
Colby Sawyer College	1	6	5	12	39	5	14	6	15
Downtown New London	0	0	5	3	13	6	3	0	3
New London Hospital	0	2	6	7	5	3	1	0	0
Along Lyme Road	1	2	3	6	5	2	0	0	0
Great Hollow Road	1	2	15	5	10	2	2	0	0
Downtown Hanover/Dartmouth College	1	4	4	16	30	22	31	7	7
Along Etna Road	1	1	2	7	8	1	0	0	0
Along Heater Road	2	0	5	11	21	2	2	0	0
Centerra	0	0	11	15	40	8	3	0	0
Colburn Hill	0	0	1	4	7	3	1	0	0
DHMC Main Campus	27	55	113	73	161	18	11	3	2
Downtown Lebanon/Hanover St		1	5	0	18	10	4	0	1

Provides direct service to this location Service available via transfer to the AT Blue Route

Table 47: Alternative 3 Demand by Shift End Time

Location	3:00 PM	3:30 PM	4:00 PM	4:30 PM	5:00 PM	5:30 PM	6:00 PM	6:30 PM	7:00 PM
Colby Sawyer College	6	7	18	4	34	11	4	2	3
Downtown New London	2	2	2	4	11	5	2	0	2
New London Hospital	0	1	2	4	6	4	1	1	5
Along Lyme Road	2	2	5	4	4	1	0	0	0
Great Hollow Road	4	11	2	9	7	2	1	0	0
Downtown Hanover/Dartmouth College	8	8	7	23	35	9	10	1	3
Along Etna Road	0	1	4	6	8	0	0	0	0
Along Heater Road	0	3	1	14	13	5	3	0	0
Centerra	0	3	7	14	42	6	2	0	2
Colburn Hill	0	1	1	6	5	3	0	0	0
DHMC Main Campus	16	33	42	74	137	42	27	9	20
Downtown Lebanon/Hanover St	0	1	2	6	17	1	4	0	3

Provides direct service to this location Service available via transfer to the AT Blue Route

Alternative 4

Table 48: Alternative 4 Demand by Shift Start Time

Location	6:00 AM	6:30 AM	7:00 AM	7:30 AM	8:00 AM	8:30 AM	9:00 AM	9:30 AM	10:00 AM
Colby Sawyer College	1	6	5	12	39	5	14	6	15
Downtown New London	0	0	5	3	13	6	3	0	3
New London Hospital	0	2	6	7	5	3	1	0	0
Along Lyme Road	1	2	3	6	5	2	0	0	0
Great Hollow Road	1	2	15	5	10	2	2	0	0
Downtown Hanover/Dartmouth College	1	4	4	16	30	22	31	7	7
Along Etna Road	1	1	2	7	8	1	0	0	0
Along Heater Road	2	0	5	11	21	2	2	0	0
Centerra	0	0	11	15	40	8	3	0	0
Colburn Hill	0	0	1	4	7	3	1	0	0
DHMC Main Campus	27	55	113	73	161	18	11	3	2
Downtown Lebanon/Hanover St		1	5	0	18	10	4	0	1

Provides direct service to this location Service available via transfer to the AT Blue Route

Table 49: Alternative 4 Demand by Shift End Time

Location	3:00 PM	3:30 PM	4:00 PM	4:30 PM	5:00 PM	5:30 PM	6:00 PM	6:30 PM	7:00 PM
Colby Sawyer College	6	7	18	4	34	11	4	2	3
Downtown New London	2	2	2	4	11	5	2	0	2
New London Hospital	0	1	2	4	6	4	1	1	5
Along Lyme Road	2	2	5	4	4	1	0	0	0
Great Hollow Road	4	11	2	9	7	2	1	0	0
Downtown Hanover/Dartmouth College	8	8	7	23	35	9	10	1	3
Along Etna Road	0	1	4	6	8	0	0	0	0
Along Heater Road	0	3	1	14	13	5	3	0	0
Centerra	0	3	7	14	42	6	2	0	2
Colburn Hill	0	1	1	6	5	3	0	0	0
DHMC Main Campus	16	33	42	74	137	42	27	9	20
Downtown Lebanon/Hanover St	0	1	2	6	17	1	4	0	3

Provides direct service to this location Service available via transfer to the AT Blue Route

Alternative 5

Table 50: Alternative 5 Demand by Shift Start Time

Location	6:00 AM	6:30 AM	7:00 AM	7:30 AM	8:00 AM	8:30 AM	9:00 AM	9:30 AM	10:00 AM
Colby Sawyer College	1	6	5	12	39	5	14	6	15
Downtown New London	0	0	5	3	13	6	3	0	3
New London Hospital	0	2	6	7	5	3	1	0	0
Along Lyme Road	1	2	3	6	5	2	0	0	0
Great Hollow Road	1	2	15	5	10	2	2	0	0
Downtown Hanover/Dartmouth College	1	4	4	16	30	22	31	7	7
Along Etna Road	1	1	2	7	8	1	0	0	0
Along Heater Road	2	0	5	11	21	2	2	0	0
Centerra	0	0	11	15	40	8	3	0	0
Colburn Hill	0	0	1	4	7	3	1	0	0
DHMC Main Campus	27	55	113	73	161	18	11	3	2
Downtown Lebanon/Hanover St		1	5	0	18	10	4	0	1

Provides direct service to this location Service available via transfer to the AT Blue Route

Table 51: Alternative 5 Demand by Shift End Time

Location	3:00 PM	3:30 PM	4:00 PM	4:30 PM	5:00 PM	5:30 PM	6:00 PM	6:30 PM	7:00 PM
Colby Sawyer College	6	7	18	4	34	11	4	2	3
Downtown New London	2	2	2	4	11	5	2	0	2
New London Hospital	0	1	2	4	6	4	1	1	5
Along Lyme Road	2	2	5	4	4	1	0	0	0
Great Hollow Road	4	11	2	9	7	2	1	0	0
Downtown Hanover/Dartmouth College	8	8	7	23	35	9	10	1	3
Along Etna Road	0	1	4	6	8	0	0	0	0
Along Heater Road	0	3	1	14	13	5	3	0	0
Centerra	0	3	7	14	42	6	2	0	2
Colburn Hill	0	1	1	6	5	3	0	0	0
DHMC Main Campus	16	33	42	74	137	42	27	9	20
Downtown Lebanon/Hanover St	0	1	2	6	17	1	4	0	3

Provides direct service to this location Service available via transfer to the AT Blue Route

Appendix D: National Review of Innovative Funding Strategies

A review of innovative strategies for funding transit service was conducted as part of this study. This appendix provides more detailed information and examples of the strategies investigated.

Fees

Fees can be used to support transit services in a similar fashion to taxes. The authority to impose fees is also given at the discretion of the state. Fees used to support transit service include: vehicle fees (title, registration, tags, and inspection), corporate franchise fee, parking fee, mortgage recording fee, tolls, motor carrier/limo fee, and underground tank storage fees.

Mortgage Recording Fee

A mortgage recording fee is similar to a realty transfer tax in that a fee is assessed when a new mortgage (due to the purchase of a property) is recorded. In western New York, for example, a mortgage recording fee is assessed at the county level for each county within a transportation authority that receives public transportation services. The county provides the revenue from the mortgage recording fee to the transportation authority to support transit service provision within that county and throughout the authority service area. In New Hampshire the the county sets and collects the mortgage recording fees.

Development Impact Fees

Development impact fees are one-time charges on new developments to help fund infrastructure costs off site but which are impacted by the new development[30]. They are typically used to fund roadway improvements but can be used for public transit infrastructure investments and operations, however it is not yet widespread. The fees can be assessed locally or on a statewide basis and are most effective in rapidly growing areas with strong markets. San Francisco enacted a transit impact development fee in 1981 and generates an average of $10 million a year. The fee has a maximum of $5 per square foot and is only applied to new office building development. The revenue is used to and help fund Muni's operating cost. Currently 26 states have passed legislation allowing for the assessment of impact fees on new development, New Hampshire is one of these states. New Hampshire municipalities adopt an impact fee system through their zoning ordinance but its uses are limited and transit is not an authorized use. To use development impact fees for transit would require a redefinition of authorized use under RSA 674:21, V. and the adoption of set legislation in their zoning.

Vehicle Fees

Ad Valorem Fee

Ad valorem fees are fees based on the estimated values of a good and in the case of transportation are typically assessed when vehicles are registered, and based on the value or weight of the vehicle. They can be assessed at the local and/or state level. The advantage to this fee is that it is assessed to those who benefit from transportation improvements regardless of the amount of vehicle usage, it is variable and not fixed such as with a registration fee, and is seen as more progressive[31]. The revenue from ad valorem fees typically goes into the state transportation fund which helps fund transit.

New Hampshire assesses ad valorem fees at both the state and local levels. State fees are assessed based on the weight of the vehicle[32], while local fees are assessed based on the value of the vehicle. The revenue goes into the state transportation fund In FY2015 state and local ad valorem registration fees in New Hampshire totaled

[30] Transit Cooperative Research Program (TCRP). *TCRP Report 129 – Local and Regional Funding Mechanisms for Public Transportation*. http://www.trb.org/Publications/Blurbs/160356.aspx. 2009.

[31] Transit Cooperative Research Program (TCRP). *TCRP Report 129 – Local and Regional Funding Mechanisms for Public Transportation*. http://www.trb.org/Publications/Blurbs/160356.aspx. 2009.

[32] NH RSA Chapter 261:141 http://www.gencourt.state.nh.us/rsa/html/xxi/261/261-141.htm 2017

$303,575,500 for 1,493,363 vehicles, this equates to an average of $203 per vehicle. State assessments accounted for 24% of the revenue collected and Municipal 76%. Table 52 presents the additional potential revenue for raising the fee by one to 10 percent at either the state or local level and dedicating it to transit. **Raising the state fee by just one-percent could generate $723,000 and New Hampshire could dedicate a portion of the revenue to fund transit.**

Percent increase	Municipal	State	Total
1%	$2,312,793.18	$722,961.82	$3,035,755
2%	$4,625,586.36	$1,445,923.64	$6,071,510
5%	$11,563,965.90	$3,614,809.10	$15,178,775
10%	$23,127,931.80	$7,229,618.20	$ 30,357,550

Table 52. Potential Revenue From an Increase in the Ad Valorem Vehicle Fee

Registration, Title and License Fees

Vehicle-based fees provide revenue to support transit service and discourage individual vehicle usage while encouraging transit usage and other alternate modes of travel. Different types of fees include inspection, heavy vehicle registration, truck gross weight registration, license, and vanity plates. Vehicle fees can be dynamic and charged based on vehicle value, weight and/or age or flat rate. The fees can be charged via several options based on the issuance of titles, licenses, registration or inspection. The authority to impose and collect vehicle fees is sometimes provided to local governments as a 'local option.' The revenue from these types of options are usually used for the administration/collection of fees, enforcement, or put into the general fund. Only a portion is generally used to fund public transportation. Across the United States local governments in 34 states have the ability to assess vehicle fees and 20 have state level versions[33]. In Vermont the state assess vehicle inspection fees based on class of vehicle and a separate fee for vanity plates which goes into the state transportation fund, part of which funds transit. In Florida 12.9% of vehicle registration fees statewide goes to fund transit.

New Hampshire allows municipalities to assess up to a $5 vehicle registration fee to create a local transportation fund which can be used for the operating and capital cost of public transportation amongst many other things. To assess the fee the legislative body of the municipality must vote and approve it. **Fifteen communities currently collect this fee including Lebanon and Hanover**. Hanover collects $34,310 and dedicates the funding to road, bridges, bicycle and pedestrian projects. Lebanon collects $60,000 annually from this fee and uses it to fund their local share for Advance Transit. If Grantham and New London were to assess the $5 fee $41,000 could be raised. There is current legislation which would increase the $5 cap to $10, if passed this could be a local funding option for communities. If the legislation passes an additional $94,100 could be collected by Hanover and Lebanon and if Grantham and New London asses the fee $176,100 could be raised.

City/Town	Current Estimated Fee Collected	Potential Fee Collection Under current Legislation	Potential Fee Collection Under Proposed Legislation	Additional Revenue Potential
Hanover	$34,310	$34,310	$68,620	$34,310
Lebanon	$60,000	$6,000	$120,000	$60,000
Grantham	$0	$19,500	$39,000	$19,500-$39,000
New London	$0	$21,500	$43,000	$21,500-$43,000
Total				**$41,100-$176,310**

Table 53. Revenue From Local Vehicle Registration Fee

Motor Carrier/Limo fees

Motor carrier/Limo fees are similar to vehicle registration fees but are collected only for limousine and buses. This fee is typically administered and collected by the state and deposited into a general transportation fund. In Michigan the state passed legislation in 1982 and 1990 which requires motor buses and limousines to pay annual fees in order to

[33] Arizona PIR Education Fund. *Why and How to Fund Public Transportation.* http://www.uspirg.org/sites/pirg/files/reports/Why-and-How-to-Fund-Public-Transportation.pdf. 2009

operate service the state has created a Comprehensive Transportation Fund (CTF) that is reserved for public transit uses. The CTF receives 10% of the Michigan Transportation Fund who's revenue sources include fuel taxes, vehicle registration fees, and motor carrier/limo fees amongst others. CTF funding can be used for capital and operating costs. The motor carrier/limo fees collected which go towards transit annually are $600,000. The registration fee for each bus is $25 and limo is $50 but effective March 21, 2017 the limo fee will be abolished and the bus fee raised to $100 per bus annually[34,35]. **If New Hampshire were to implement a $100 annual fee for all private and commercially owned buses the state could generate $163,600 in revenue.**

Vehicle lease fee

When a consumer leases a vehicle, fees are included in every lease payment. Lease taxes or lease fees are basically like a sales tax applied to the amount of each monthly lease payment. The fees could be assessed to generate transportation revenue. In Pennsylvania there is a 3% motor vehicle lease fee which goes into the Public Transportation Assistance Fund[36]. According to Kelley Blue Book approximately 21.2% of vehicles are leased. While New Hampshire does not assess a specific fee on leased vehicles, if a monthly fee of 50¢ was assessed this could generate $718,000 or an annual fee of $1 could generate $130,000. **If the Pennsylvania model was applied, assuming the average lease payment is $250 a month, this could generate $976,000 annually.**

New Tire Fee

Several states assess a fee to the purchase of every new tire therefor the fee is based on usage, those who drive more will need to purchase more tires. Most states which impose the fee do so to offset the cost of disposing of the tires. Pennsylvania is the only known state which dedicates the entire assessed fee to funding public transit. Pennsylvania assess a $1 fee on all new tires, all collected fees go into the Public Transportation Assistance Fund[37]. New Hampshire does not collect a fee on new tires but does allow municipalities to assess a fee when vehicles are registered, the revenue must be used for off-site scrap tire management. If New Hampshire wanted to allow for municipalities who assess a new tire fee at the time of vehicle registration to use the revenue to fund transit then a change in the legislation would be required. A 50¢ charge per tire fee collected at the local level dedicated to funding transit could generate $54,100 amongst the local communities. Table xx shows the potential revenue which could be generated locally for a 50¢, 75¢ and $1 fee per tire during registration.

Municipality	50¢/tire	75¢/tire	$1/tire
Hanover	$13,700	$20,600	$27,400
Lebanon	$24,000	$36,000	$48,000
Grantham	$7,800	$11,700	$15,600
New London	$8,600	$12,900	$17,200
Total	**$54,100**	**$81,200**	**$108,200**

Table 54. Potential New Tire Fee Revenue

Parking Revenue/Fees

Parking fees can established multiple goals including generating revenue, shifting mode choice, and reducing congestion. Paid parking is almost always a locally managed funding option for transportation. In Hanover the city uses revenue from the parking fund to support Advance Transit. The fund is derived from permit parking, meter fees, leased parking, fines and the Tax Increment Financing District Levy. **The fund collects $1.8 million annually of which approximately 13% is spent on transit.** If Hanover raised their rates by 5% then an additional $90,000 could

[34] Michigan State Act 271 http://www.legislature.mi.gov/documents/mcl/pdf/mcl-Act-271-of-1990.pdf?20140806142541 2017

[35] Michigan State Act 432 http://www.legislature.mi.gov/documents/mcl/pdf/mcl-act-432-of-1982.pdf?20140806142541 2017

[36] Pennsylvania Department of Revenue. Public Transportation Assistance Fund Taxes and Fees https://revenue-pa.custhelp.com/app/answers/detail/a_id/661/~/public-transportation-assistance-fund-(pta-)-taxes-and-fees 2017

[37] Pennsylvania Department of Revenue. Public Transportation Assistance Fund Taxes and Fees https://revenue-pa.custhelp.com/app/answers/detail/a_id/661/~/public-transportation-assistance-fund-(pta-)-taxes-and-fees 2017

be generated. New London and Lebanon do not have paid parking; implementing paid parking would require capital investments in infrastructure and enforcement.

Tolls

Tolling provides a source of revenue for transportation investments and congestion relief and is administered at the state level. Users pay a fee for access to a road, bridge or tunnel and the revenue general goes into improving and paying for that system. Tolls are seen as reliable and through the advent of new technology have reduced constraints associated with collecting tolls. While traditionally the revenue is restricted to use on the corridor collected in San Francisco bridge tolls were raised in 2004 to fund a new ferry, transit infrastructure, express bus, operating costs for regional transit, and improved connections[38]. Locally in Maine the Shuttlebus Zoom service is partially funded by the Maine Turnpike Authority. Several other states, such as Delaware and New York, have begun to allocate revenue from tolling to the state transportation fund which helps fund transit. In California Solano County Transit and the Eastern Contra Costa Transit Authority both have dedicated funds from bridge tolling.

In the United States over half of the states have implemented toll roads including New Hampshire. New Hampshire has several toll roads including I-95, Route 16 and I-93. In New Hampshire toll credits can be used to match federal highway funds for roadway and "projects concerning the travel of motor vehicles on such highways and roads" without approval of the joint legislative capital budget overview committee. Toll credits were used for the local match to fund the MTA Concord Express demonstration project for the first two years. Tolls collected are used exclusively for the turnpike system expenses including operating, construction, reconstruction and maintenance; therefor the funds could not be used for a service along I-89. Implementing tolls generally requires a minimum average daily traffic (ADT) of 30,000, only a small portion of I-89 between the Vermont boarder and Exit 19 would qualify. The cost to implement tolls at this time would be greater than the revenue collected.

Underground Storage Tank Fee

Underground tank storage fees are assessed to the owners of underground motor fuel tanks based on the capacity of the tank. The fees are set and collected at the state level. Typically they are used for environmental protection and clean up but in certain states amounts have been allocated to the transportation or general funds. In Rhode Island 50% of the 1.0¢ underground storage tank recovery fee, which is assessed per gallon, is allocated to Rhode Island Public Transit Authority operations[39]. New Hampshire does have an underground storage tank program but does not collect a fee. **Implementing a fee and allocating a percentage to fund transit would require state legislation but could collect up to $30,000 and if followed the Rhode Island model could allocate $15,000 (50%) of the revenue to funding transportation and transit programs.**

Taxes

Taxes generated specifically for transit service come from a variety of sources: sales tax, property tax, income tax, employer/payroll taxes, vehicle excise tax, realty transfer tax, hospitality tax, utility (including gas) tax, etc. Equally variable is the authority by which the taxes are assessed. The ability of individual jurisdictions to collect income taxes varies widely. In New Hampshire the authority is at the state level currently but if a Regional Ballot Initiative was passed the authority would be given to counties/municipalities to apply a tax surcharge to raise revenue for transportation-related purposes only.

Employer Pass Tax Break

Under Section 132 (f) of the Internal Revenue Code commuter tax benefits area allowed. Under the law employers can give their employees up to $255 a month in transit vouchers/passes or employees can use up to $255 per month

[38] Transit Cooperative Research Program (TCRP*). TCRP Report 129 – Local and Regional Funding Mechanisms for Public Transportation*. http://www.trb.org/Publications/Blurbs/160356.aspx. 2009.

[39] Survey of State Funding – Public Transportation American Association of State Highway and Transportation officials http://scopt.transportation.org/Documents/SSFP-10-UL.pdf 2016

in pre-tax income to pay for transit. If the employer pays for the transit passes, the subsidy does not show up in the employees W-2 form as income. If the employee elects to pay the commuter benefit they can do so with their pre-tax income thus receiving more after-tax spendable income[40].

General Revenue and Taxes

Property Tax

Property taxes are the primary source of local tax collection used to operate local government. Fifty-percent of states have municipalities which impose property taxes and dedicate a proportion to funding transit. Property taxes are a source of local revenue for 69 transit providers according the National Transit Database. The use of property tax revenue is generally left to the discretion of the municipality so using this source of revenue to support transit service does not always require special authority. The Town can use a portion of existing property tax revenue to support transit service.

New Hampshire assesses four types of property taxes: town tax, local education tax, state education tax, and a county tax. A special assessment or local mill levy for transit would require legislation action in New Hampshire. **Assessed property value in 2016 for Grantham, Lebanon, Hanover, and New London was $5.3 billion[41], applying a tax rate increase of 0.1 mills to these four communities would generate $535,000.**

Sales Tax

Nationally sales tax is the most commonly used tax to support transit services for capital spending and operating expenses, particularly at the state level. According to the Federal Transit Administration's National Transit Database, after federal funds, sales taxes comprised the largest source of revenues for capital spending (38%) and the second largest source of operating expenses (27%) after fares (32%). Nineteen states use the state sales tax to fund 99 transit systems. Massachusetts is the only New England state to dedicate state sales taxes to transit. At the local and regional level, sales taxes can be enacted for transit (if the authority is given). Nationally, the additional local/regional sales tax assessed for transit ranges from 0.25% to 1%[42]. Local sales taxes are dedicated transit sources in 19 states to fund 101 transit systems. There are no states in New England that have local sales taxes as dedicated sources of transit funding.

'Use' taxes and 'excise' taxes are also types of sales taxes. 'Use' taxes are either applied to transactions not subject to sales tax or in combination with sales tax. Examples are lease or rental transactions and can be structured in a way to tax services used by higher-income consumers to reduce the burden on lower-income consumers[43]. 'Excise' taxes are paid with the purchase of specific goods, such as a vehicle. Vehicle-based taxes make particularly good sense to fund transportation for two reasons:

1. They can be used to fund transit
2. They discourage individual auto usage and encourage transit usage

In Texas eleven urban areas have approved local sales taxes dedicated to a transit system[44]. Michigan designates ¼ of the 4% sales tax on automotive related item to transit. New Hampshire does not collect sales taxes at the state level nor do they allow local municipalities to collect one. Utilizing sales taxes to fund transit in New Hampshire would require state legislation. **Using Vermont as a measure of potential revenue from sales taxes every 1% increase in sales tax could generate $38 million annually. Implementing a 1% sales tax on just automotive related items could generate $808,000.**

[40] National Center for Transit Research – Commuter Tax Benefits https://www.nctr.usf.edu/programs/clearinghouse/commutebenefits/ 2017

[41] New Hampshire Department of Revenue. *Completed Public Tax Rates* http://www.revenue.nh.gov/mun-prop/municipal/documents/16-final-rates.pdf. 2016.

[42] Transit Cooperative Research Program (TCRP*). TCRP Report 129 – Local and Regional Funding Mechanisms for Public Transportation*. http://www.trb.org/Publications/Blurbs/160356.aspx. 2009.

[43] Arizona PIR Education Fund. *Why and How to Fund Public Transportation.* http://www.uspirg.org/sites/pirg/files/reports/Why-and-How-to-Fund-Public-Transportation.pdf. 2009

[44] Texas Department of Transportation. *A study of sources used for local revenue for transit* https://ftp.dot.state.tx.us/pub/txdot-info/ptn/matching-funds-resource-guide.pdf 2013

Income Tax

State income taxes are a major source of revenue, while local income taxes are far less common. Very few states dedicate a proportion of the income tax revenue to fund transit. State income tax revenue in just three states (New Mexico, New York, Oregon) are a dedicated source of funding for transit[45]. Imposing a local income tax and dedicating it to transit is more commonly seen at the local level. Cities in Indiana, New Mexico, New York and Ohio have used income taxes as a dedicated source of funding for transit. In 2016, Indianapolis Region voters approved a referendum that authorizes the city to impose an income tax of up to 0.25 percent—25 cents per $100 of income—to help fund the Marion County Transit Plan. New Hampshire does not tax an individual's earned income.

Real-Estate Transfer Taxes

Real estate transfer taxes are taxes levied onto property sales transactions, they are also called a documentary stamp tax in certain locations. They can be levied on residential, commercial, industrial or a combination of classes of property depending on state legislation. Depending on state legislation, sometimes it is the seller's responsibility to pay the transfer tax and sometimes it is the buyer's responsibility to pay the transfer tax. Nationally rates are highly variable and range from 0.01% to 2.2%[46]. In New Hampshire the state assesses a real estate transfer tax (RETT) of $0.75 per $100 of the sale, granting and transfer of property. The RETT is paid by both the buyer and the seller.

Illinois imposes an additional one percent real-estate tax to their 0.10% tax on the sale and transfer of any personal residence valued at more than one million dollars to help fund transit. Assuming that 0.5% (or 1 out of every 200) homes in New Hampshire is worth more than $1 million, that each year one 2% of homes are sold, that the average value of homes over $1 million is $1.5 million and an additional real-estate transfer tax of 1% was added to the sale of these homes it could **generate $946,000 in revenue**.

Vehicle Related Taxes

Gas Tax

Gas/Fuel taxes not only generate revenue but reduce single occupancy vehicle travel and increase transit and other alternate mode usage[47]. The tax is typically assessed by the state and less commonly through local governments. State fuel/gas taxes are dedicated sources to fund 92 transit services in 22 states. Local gas taxes are used in seven states to fund 19 transit systems and are primarily located in the midwest, west, and south. Typically the taxes raised through the gas tax are dedicated to a transportation fund, in some instances a proportion is dedicated to transit. For example in Florida 2.86¢ of the federal gas tax goes to funding transit. Additionally 15% of the 13.3¢ state fuel tax, 31.7¢ fuel use tax, 6.1¢ of the state comprehensive transportation system tax, and 6.9¢ aviation fuels tax goes to fund alternative (air, bus, rail, water) transportation. Locally counties can impose up to an additional 11¢ local option fuel tax, all 67 counties have imposed the tax and 26 have imposed the maximum tax.

In New Hampshire the gas tax was raised 4.1¢ to 23.83 ¢/gallon in 2014 to fund the widening of I-93, local bridge and road repairs and state road improvements. New Hampshire now ranks 18th out of 51 states (including the District of Columbia) for the lowest gas tax and is 6.63¢ less than Vermont. Gas taxes can be a substantial source of funding. If you assume the average person consumes 500 gallons of fuel annually then each cent per gallon of taxes raises $5 per capita. **Raising the gas tax by just half a cent and dedicating it to funding transit could generate $3.3 million in New Hampshire.**

Vehicle Rental Tax/Fee

Rental car fees are paid by the consumer on the rental of a passenger car, and typically limited to 30 days. These types of fees are generally remitted to the state with the other taxes and fees collected (including sales or use taxes) and then distributed to the transit agencies. Thirty-eight states tax the rental of motor vehicles, the rate of the fees is

[45] National Transit Database Tables 28 and 29. 2014

[46] Illinois PIRG. *Finding Solutions to Fund Transit*. http://financecommission.dot.gov/Documents/IL_transit_report_June%202007.pdf. 2007

[47] Victoria Transport Policy Institute. Local Funding Options for Public Transportation. http://www.vtpi.org/tranfund.pdf. 2016

generally in the range of 1-2% of rental/room base fee[48,49]. Pennsylvania, for example, established a 'Public Transportation Assistance' (PTA) Fund in 1991 that is partially funded by a fee imposed on rental cars. The PTA Fund revenue is dedicated to funding for mass transportation. The rental car fee is $2 per day[50]. Arkansas dedicates $1.5 million for rural transit systems annual, 90% of this comes from the car rental tax. Indiana, Kentucky, North Carolina and Wisconsin all permit municipalities to impose local rental car taxes to support transit (TDOT report). Maine has a 5% tax on the rental of vehicles, 100% of tax revenue from truck and van rentals, and all tax revenue from rental cars during the last six month of the prior fiscal year partially fund the Multimodal Transportation Fund (MTF). Funds from the MTF are allocated based on formulas and can be used for operating assistance.

New Hampshire taxes rental cars under the Meals and Rooms (Rentals) Tax and the revenue goes to the general fund and education fund. In FY2016 New Hampshire collected $8.7 million in taxes from rental cars. If the state were to **increase the tax by half a percent and dedicate the revenue to transit, $484,000 could be generated.**

Parking Taxes

Parking taxes are special taxes on commercial parking transactions and are similar to parking fees where motorists pay directly for parking. They are administered at the local level and found in large urban areas. In nonurban areas it has been found that implementing such a tax just encourages private businesses to supply their own parking free of charge.

The city of Pittsburg imposes a tax of 37.5% for each parking transaction in a non-residential parking place[51]. To assess such a tax New Hampshire would have to pass local tax enabling legislation. Due to the population densities found in most New Hampshire municipalities it is unlikely that this tax could be successfully implemented.

Use Taxes

Utility Tax/Fees

Utility taxes are applied locally to properties and a transportation utility rate can be set. Setting a utility tax dedicated to funding transit typically requires a special levy. The state of Washington asses a utility tax which goes into the state general fund and locally Pullman Washington assess a fee. Rates vary from 0.10 percent to 5 percent based on the utility. The fee is found to be useful in areas where the scale of the economy or lack of sales tax do not provide a large tax base to support transit[52]. The levy is typically $10-40 per meter which equates to $5-$20 per capita (site transport Victoria). **If New London, Hanover, Lebanon and Grantham were to assess a utility tax/fee it could generate between $163,000 and $653,000.** This would require state legislative action and a special levy adopted by municipalities to impose the tax/fee.

	Low Fee $5	High Fee $20
New London	$ 21,985	$ 87,940
Hanover	$ 56,300	$ 225,200
Lebanon	$ 69,995	$ 279,980
Grantham	$ 14,925	$ 59,700
Total	**$ 163,205**	**$ 652,820**

Table 55. Potential Revenue From Utility Tax/Fee Assessment

[48] Illinois PIRG. *Finding Solutions to Fund Transit*. http://financecommission.dot.gov/Documents/IL_transit_report_June%202007.pdf. 2007

[49] Transit Cooperative Research Program (TCRP). *TCRP Report 129 – Local and Regional Funding Mechanisms for Public Transportation*. http://www.trb.org/Publications/Blurbs/160356.aspx. 2009.

[50] Pennsylvania Department of Revenue. Public Transportation Assistance Fund Taxes and Fees. https://revenue-pa.custhelp.com/app/answers/detail/a_id/661/~/public-transportation-assistance-fund-(pta-)-taxes-and-fees. 2003.

[51] Parking Tax form PT 2016, City of Pittsburgh. http://apps.pittsburghpa.gov/finance/2016_PT.pdf. 2017

[52] [52] Transit Cooperative Research Program (TCRP). *TCRP Report 129 – Local and Regional Funding Mechanisms for Public Transportation*. http://www.trb.org/Publications/Blurbs/160356.aspx. 2009.

Hospitality Tax/Fee

Room or occupancy taxes can be applied to lodging at hotels, motels, campgrounds, rooming houses, RV parks, etc. to support transit services. Room or occupancy taxes can be collected at the state level and reallocated to municipalities or collected and retained by local municipalities where state authority is provided. The consumer pays a nominal transit/transportation fee with all of the other fees paid when staying in a hotel room. These fees are generally time-based so that, for example, short-term visitors are assessed the fees while year-round or seasonal residents are not.

In Arlington, Texas a special district (the Arlington Entertainment Area Management District) was created to fund a trolley service for guests staying in member hotels to visit recreation and tourist destinations within the district. It was created in 1995 as a municipal management district and is a political subdivision of the state. Hotel properties within the district are assessed a fee of $1.90 per occupied room per night (excluding long stays – those of 30 days or longer) to support the transit service. The hotels pass along the fee to guests as an additional entertainment district fee.

New Hampshire currently has a tax on meals and rooms at a rate of nine percent, which increased from eight percent in FY2010. The revenue generated goes into the state general fund and the education trust fund. In FY2015 this generated $50 million in revenue[53]. **If New Hampshire imposed a hospitality tax or fee of $1 per occupied room per night they could generate up to $4,000,000** in revenue based on the data provided in the New Hampshire Department of Revenue Administration annual report and the average cost of a hotel room in the US of $137 per the Hotel Price Index™ .

Business Activity

Payroll Tax

Payroll taxes are usually imposed directly on employers with the transit service area for the amount of gross payroll paid to employees. Typically employer taxes are administered by the state revenue agency on behalf of the transit agency or municipality authorized to assess the tax. Authorizing legislation is generally accompanied with regulations and guidelines for which types of wages and payments are subject to the payroll tax. Payroll taxes are currently used by the state of Oregon to fund the mass transit districts. The program is managed through the Department of Revenue. In New York the Metropolitan Commuter Transportation Mobility Tax (MCTMT) is a tax imposed on those doing business within the metropolitan commuter transportation district who administers the tax for the Metropolitan Transportation Authority. The Columbia Area Transit in Oregon operates in a rural area and part of the local and regional funding sources for public transportation come from a payroll tax. **New Hampshire does not have a payroll tax and legislation would be required to levy such tax.**

Occupational Tax/Fee

Occupational taxes assess taxes on all income resulting from transacting business within an area. It is imposed upon the privilege of engaging in a business, profession, occupation, or trade within an area regardless of the legal residence of the person so engaged. Louisville Metro in Kentucky levy's an occupational tax in Jefferson County. Employees who live outside the Louisville Metro but work inside it have a tax rate of 1.45%, those who both live and work in the metro have a rate of 2.2% and those who live in the metro but work outside it are not subject to the tax[54]. New Hampshire does not allow municipalities or counties to impose such a tax; doing so would require a legislative action.

Corporate Income Tax

The corporate income tax is a gross receipts tax assessed on gross proceeds of sale, value of products, or gross income of a business. In Maryland three percent ($23,020,158) of the state funding for transit comes from the Corporate Income Tax. The tax rate is 8.25% and applies to every Maryland corporation, even it if does not have taxable income or is inactive.

[53] New Hampshire Department of Revenue. *Completed Public Tax Rates* http://www.revenue.nh.gov/mun-prop/municipal/documents/16-final-rates.pdf. 2016.

[54] Louisville Metro Revenue Commission, Frequently Asked Question https://louisvilleky.gov/government/revenue-commission/frequently-asked-questions-faqs. 2017

New Hampshire has a Business Profits Tax of 8.2% (a decrease of 0.3% from 2016), which fluctuates based on inflation and the economy. It is the largest sources of revenue for the general fund and in FY2016 it generated $418 million and increase of 20.15% from FY2015. Table 56 shows the potential increase in revenue from raising the tax rate, which if dedicated to transit could provide substantial funding.

Percent Increase	Additional Revenue Potential
0.10%	$4,900,000
0.25%	$12,300,000
0.50%	$24,600,000
1.00%	$49,200,000

Table 56. Potential Increase in Revenue From Increased Business Profits Tax

Corporate Franchise Tax

A corporate franchise tax is levied on the profit and taxable assets of a business. It is a tax that corporations pay in advance for doing business in a state. The tax can be targeted to certain industries and activities. For example, in the New York metropolitan region, a corporate franchise fee is imposed on transportation and transmissions companies and the revenue is used to support transit[55]. In Arkansas any franchise conducting business in the state is required to pay a franchise tax, the rate varies based on the size of the entity. According to a survey done by the American Association of State Highway and Transportation Officials (AASHTO) on state funding for public transportation Arkansas receives $350,000 from the corporate franchise Fee to fund public transit[56]. New Hampshire does not have a Corporate Franchise Tax but does have a Business Enterprise Tax and Business Profits Tax. Such a tax would require legislative action.

"Sin" Taxes

Gambling/Lottery Revenue

42 states have establishes lotteries and, 30 operate casinos/legalized gambling. Typically states use the revenues to support education systems and the general fund, a few states use it to directly support public transit. Pennsylvania dedicated $80 million from lottery revenues to provide free transit trips to seniors. In New Jersey 8.5% of the 8% Casino Revenue Tax funds the Senior Citizen & Disabled Resident Transportation Assistance Program (SCDRTAP). SCDRTAP received $20 million in funding from the Casino Revenue Tax Fund[57].

New Hampshire is one of the states with an established lottery and casino. In 2009 the state enacted a 10% tax on gambling winnings in order to generate revenue due to the lack of sales and income taxes in New Hampshire. It was eliminated in 2011 when the state saw a drop in lottery ticket sales and reduction in betting at the racetrack while neighboring states saw an increase. The enactment of the tax discouraged residents of neighboring states to gamble in New Hampshire. The 2010 Department of Revenue Annual Report for New Hampshire reported that the Gambling Winnings Tax generated $821,049 which equates to $82,000 per one-percent of tax. It is unlikely that a tax on gambling and lottery winnings will be put forth in New Hampshire in the near future.

Alcohol Tax

Alcohol taxes are imposed at the state level nationwide, and are less commonly found as local taxes. Allegheny County in Pennsylvania is the only known alcohol tax which is dedicated to transit. There is a 10-percent tax on poured alcoholic drinks which supports Port Authority Transit. New Hampshire is one of two states which does not tax

[55] Transit Cooperative Research Program (TCRP*). TCRP Report 129 – Local and Regional Funding Mechanisms for Public Transportation*. http://www.trb.org/Publications/Blurbs/160356.aspx. 2009.

[56] Survey of State Funding – Public Transportation. American Association of State Highway and Transportation Officials http://scopt.transportation.org/Documents/SSFP-10-UL.pdf 2016

[57] NJ Transit. Senior Citizen & Disabled Resident Transportation Assistance Program Annual Report and Public Hearing. http://www.njtransit.com/pdf/SDAnnual2014.pdf. 2013

liquor or wine, there is a 30¢ excise tax on beer which generates $30 million annually. Every penny levied of the tax generates $1 million in revenue.

Cigarette Tax

All 50 states levy excise taxes on cigarettes. The tax ranges from 17¢ to $2.59 and averages $1.11. IN many states the cigarette tax revenues go to the general fund. In addition to state taxes 460 local jurisdictions (municipality or county) nationwide assess an additional tax on cigarette[58]s. Oregon and Puerto Rico dedicate a portion of the cigarette tax to funding transit. In Massachusetts part of the cigarette tax goes into the Commonwealth Transportation Fund via an offset transfer from the general fund.

The Tobacco Tax in New Hampshire ranges from $1.78 to $2.23 per pack depending on its size and was last raised in 2013. In FY2016 the Tobacco Tax raised $229 million in revenue. Revenue from the tax funds the Education Trust Fund and General Fund. If New Hampshire were to raise the tax by 1¢ and dedicate the revenue to funding transit, $1.1 million could be raised.

Special Districts

Special Assessment District

A special assessment district is another form of property tax. It is used to add an additional tax onto the property tax to support a specific benefit or local public improvement, such as the expansion of transit service. The properties located within a defined zone around the transportation project are assessed with a higher tax rate or a flat fee expressly to fund amenities that benefit those properties. A special assessment district may levy the additional taxes or fees based on distance from the project, type of land use, total acreage, or frontage along the transit line. Special assessments are typically structured to generate either a specified level of revenue or to last a set number of years. In Iowa municipal transit systems are allowed to enact 95¢ per $1,000 valuation of property for transit through a vote of city council. Twenty municipalities have utilized this tax but at lower levels[59].

Tax Increment Financing

Tax increment financing (TIF) districts are special tax districts within a community where any increase in tax revenue resulting from increased property value is used to pay for public improvements in that district. They have the same purpose as special assessment districts and capture the additional property tax revenue generated by the surrounding land after a project is completed. The rise in property values results in an increase in tax revenue, it does not involve a tax rate increase. Typically bonds were issued to finance the project and are repaid from the increment in property taxes from the improvement. TIF's are typically used to fund large capital infrastructure projects and could include such things as a new transportation center. Hanover implemented a TIF in 1998 to fund the construction of a new parking garage in order to improve and increase downtown parking[60]. In FY2017 Hanover anticipates generating $85,000 from the TIF levy which will go into the parking fund that contributes to Advance Transit[61].

[58] Transit Cooperative Research Program (TCRP). *TCRP Report 129 – Local and Regional Funding Mechanisms for Public Transportation*. http://www.trb.org/Publications/Blurbs/160356.aspx. 2009.

[59] Transit Cooperative Research Program (TCRP). *TCRP Report 129 – Local and Regional Funding Mechanisms for Public Transportation*. http://www.trb.org/Publications/Blurbs/160356.aspx. 2009.

[60] Southwest Region Planning Commission. *Tax Increment Financing in New Hampshire* http://www.swrpc.org/files/data/com_econ_dev/ed/December%202003_%20TIF%20Handbook_7232010forweb.pdf. 2003

[61] Town of Hanover – Budget Summary FY2017, http://www.hanovernh.org/sites/hanovernh/files/uploads/fy2017_sources_and_uses-functional_budget_summary.pdf 2017

Potential Partnerships

Colby-Sawyer College

Colleges and University systems nationwide partner with transit systems to help subsidize the cost of transit services. Schools either provide direct funding to the system or purchase bulk passes and distribute them to students for free or at a reduced price. Direct funding, in the form of U-Passes, allows students, faculty and/or staff to ride for free or a reduced price and the university covers their cost. Twenty percent of colleges and universities pass the cost along to students through fees[62]. Colby-Sawyer could assess all nursing students a fee each semester that allows those students to ride for free. **A semester fee of $180 (equivalent to three monthly passes) could generate $64,800 annually**. This would decrease the farebox revenue because students would no longer be paying a fare, but could then be used as local match.

Dartmouth Hitchcock Medical Center

Dartmouth Hitchcock Medical Center (DHMC) contributes approximately $670,000 each year to help fund Advance Transit[63]. DHMC also partners with Stagecoach Transit to provide a reduced fare.

Dartmouth College

Dartmouth College has limited parking for faculty and staff and reported that they are exploring alternatives ways to bring people to campus. To promote sustainability the college offers several alternative modes of transportation including free commuter bus service on Stagecoach and The Current.

[62] TCRP Synthesis 78. Transit Systems in College and University Communities. A synthesis of best practice, 2008

[63] Advance Transit. Transit Development Plan. http://www.advancetransit.com/AT2012%20Final.pdf 2012

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