

Upper Valley Lake Sunapee Regional Planning Commission

# **NH 120 Claremont- Lebanon/Hanover Transit Planning Services**

**Final Report:  
Appendices**



**June 2011**

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## Appendix A. Inventory of Plans and Studies and Transit Systems

NH 120 has been identified in a variety of studies as a priority for transit service. The Corridor's increased growth, contributing to its role as an employment and economic center for the region, and the accompanying traffic congestion, are the primary reasons for recommending transit service in this area. The table on the next page shows the plans and studies, starting with the most recent plan.

On the state level, NH 120 was listed in the New Hampshire Long Range Transportation Plan 2010-2030. On a regional level, NH 120 was the subject of a corridor study by the UVLSRPC in 2007, which analyzed future land use and associated trip generation along the roadway. In planning for a more intensive use of land along NH 120, the report recommends transit service as a means of managing increased travel in that area. The Regional Transportation Plan (2004) also analyzes problem intersections that are contributing to congestion along NH 120, as well as peak periods in which traffic in the area is particularly high.

County coordination plans explore the issues confronting transit-dependent populations, and cite the need for access to the employment opportunities and medical offices in Lebanon. Local plans including those for Lebanon and Hanover, also identify congestion problems, as well as a need for public transit to connect parts the region.

FINAL REPORT

UPPER VALLEY LAKE SUNAPEE REGIONAL PLANNING COMMISSION

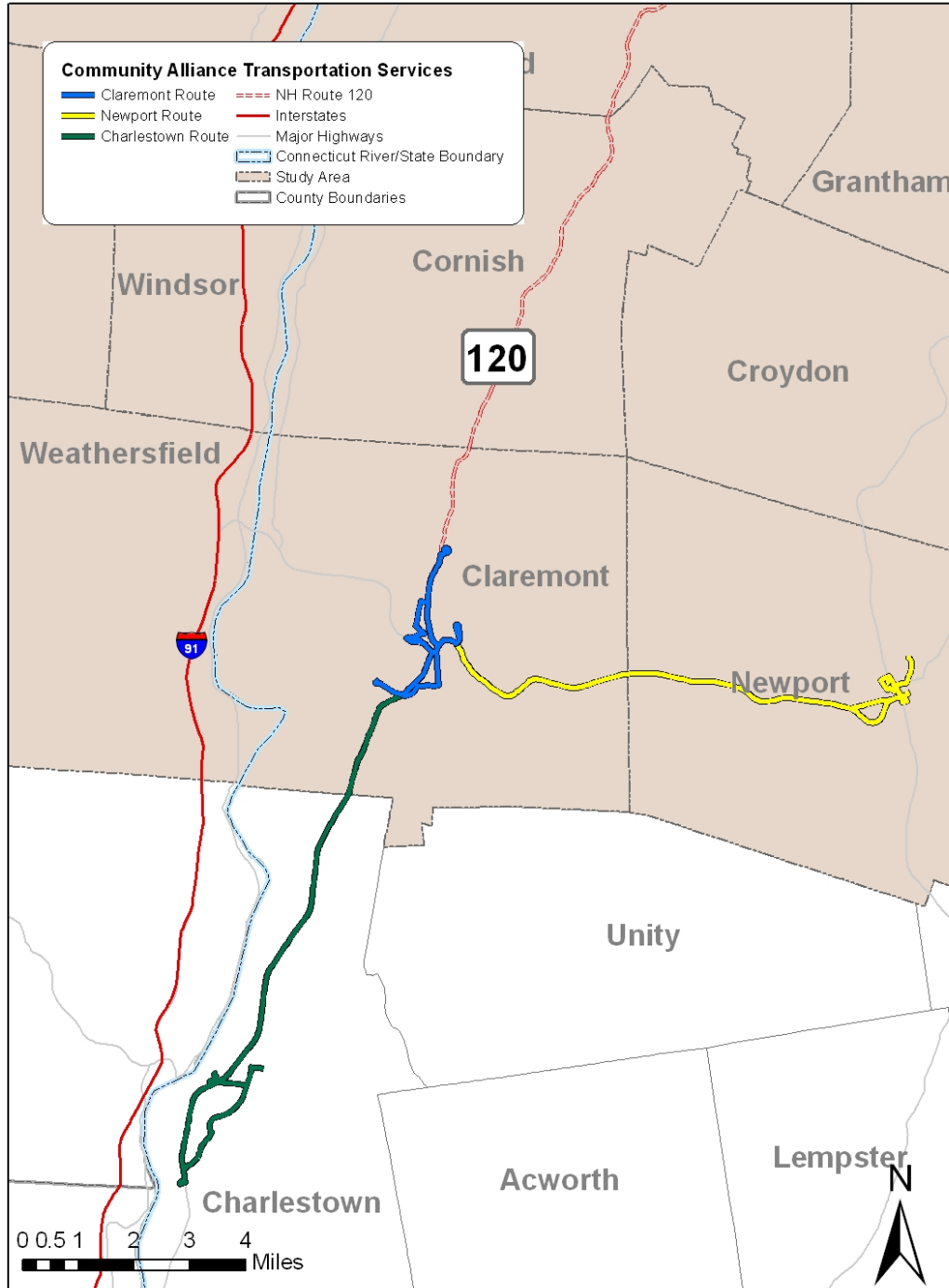
Document Name	Document Sponsor/Author	Date	Summary of Findings
NH Long Range Transportation Plan 2010-2030	NH DOT	July 2010	<ul style="list-style-type: none"> <li>Listed in Recent Planning Initiatives                             <ul style="list-style-type: none"> <li>NH 120 Corridor Management Plan – Lebanon</li> </ul> </li> </ul>
Draft Lebanon Master Plan, Chapter 9: Transportation	City of Lebanon	May 2010	<ul style="list-style-type: none"> <li>Cites commuter traffic congestion on Route 120</li> <li>New transit route needed: linking Upper Valley with Precision Valley of Springfield via Route 120</li> </ul>
Community Alliance of Health Services Transportation – Short Range Transit Operations Plan	LSC Transportation Consultants, Inc.	Sept. 3, 2008	<ul style="list-style-type: none"> <li>Recommended Hanover Connection                             <ul style="list-style-type: none"> <li>Route deviation service with scheduled transfers with Claremont services                                     <ul style="list-style-type: none"> <li>But believed it will have low ridership</li> </ul> </li> <li>Primary purpose: medical related services                                     <ul style="list-style-type: none"> <li>Opportunities for shopping, educational, and human service trips</li> </ul> </li> <li>Data from hospitals- helpful to determine origins of patients and employees, but unavailable</li> <li>Recommended to connect with local services: Red Cross</li> <li>Anticipated annual cost - \$70,000 with one vehicle</li> </ul> </li> </ul>
Sullivan County Public Transit-Human Services Coordination Plan Final Draft	Upper Valley Lake Sunapee Regional Planning Commission	May 2008	<ul style="list-style-type: none"> <li>Recognizes need for improved access to employers and medical resources in Lebanon, reliance solely upon volunteer drivers currently</li> <li>Transit options for 2nd and 3rd shift workers</li> </ul>
Southern Grafton County Public Transit-Human Services Coordination Plan	Upper Valley Lake Sunapee Regional Planning Commission	March 2008	<ul style="list-style-type: none"> <li>No explicit mention of Route 120, but does find:                             <ul style="list-style-type: none"> <li>Senior populations consistent/slightly lower than average, but proportion of senior centers slightly higher</li> <li>Percentage of citizens with disabilities slightly lower than state average</li> <li>Nine of ten largest employers in Lebanon-Hanover</li> <li>Poverty and autoless households rates are higher than state average</li> </ul> </li> </ul>
Route 120 Corridor Study Phase I Interim Report	Upper Valley Lake Sunapee Regional Planning Commission	Sept. 2007	<ul style="list-style-type: none"> <li>Analyzes future land use and infrastructure needs for Route 120</li> <li>Study area of 4.6 miles from NH 120/Hanover Street in Lebanon to Route 120/Lebanon Street in Hanover</li> <li>Provides analysis of land use impacts on corridor for both Hanover and Lebanon</li> <li>Increase of 65% annual daily traffic between 1995 and 2005 on Route 120 (1 mile south of Lebanon/Hanover line)</li> <li>Traffic Volume increased 54% on Mt. Support Rd. and 29% on Greensboro Rd. – two important nearby roads</li> <li>Various Build-out scenarios are explored and find:                             <ul style="list-style-type: none"> <li>Residential Trip Generation= 8.1 trips per day/housing unit</li> <li>5.17 trips/employee/day (DHMC or MC District Development)</li> <li>4.04 trips/employee/day (Other non-residential development)</li> </ul> </li> <li>Significant increase in traffic volumes from 2006 to 2025; 64% increase under smaller development plan; 79% increase for more intensive development plan</li> <li>Recommends investment in public transit and transportation demand management as a means of mitigating future travel demands</li> </ul>

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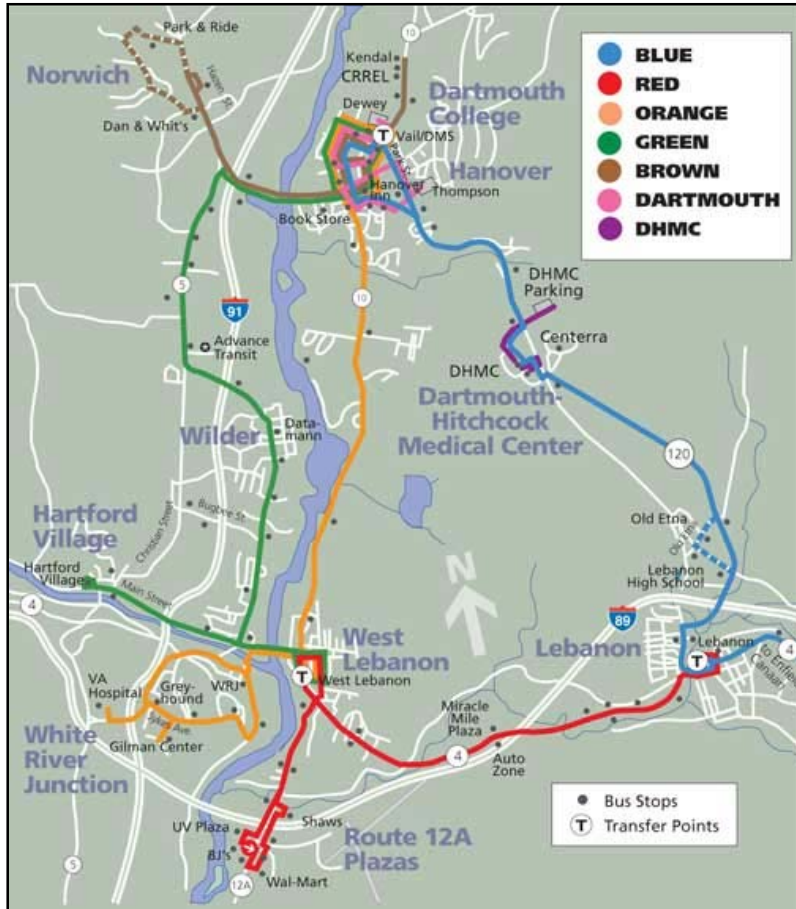
UPPER VALLEY LAKE SUNAPEE REGIONAL PLANNING COMMISSION

<p>Lebanon Master Plan, Chapter 9: Transportation</p>	<p>City of Lebanon</p>	<p>Adopted June 20, 2006</p>	<ul style="list-style-type: none"> <li>• Cites commuter traffic congestion on Route 120</li> <li>• Average Daily Traffic Volumes have increased substantially on Route 120 at several locations</li> <li>• No official park and ride lots in Lebanon; but lots in Grantham and Enfield will help</li> <li>• Some large employers considering satellite lots</li> <li>• Suggests that more park and ride lots on Route 120 would be helpful for transit: Exit 18 of I-89</li> <li>• Recommends:             <ul style="list-style-type: none"> <li>▪ Implementation of access management for Route 120</li> <li>▪ Corridor plan for Route 120</li> <li>▪ Continue working with Hanover on Route 120 Issues</li> <li>▪ DOT project- Add southbound land from Lahaye Drive to Etna Route on Route 120</li> </ul> </li> </ul>
<p>Upper Valley Lake Sunapee Regional Transportation Plan</p>	<p>Upper Valley Lake Sunapee Regional Planning Commission</p>	<p>Feb. 5, 2004</p>	<p>Need for Transit based on:</p> <ul style="list-style-type: none"> <li>• Access management concerns             <ul style="list-style-type: none"> <li>▪ Development and use regulations</li> </ul> </li> <li>• Poor intersection performance             <ul style="list-style-type: none"> <li>▪ Etna Road, Lebanon</li> <li>▪ Heater Road, Lebanon</li> <li>▪ I-89 Exit 18 Ramps, Lebanon</li> <li>▪ Hanover Street, Lebanon</li> </ul> </li> <li>• Areas/times of concern: I-89 Exit 18/NH 120 – rush hour</li> <li>• New commercial developments</li> <li>• Future plans:             <ul style="list-style-type: none"> <li>▪ Connector from I-91 in Wilder to NH 120 near DHMC</li> <li>▪ Bike/Ped Plans</li> </ul> </li> </ul>
<p>Hanover Master Plan, Chapter 12: Transportation</p>		<p>Adopted July 29, 2003</p>	<ul style="list-style-type: none"> <li>• 1994 Survey found decrease in need for public transit (48% of respondents; down from 73%), probably due to expansion of Advance Transit</li> <li>• 1999 Guiding Growth survey: "Most respondents were quite concerned about the large and growing volume of traffic, and the attendant noise, speed and congestion"</li> <li>• Cites need for Route 120 Corridor Study</li> <li>• Notes congestion during peak periods on NH 120</li> <li>• Significant Increase of Average Daily Traffic Volumes from 1990-2001 and generally Moderate to Poor Level of Service during similar time period</li> <li>• Developments near and off of Route 120 (ex. Greensboro Road), can increase percentage of turning movements and increase traffic volumes</li> <li>• Route 120 to Route 10 in Hanover – Part of Regional Bikeway system</li> <li>• Recommends:             <ul style="list-style-type: none"> <li>▪ Direct access to Centerra North from Route 120 via Centerra Parkway</li> <li>▪ Regional cooperation on public transit</li> <li>▪ Discussions with stakeholders for new parkway from Route 120 to Route 10, I-91 or I-89</li> </ul> </li> </ul>
<p>Sullivan County Economic Development Strategy</p>	<p>Comprehensive Economic Development Strategy Committee</p>	<p>Undated</p>	<ul style="list-style-type: none"> <li>• Report does not mention NH 120 directly, but discusses the lack of public transportation to the Hanover/Lebanon area as a primary constraint to economic growth</li> <li>• The Report describes improved inter and intra Sullivan County transit to benefit the region's workforce</li> </ul>

### Community Alliance Transportation Services (CATS) System Map



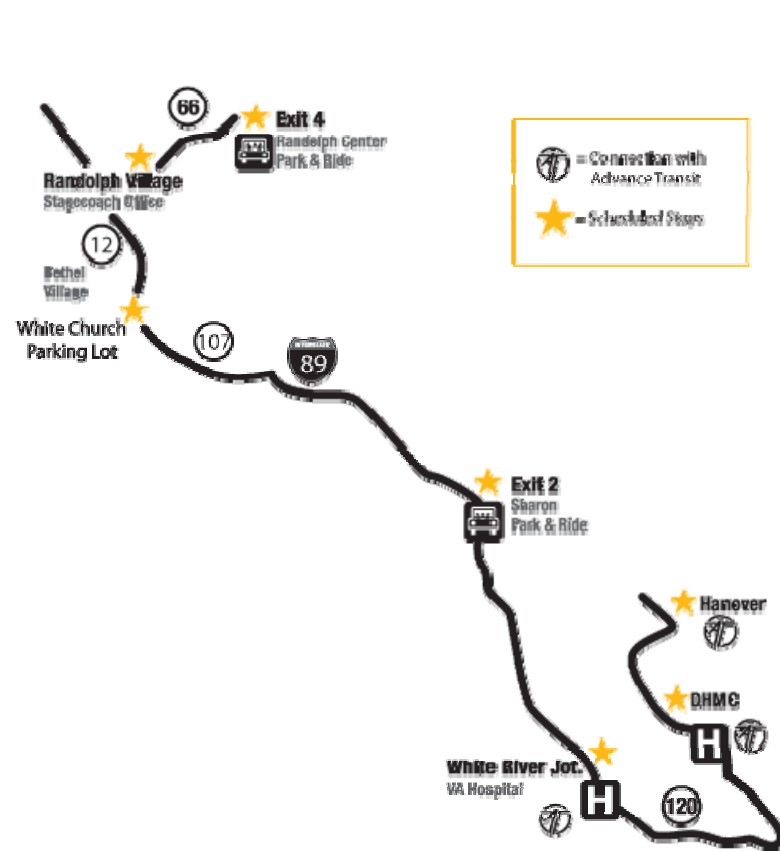
### Advance Transit System Map



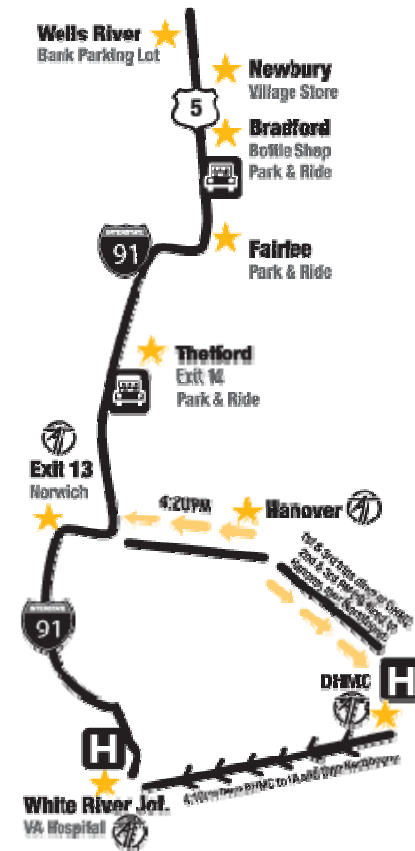
### Stagecoach System Map



### Stagecoach 89er Commuter Route

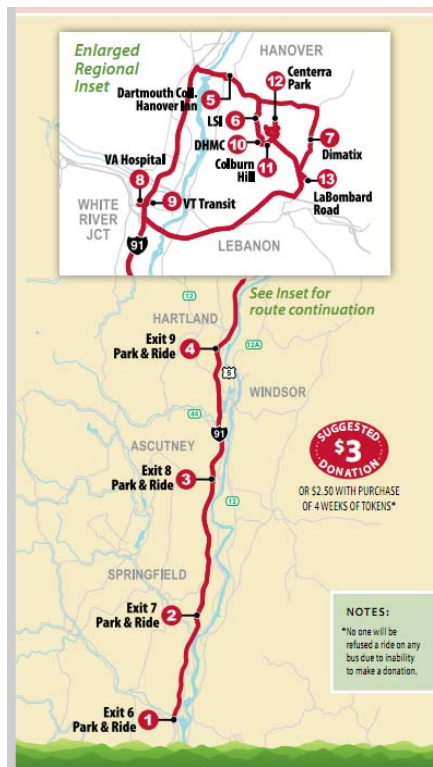


### River Route Commuter Route





### Connecticut River Transit NH Routes



## Appendix B. Stakeholders Interviewed

<b>Name</b>	<b>Affiliation</b>
Jonathan Edwards	Hanover Planning Department
Kim Vacca	Red River Computer, Claremont
Barbara Brill	Community Transportation Services, Claremont
Bill Lipfert	Town of Cornish Planning Board
Van Chesnut	Advance Transit
Joanna Whitcomb	Dartmouth College
Dan Dahmen	Dartmouth Hitchcock Medical Center
Stacey Chiochio	Hypertherm
Jim Gray	Kimball Union Academy
Stephen Halleran	Plainfield Town Manager
Susan Berry	Upper Valley Rideshare
David Brooks	Lebanon Planning Department
Valerie Maher	River Valley Community College, Claremont
Nancy Merrill	Claremont Planning Department

## Appendix C. Employers Interviewed

<b>Employer Name</b>
Astronics Luminescent Systems, Inc.
Common Man
Crown Point Cabinetry
Elmwood Nursing Home
Fuji-Dimatix
Hannaford Brothers
Lowe's
Mikros
Teleatlas/TomTom
Trumbull Nelson Construction

## Appendix D. Overview of Service Alternatives

The Steering Committee identified four primary alternatives (plus two sub-options) for structuring potential public transportation services along NH 120. The objective of the proposed service is to strengthen the links between Claremont and the Lebanon/Hanover area and increase access to employment in both communities. The identified public transportation service options include:

- **Alternative 1:** Fixed-route bus service between the Claremont Visitors Center and the Dartmouth Hitchcock Medical Center (DHMC) Parking Lot 9.
  - **Alternative 1a:** Fixed-route bus service between the Moody Building in downtown Claremont and DHMC Parking Lot 9.
  - **Alternative 1b:** Fixed-route bus service that is designed to be a continuation of the CATS Newport to Claremont route so that the bus continues to Lebanon and DHMC Parking Lot 9.
- **Alternative 2:** Fixed-route bus service between the Claremont Visitors Center and the main hospital entrance on the DHMC campus.
- **Alternative 3:** Fixed-route bus service between the Claremont Visitors Center and the DHMC Parking Lot 9 with Flex Service at each end.
- **Alternative 4:** Fixed-route bus service between the Claremont Visitors Center and the DHMC Parking Lot 9 returning to downtown Lebanon via Etna Road.

Details on each of these alternatives, including maps, are provided in the following text. To help evaluate the relative strengths and weaknesses of the different alternatives, the study team calculated various performance measures that show the annual cost of service, average daily ridership and the estimated cost per passenger trip. The assumptions behind these estimates are outlined in the subsequent text.

As shown in Figure 1, operating the NH 120 bus route would require between \$140,000 and \$180,000 in operating costs alone. Estimates of ridership (using the “medium” case scenarios) suggest that this route would carry between 110 and 135 people per day for a cost per passenger trip between \$4.00 and \$5.00, not including fares (see discussion below). From a transit planning perspective, routes that can operate with a cost per passenger of less than \$5.00 are considered effective. As a reference, the Vermont Agency of Transportation (Vtrans) identifies a bus route as “successful” if it operates in a small town setting and achieves a cost per passenger of \$5.98.<sup>1</sup> Vtrans “acceptable” cost per passenger benchmark for service in a small town setting is set at \$11.96. Ultimately, however, each alternative offers different strengths and weaknesses and may be preferred based on a variety of factors.

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<sup>1</sup> Vermont Agency of Transportation 2009 Transit Route Performance Review

**Figure 1: Summary of Performance Measurements by Service Alternative**

Service Alternative	Annual Service Cost	Average Daily Ridership*	Estimated Cost per Passenger Trip*
Alternative 1	\$137,500	109.4	\$5.03
Alternative 1a	\$152,500	124.4	\$4.42
Alternative 1b	\$137,500	134.4	\$4.09
Alternative 2	\$137,500	136.3	\$4.03
Alternative 3	\$179,167	112.1	\$4.91
Alternative 4	\$150,000	115.1	\$4.78

Source: Nelson\Nygaard

Notes: \* Based on "medium" estimate of ridership

## Fares

For purposes of this analysis, fares were not considered in the cost estimates. More detail on the role of fares will be provided in the funding analysis, which will be developed as part of subsequent study tasks. In general, fares for transit service in the region vary considerably. Advance Transit (AT), which operates primarily local service within Lebanon and Hanover, is a free fare system. The Claremont based Community Alliance Transportation Service (CATS) is also primarily a local service and charges \$2.00 per trip. Other regional operators, Stagecoach and Connecticut River Transit operate longer distance commuter service and charge \$3.50 and \$3.00 for a one-way trip respectively. CRT does not charge fares but requests donations.

# Service Alternative 1: Fixed-Route Bus Service: Claremont Visitors Center to DHMC Parking Lot 9

## Alternative Description

Alternative 1 is designed to provide frequent, peak-period public transportation service between Claremont and Lebanon and to the DHMC campus via Parking Lot 9. The service is primarily oriented towards commuters, but includes a midday trip to support medical and shopping trips. An overview of the strengths and weaknesses of this alternative is summarized in Figure 2.

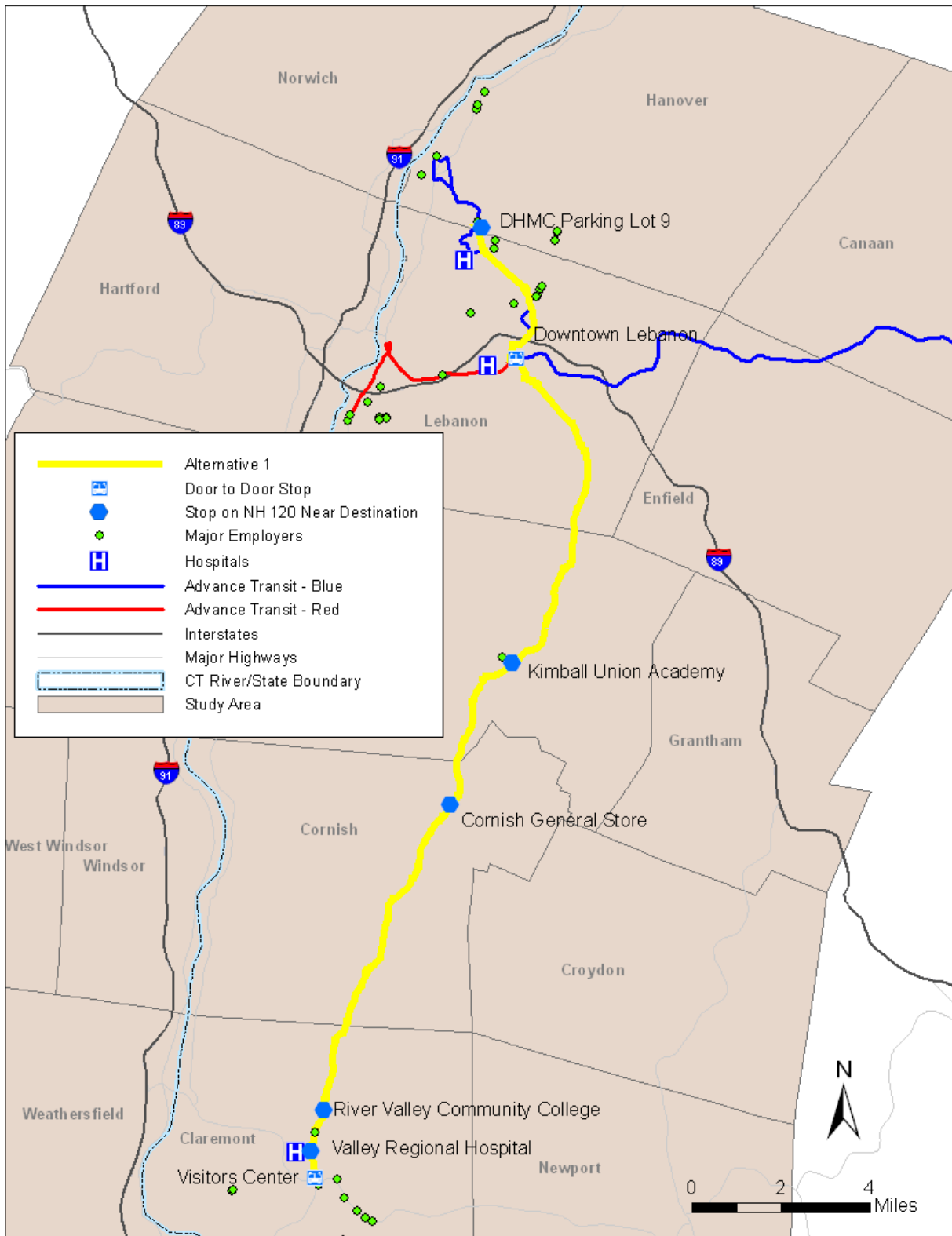
The route will originate at the Claremont Visitors Center, a location that is within walking distance of downtown Claremont and offers park and ride opportunities. From the Visitors Center, the NH 120 bus would stop as appropriate at points along NH 120 as it travels toward downtown Lebanon, such as Valley Regional Hospital, River Valley Community College, Cornish General Store, and Kimball Union Academy. The service is designed to stay on NH 120, however, and assumes individuals disembarking from the bus will walk from NH 120 to their destination. A one-way trip between Claremont and DHMC Parking Lot 9 is 25.2 miles (roundtrip is 50.4 miles) and the one-way travel time is estimated at 54 minutes. Total roundtrip travel time is 1 hour and 50 minutes, allowing for recovery time at the route ends.

**Figure 2: Alternative 1 Strengths and Weaknesses**

Strengths	Weaknesses
Direct service between Claremont and Lebanon.	Targeted towards commuters traveling north and to meet DHMC schedule.
Offers Park and Ride service at each end of route.	Not specifically targeted to meet needs of transit dependent travelers.
Meets major DHMC shifts and connect with shuttle services to DHMC campus.	Does not serve employers on Etna Road.
Connects with AT Red and Blue routes at Lebanon Green.	Does not connect to CATS service at Moody Building.

Source: Nelson\Nygaard

**Figure 3: Alternative 1: Claremont Visitors Center to DHMC**



## Indicative Service Schedule and Costs

As discussed, Alternative 1 requires approximately 54 minutes in travel time for a one-way trip between the Claremont Visitors Center and DHMC Lot 9. For the purpose of creating an indicative schedule, the study team allowed for six minutes of recovery time between trips, which means the service will require 9 hours and 10 minutes of daily operating time.

The timing of service is intended to allow for connections with Advance Transit’s Blue and Red Routes, which serve downtown Lebanon.

### Northbound

Claremont Visitors Center	Valley Regional Hospital	River Valley Community College	Cornish General Store	Kimball Union	Downtown Lebanon <sup>2 3</sup>	DHMC Lot 9
5:25 AM	5:28 AM	5:29 AM	5:40 AM	5:46 AM	6:04 AM	6:14 AM
7:15 AM	7:18 AM	7:19 AM	7:30 AM	7:36 AM	7:54 AM	8:04 AM
11:05 AM	11:08 AM	11:09 AM	11:20 AM	11:26 AM	11:44 AM	11:54 AM
3:05 PM	3:08 PM	3:09 PM	3:20 PM	3:26 PM	3:44 PM	3:54 PM
4:55 PM	4:58 PM	4:59 PM	5:10 PM	5:16 PM	5:34 PM	5:44 PM

### Southbound

DHMC Lot 9	Downtown Lebanon <sup>4 5</sup>	Kimball Union	Cornish General Store	River Valley Community College	Valley Regional Hospital	Claremont Visitors Center
6:20 AM	6:33 AM	6:48 AM	6:53 AM	7:04 AM	7:06 AM	7:09 AM
8:10 AM	8:23 AM	8:38 AM	8:43 AM	8:54 AM	8:56 AM	8:59 AM
12:00 PM	12:13 PM	12:28 PM	12:33 PM	12:44 PM	12:46 PM	12:49 PM
4:00 PM	4:13 PM	4:28 PM	4:33 PM	4:44 PM	4:46 PM	4:49 PM
5:50 PM	6:03 PM	6:18 PM	6:23 PM	6:34 PM	6:36 PM	6:39 PM

## Estimated Cost

Based on the draft schedule and assuming that the service will operate on weekdays, exclusive of holidays, for approximately 250 days a year with an hourly operating cost of \$60, the annual cost of service is estimated at \$137,500. The cost of a one-way trip is estimated at \$55.

## Estimated Ridership and Performance

Alternative 1 is expected to attract between seven and 16 passengers per trip (see Figure 4). Ridership was estimated using several sources. For an estimate of the workers in Claremont and Lebanon, we relied on the 2000 Census Transportation Planning Package (CTPP), which

<sup>2</sup> Connects with AT Blue Route – AM: 6:10, 8:15, 11:45; PM: 12:15, 3:45

<sup>3</sup> Connects with AT Red Route – AM: 6:15, 8:15, 11:45 AM; PM: 3:45, 4:20, 5:45

<sup>4</sup> Connects with AT Blue Route – AM: 6:45, 8:45; PM: 12:15, 4:15, 6:05

<sup>5</sup> Connects with AT Red Route – AM: 7:15, 8:45; PM: 12:15, 4:15, 6:15



reported the number of people working in the Claremont and Lebanon census tracts. We removed one Claremont census tract is not directly served by transit, and took 50% of the Claremont and Lebanon totals as the market that could potentially use this service. This discount factor allows for jobs that are outside of the “traditional” business hours that the bus route is designed to serve. The bus service is designed specifically to meet the needs of the NH 120 commuters, and we created a low, medium and high estimate of the riders who might be attracted to the service as .75%, 1.0%, and 1.5% of the commuter market. These ratios are consistent with the survey data collected as part of this study (see Technical Memo 1).

Given our more detailed understanding of the hospital employment market and taking into consideration parking shortages and existing transit mode split, we assumed employees traveling to DHMC, Alice Peck Day Memorial Hospital, and Valley Regional Hospital would use public transportation services at slightly higher rates of 1% (low), 1.5% (medium) and 2.5% (high). These assumptions are conservative based on the experience at DHMC, but account for the longer travel time associated with the route and other medical facilities that have not recorded high transit use.

Ridership for the midday trip was based on an estimate of the older adults and persons with disabilities within walking distance (a quarter-mile) of the NH 120 stops.

**Figure 4: Alternative 1 Estimated Demand and Performance Measures**

Service Alternative 1	Low	Medium	High
Annual Ridership	18,408	27,362	39,553
Passengers per Day	73.6	109.4	158.2
Passengers per Trip	7.4	10.9	15.8
Cost per Trip	\$55	\$55	\$55
Cost per Passenger Trip	\$7.47	\$5.03	\$3.48

Source: Nelson\Nygaard

# Variations on Alternative 1

## Alternative 1a: Continue Service to Moody Building

A potential variation on Alternative 1 would be to extend the service from the Visitors Center to the Moody Building in downtown Claremont. The Moody Building is also an interchange location for other CATS services and increases options for local transfers (see Figure 6).

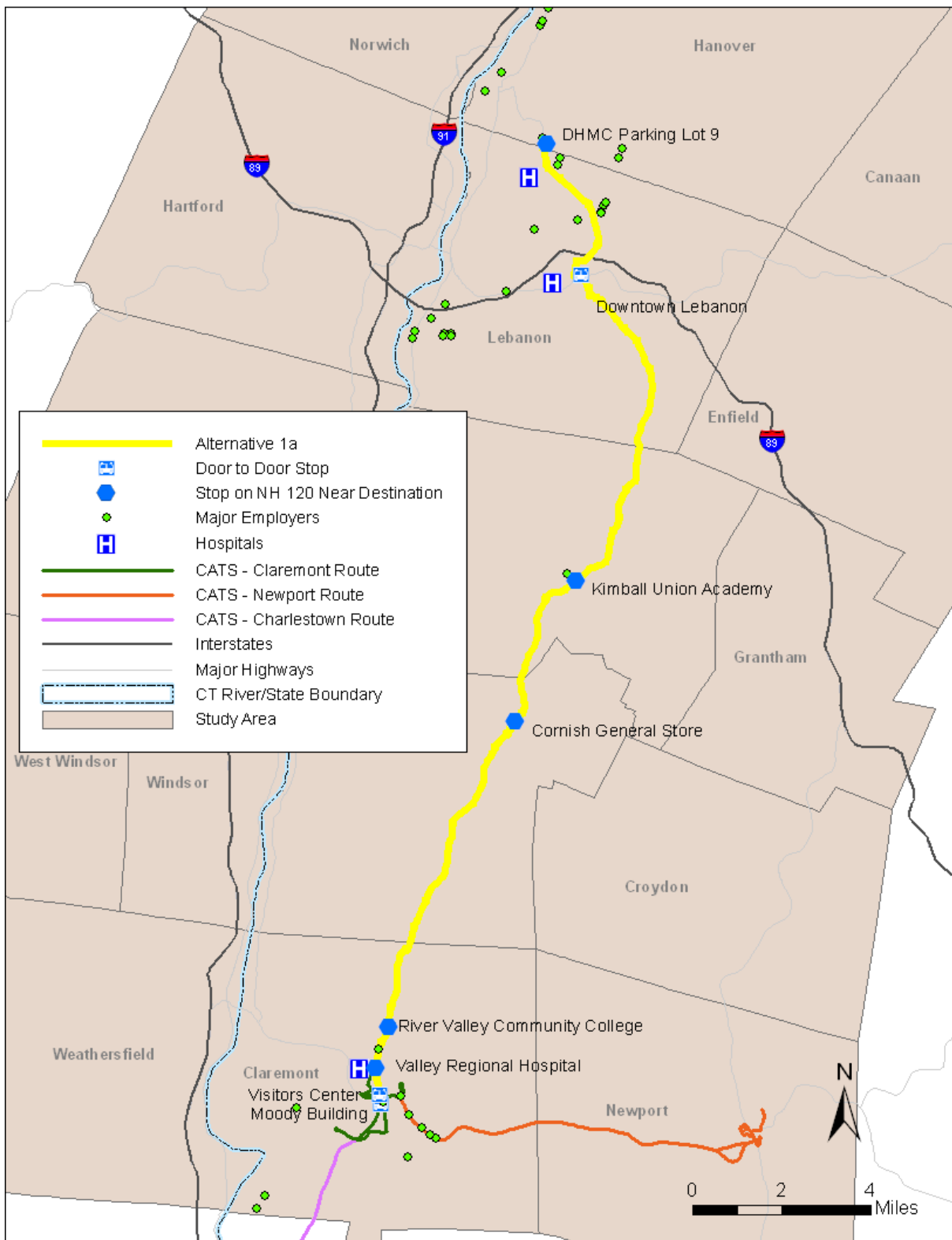
By extending the service to the Moody Building, the alternative is estimated to attract one to two additional passengers per trip and require an additional hour of service per day. As a result, the annual cost increases \$15,000 per year to \$152,500 annually. Using a medium scenario for ridership, the estimated cost per passenger trip is \$4.42 (see Figure 5).

**Figure 5: Alternative 1a Estimated Demand and Performance Measures**

Service Alternative 1a	Low	Medium	High
Annual Ridership	20,908	31,112	44,553
Passengers per Day	83.6	124.4	178.2
Passengers per Trip	8.4	12.4	17.8
Cost per Trip	\$61	\$61	\$61
Cost per Passenger Trip	\$6.58	\$4.42	\$3.09

Source: Nelson\Nygaard

Figure 6: Alternative 1a Moody Building in Claremont to DHMC Parking Lot 9



### Alternative 1b: Interline Service with CATS Newport Route

A second option for Alternative 1 would be to link the proposed NH 120 service with the existing CATS route that travels between Newport and Claremont. By interlining the two routes, the bus would originate in Newport and continue along NH120 northbound to Lebanon and DHMC (see Figure 8). Currently, the Newport – Claremont bus operates five times per day with trips departing from Newport at approximately 6:45 am, 8:00 am, 10:20 am, 11:50 am and 1:50 pm. These times are not consistent with the commuter shift times recorded as part of this study, therefore, to effectively interline the two services, the Newport – Claremont route would have to adjust one or more of its trip times to meet the needs of the NH 120 service.

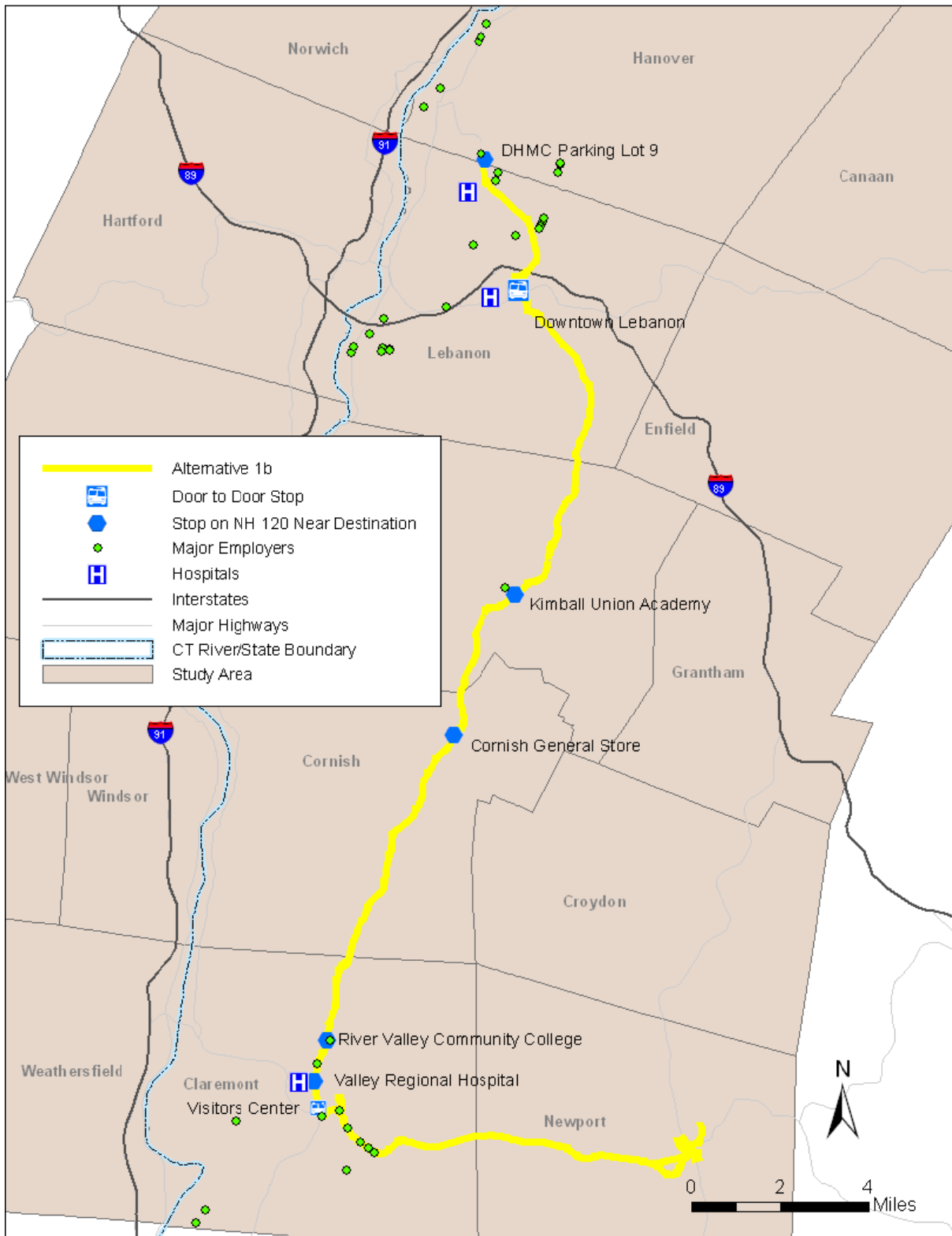
Interlining the proposed NH 120 service with CATS existing Newport to Claremont would not demonstrably increase costs. If the Newport service schedule were changed to coincide with the NH 120 service, there may be operational changes that increase service costs, but these costs are not estimated at this time. Currently, the Newport route carries approximately six passengers per trip. If the schedule were changed such that the NH 120 route would be operated as is currently planned (Alternative 1), the study team estimates that between two and three additional passengers per trip would use the service. The broadly estimated ridership estimates and service costs are shown in Figure 7.

**Figure 7: Alternative 1b Estimated Demand and Performance Measures**

Service Alternative 1	Low	Medium	High
Annual Ridership	23,408	33,612	47,053
Passengers per Day	93.6	134.4	188.2
Passengers per Trip	9.4	13.4	18.8
Cost per Trip	\$55	\$55	\$55
Cost per Passenger Trip	\$5.87	\$4.09	\$2.92

Source: Nelson\Nygaard

Figure 8: Alternative 1b Newport to DHMC



# Service Alternative 2: Claremont Visitors Center – DHMC

## Alternative Description

Like Alternative 1, Alternative 2 is designed to provide frequent, peak-period public transportation service between Claremont and Lebanon. Instead of serving Parking Lot 9, Alternative 2 would provide service to the main entrance of the DHMC campus. As with the initial alternative, this route is intended to meet the needs of commuters, but will also improve service for travelers using the route to travel to/from DHMC.

Alternative 2 will start at the Claremont Visitors Center, taking advantage of the park and ride opportunities. The route would travel along NH 120 stopping at the Valley Regional Hospital, River Valley Community College, Cornish General Store, and Kimball Union Academy. Like Alternative 1, Alternative 2 is designed to stay on the main road and assumes passengers will walk to and from NH 120 to reach the bus service. In downtown Lebanon, the bus would stop at the Lebanon Green (and connect to Advance Transit bus routes), and continue on to DHMC, terminating at the main entrance to the hospital.

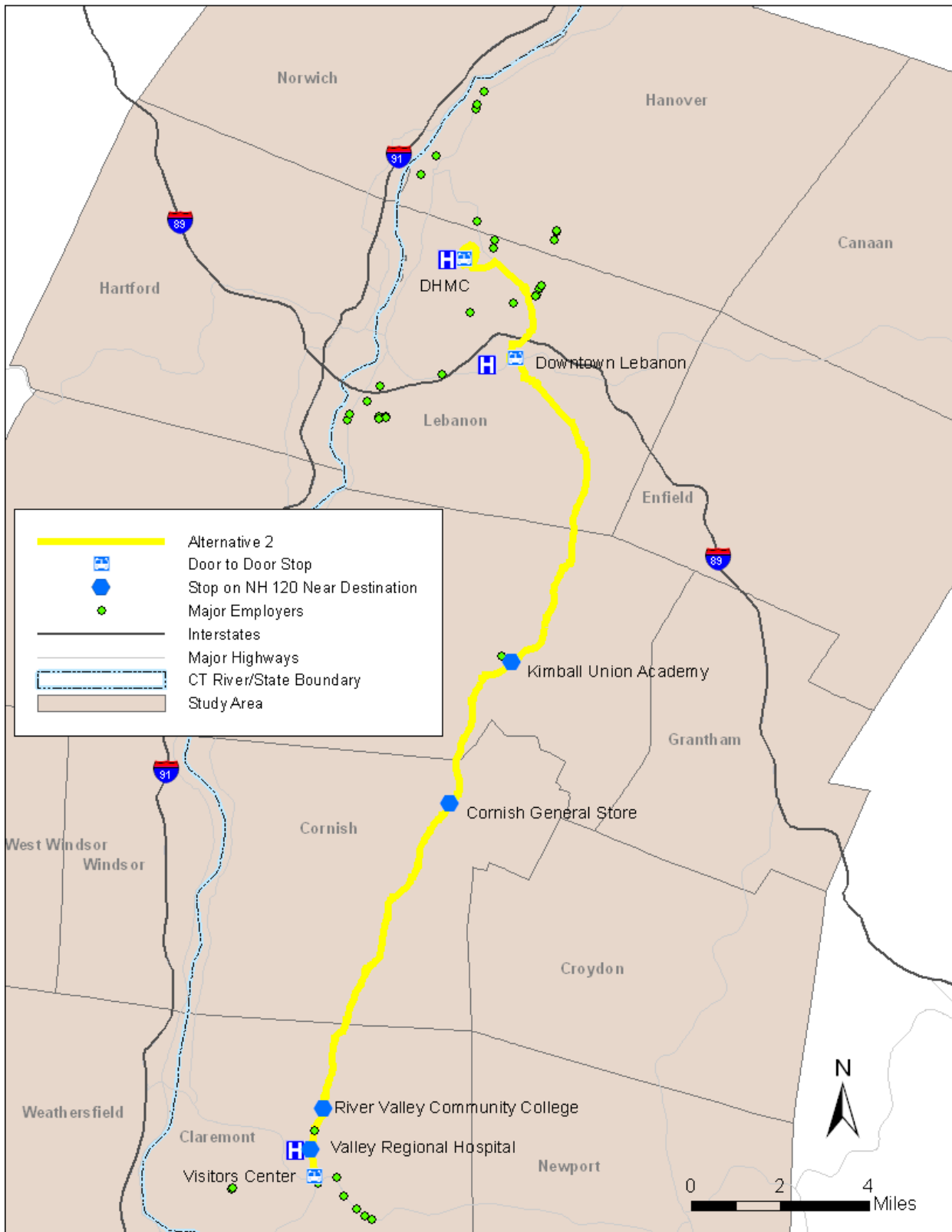
With this schedule, the trip length is approximately 25.3 miles, with a roundtrip at 50.6 mile. One-way travel time is estimated to be 54 minutes, with roundtrip service at 1 hour and 50 minutes, allowing for a short dwell time at DHMC and recovery time in Claremont.

**Figure 9: Alternative 2 Strengths and Weaknesses**

Strengths	Weaknesses
Direct service between Claremont and Lebanon.	Designed to meet needs of DHMC ridership with additional focus on northbound commuters.
Offers Park and Ride service in Claremont.	Does not serve employers on Etna Road.
Meets DHMC shift times and provides front door service to DHMC campus.	Does not connect to CATS service at Moody Building.
Connects with AT Red and Blue routes at Lebanon Green.	Does not connected to a park and ride facility on the north end of the route.
Better meets needs of transit dependent travelers with medical appointments at DHMC.	

Source: Nelson\Nygaard

Figure 10: Alternative 2 Claremont to DHMC



## Indicative Service Schedule and Costs

### Northbound

Claremont Visitors Center	Valley Regional Hospital	River Valley Community College	Cornish General Store	Kimball Union	Downtown Lebanon <sup>6 7</sup>	DHMC <sup>8</sup>
5:15 AM	5:18 AM	5:19 AM	5:30 AM	5:36 AM	5:54 AM	6:07 AM
7:05 AM	7:08 AM	7:09 AM	7:20 AM	7:26 AM	7:44 AM	7:57 AM
11:05 AM	11:08 AM	11:09 AM	11:20 AM	11:26 AM	11:44 AM	11:57 AM
3:00 PM	3:03 PM	3:04 PM	3:15 PM	3:21 PM	3:39 PM	3:52 PM
4:50 PM	4:53 PM	4:54 PM	5:05 PM	5:11 PM	5:29 PM	5:42 PM

### Southbound

DHMC	Downtown Lebanon <sup>9 10</sup>	Kimball Union	Cornish General Store	River Valley Community College	Valley Regional Hospital	Claremont Visitors Center
6:10 AM	6:23 AM	6:39 AM	6:44 AM	6:55 AM	6:57 AM	7:00 AM
8:00 AM	8:13 AM	8:29 AM	8:34 AM	8:45 AM	8:47 AM	8:50 AM
12:00 PM	12:13 PM	12:29 PM	12:34 PM	12:45 PM	12:47 PM	12:50 PM
3:55 PM	4:08 PM	4:24 PM	4:29 PM	4:40 PM	4:42 PM	4:45 PM
5:45 PM	5:58 PM	6:14 PM	6:19 PM	6:30 PM	6:32 PM	6:35 PM

## Estimated Cost

Since Alternative 2 shares very similar features to Alternative 1, with the change being the northern termination point, it is assumed that the estimated cost of Alternative 2 will be approximately the same, at \$137,500.

## Estimated Ridership and Performance

Ridership assumptions follow the same methodology as developed for Alternative 1. Since this route goes directly to DHMC’s door, the mode split for hospital employees is increased slightly to 1.5% (low), 2% (medium) and 3% (high). In addition, the demand for midday trips is also anticipated to increase slightly, because the route will be more attract to people traveling to DHMC. As shown in Figure 11, with five trips per day, the service is estimated to attract between 100 to 200 passengers per day.

<sup>6</sup> Connects with AT Blue Route – AM: 6:10, 7:45, 8:15, 11:45; PM: 12:15, 3:45, 5:50

<sup>7</sup> Connects with AT Red Route – AM: 6:15, 8:15, 11:45 AM; PM: 3:45, 4:20, 5:45

<sup>8</sup> Connects with AT Blue Route – AM: 6:25, 8:00; 12 noon; PM: 4:00, 6:05

<sup>9</sup> Connects with AT Blue Route – AM: 6:45, 8:15; PM: 12:15, 4:20, 6:05

<sup>10</sup> Connects with AT Red Route – AM: 7:15, 8:15; PM: 12:15, 4:15, 6:15



**Figure 11: Alternative 2 Estimated Demand and Performance Measures**

Service Alternative 2	Low	Medium	High
Annual Ridership	23408	33612	53020
Passengers per Day	93.6	134.4	212.1
Passengers per Trip	9.4	13.4	21.2
Cost per Trip	\$55	\$55	\$55
Cost per Passenger Trip	\$2.59	\$4.09	\$5.87

Source: Nelson\Nygaard

# Service Alternative 3: Claremont Visitors Center – DHMC Parking Lot 9 with Flex Service

## Alternative Description

Alternative 3 is designed to better meet the needs of the travelers by offering flexible, or “flex” service at each end of the route (see Figure 13). Typically flex routes are structured such that passengers on the bus may request to be dropped off or picked-up at any location within a designated zone. Often passengers on the bus can merely request the driver take them to their destination, while passengers needing a pick-up would need to make a reservation with the transit agency. This type of service design expands the coverage of the bus service by responding directly to passenger needs. It is particularly helpful for older adults and persons with disabilities who may need door-to-door service.

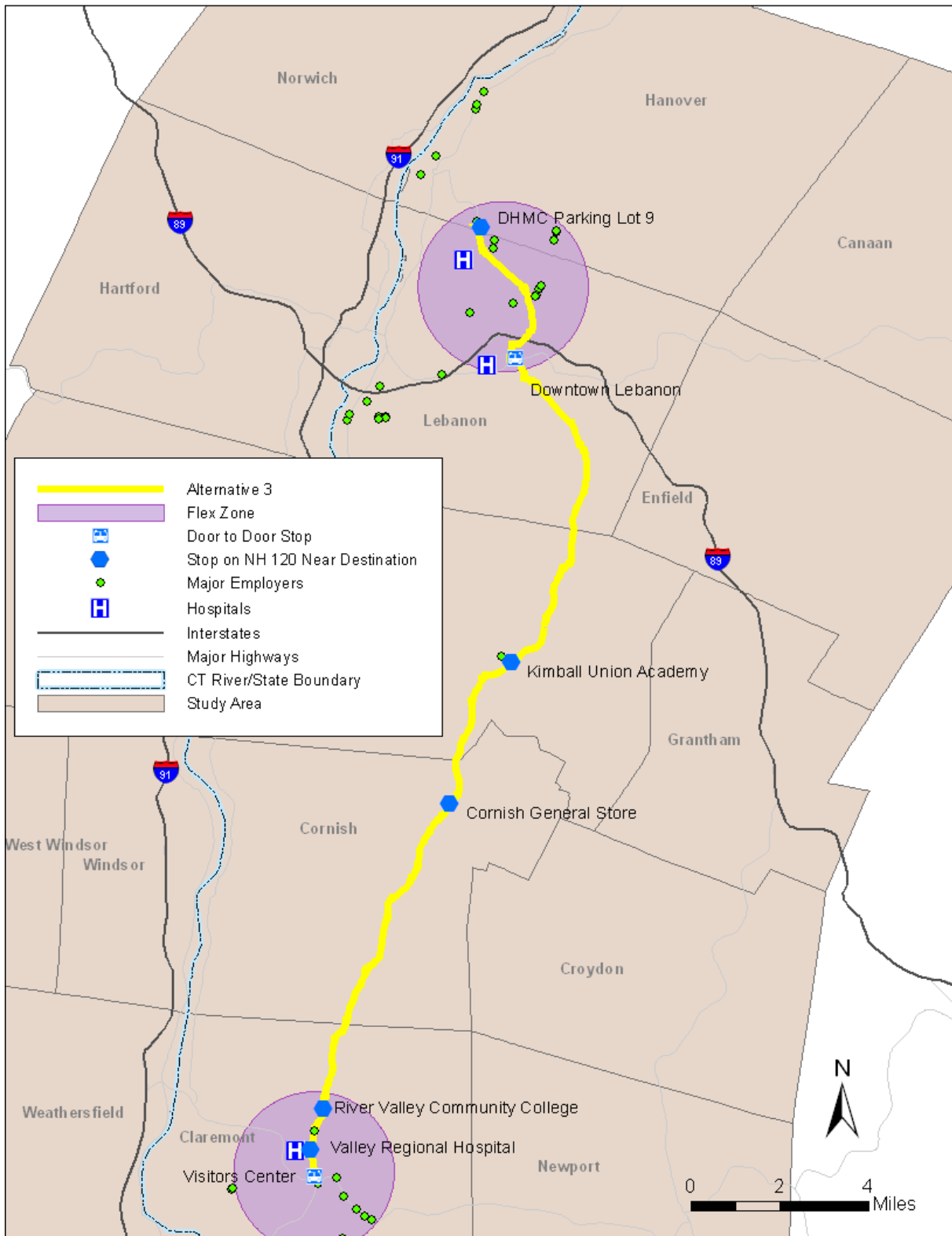
A key advantage of offering flex service is that passengers may use the NH 120 service to reach destinations off of the NH 120 bus route in Claremont or Lebanon, such as Alice Peck Day Hospital or employment along Etna Road. A disadvantage of flex service is that both passengers and drivers need experience with the service in order to make it successful (see Figure 12).

**Figure 12: Strengths and Weaknesses of Alternative 3**

Strengths	Weaknesses
Provides direct service between Claremont and Lebanon.	Scheduling time for service to flex compromises schedule design. As a result, route may not be as attractive to commuters.
Offers Park and Ride services at both ends of the trip.	There is a learning curve to get used to how Flex service works. As a result, service will require more marketing and outreach than other service.
Flex service expands service coverage without compromising directness of service.	Passengers will need to call and make a reservation in order to be picked-up.
Flex service makes service more useful for non-commuters, especially older adults and persons with disabilities.	Flex option may not be attractive to commuters.
Would provide opportunities to get to Alice Peck Day Memorial Hospital.	Adding Flex option increases service costs.

Source: Nelson\Nygaard

Figure 13: Alternative 3 Claremont to DHMC with Flex Service



## Indicative Service Schedule and Costs

### Northbound

Claremont Visitors Center	Valley Regional Hospital	River Valley Community College	Cornish General Store	Kimball Union	Downtown Lebanon <sup>11 12</sup>	DHMC Lot 9	Flex Time
5:25 AM	5:28 AM	5:29 AM	5:40 AM	5:46 AM	6:04 AM	6:14 AM	6:15 - 6:35 AM
8:00 AM	8:03 AM	8:04 AM	8:15 AM	8:21 AM	8:39 AM	8:49 AM	8:50 - 9:10 AM
11:05 AM	11:08 AM	11:09 AM	11:20 AM	11:26 AM	11:44 AM	11:54 AM	11:55 AM - 12:15 PM
3:00 PM	3:03 PM	3:04 PM	3:15 PM	3:21 PM	3:39 PM	3:49 PM	3:50 - 4:10 PM
5:35 PM	5:38 PM	5:39 PM	5:50 PM	5:56 PM	6:14 PM	6:24 PM	5:45 - 6:05 PM

### Southbound

DHMC Lot 9	Downtown Lebanon <sup>13 14</sup>	Kimball Union	Cornish General Store	River Valley Community College	Valley Regional Hospital	Claremont Visitors Center	Flex Time
6:40 AM	6:53 AM	7:09 AM	7:14 AM	7:25 AM	7:27 AM	7:30 AM	7:35 - 7:55 AM
9:15 AM	9:28 AM	9:44 AM	9:49 AM	10:00 AM	10:02 AM	10:05 AM	10:10 - 10:30 AM
12:20 PM	12:33 PM	12:49 PM	12:54 PM	1:05 PM	1:07 PM	1:10 PM	1:15 - 1:35 PM
4:15 PM	4:28 PM	4:44 PM	4:49 PM	5:00 PM	5:02 PM	5:05 PM	5:10 - 5:30 PM
6:50 PM	7:03 PM	7:19 PM	7:24 PM	7:35 PM	7:37 PM	7:40 PM	7:45 - 8:05 PM

## Estimated Cost

Operating Flex service will increase the operating hours of the service. By adding approximately 20 minutes of flexible time at each end of the service increases the cost of the service to an estimated \$179,167. Accordingly, the average cost per trip increases to just over \$71.

## Estimated Ridership and Performance

A key challenge associated with the flex service is that by adding 20 minutes on each trip end, the original service design, which is timed to meet key shift starting times, is compromised. As a result, we reduced our ridership estimates for individuals commuting to the area hospitals. At the same time, operating a flex route will attract additional riders who could not get to/from the route ends without the flex service option. To accommodate the strengths and weaknesses of the alternative, we reduced the ridership assumed in Alternative 1 by 75% but added in between two and three additional riders to each trip. Figure 14 shows the ridership and cost estimates.

<sup>11</sup> Connects with AT Blue Route – AM: 6:10, 8:45, 11:45; PM: 12:15, 3:45; 6:15

<sup>12</sup> Connects with AT Red Route – AM: 6:15, 8:45, 11:45 AM; PM: 3:45

<sup>13</sup> Connects with AT Blue Route – AM: 7:10, 9:45; PM: 12:45, 4:50

<sup>14</sup> Connects with AT Red Route – AM: 7:15, 9:45; PM: 12:45, 4:45

**Figure 14: Alternative 3 Estimated Demand and Performance Measures**

Service Alternative 3	Low	Medium	High
Annual Ridership	21,306	28,021	37,165
Passengers per Day	85.2	112.1	148.7
Passengers per Trip	8.5	11.2	14.9
Cost per Trip	\$71.7	\$71.7	\$71.7
Cost per Passenger Trip	\$6.45	\$4.91	\$3.70

Source: Nelson\Nygaard

# Service Alternative 4: Claremont Visitors Center – Etna Road

## Alternative Description

Alternative 4 is designed to meet the needs of commuters, similar to Alternative 1 and its sub-options, as well as Alternative 2, but this alternative also extends the service to employers along the Great Hollow Road/Etna corridor. The advantages and disadvantages of this alternative are listed in Figure 15.

Like Alternatives 1 and 2, the route begins at the Claremont Visitors Center, with a variety of potential intermediate stops, traveling to downtown Lebanon and DHMC Parking Lot 9. Upon leaving Parking Lot 9, the vehicle will turn north on NH 120 and turning right again on to Greensboro Road and Great Hollow Road. The proposed alignment will continue along Great Hollow Road until it turns into Etna Road. After making two stops along this path, the vehicle will return to NH 120 to go to downtown Lebanon, and then will continue on to downtown Claremont.

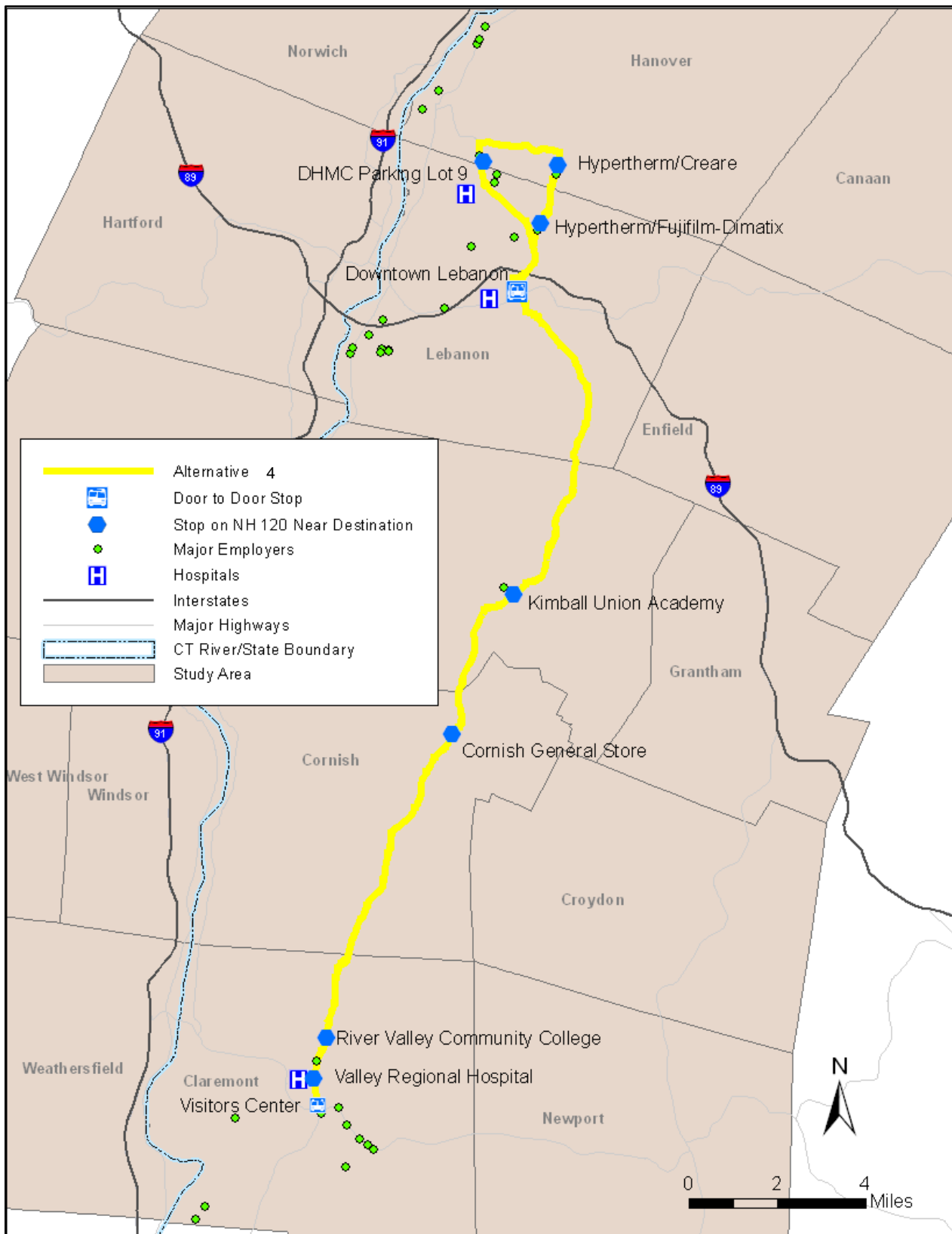
With this alignment, the one-way trip is 26.4 miles (roundtrip of 52.8 miles) and the one way travel time is approximately 55 minutes. Including recovery time, a single round trip requires two hours.

**Figure 15: Strengths and Weaknesses of Alternative 4**

Strengths	Weaknesses
Direct service between Claremont and Lebanon.	Service along Etna Road is one-way only.
Provides Park and Ride opportunities at both ends of route.	Some employers are set back from Etna Road and the walk to the work site may be long.
Meets major DHMC shift times and meet shuttle service to DHMC campus.	Etna Road extension does not necessarily help transit dependent riders and may be confusing for mid-day riders.
Connects with AT Red and Blue routes at Lebanon Green.	
Serves Etna Road employment, which currently does not have a lot of transit service.	
Could be scheduled to meet CATS route at the Moody Building or as an extension of CATS Newport route.	

Source: Nelson\Nygaard

**Figure 16: Alternative 4 Claremont to DHMC and Etna Road**



## Indicative Service Schedule and Costs

As discussed, the key attribute of Alternative 4 is continuing service from DHMC Lot 9 along Etna Road to downtown Lebanon. This alternative provides one-way service to several employers. For purposes of this analysis, the study team assumed the route would operate in the same pattern for all trips. This assumption may change if the alternative is carried forward to final design.

### Northbound

Trip	Claremont Visitors Center	Valley Regional Hospital	River Valley Community College	Cornish General Store	Kimball Union	Downtown Lebanon <sup>15 16</sup>	DHMC Lot 9	Great Hollow	Etna
Trip 1	5:25 AM	5:28 AM	5:29 AM	5:40 AM	5:46 AM	6:04 AM	6:17 AM	6:24 AM	6:27 AM
Trip 2	7:25 AM	7:28 AM	7:29 AM	7:40 AM	7:46 AM	8:04 AM	8:17 AM	8:24 AM	8:27 AM
Trip 3	11:05 AM	11:08 AM	11:09 AM	11:20 AM	11:26 AM	11:44 AM	11:57 AM	12:04 PM	12:07 PM
Trip 4	3:00 PM	3:03 PM	3:04 PM	3:15 PM	3:21 PM	3:39 PM	3:52 PM	3:59 PM	4:02 PM
Trip 5	5:00 PM	5:03 PM	5:04 PM	5:15 PM	5:21 PM	5:39 PM	5:52 PM	5:59 PM	6:02 PM

### Southbound

Trip	Downtown Lebanon <sup>17 18</sup>	Kimball Union	Cornish General Store	River Valley Community College	Valley Regional Hospital	Claremont Visitors Center
Trip 1	6:42 AM	6:58 AM	7:03 AM	7:14 AM	7:16 AM	7:19 AM
Trip 2	8:42 AM	8:58 AM	9:03 AM	9:14 AM	9:16 AM	9:19 AM
Trip 3	12:22 PM	12:38 PM	12:43 PM	12:54 PM	12:56 PM	12:59 PM
Trip 4	4:17 PM	4:33 PM	4:38 PM	4:49 PM	4:51 PM	4:54 PM
Trip 5	6:17 PM	6:33 PM	6:38 PM	6:49 PM	6:51 PM	6:54 PM

## Estimated Cost

Operating the NH 120 route via Etna Road would increase the travel time slightly as compared with Alternatives 1 and 2, and would result in an annual cost of \$150,625. The cost per trip is roughly \$60.

<sup>15</sup> Connects with AT Blue Route – AM: 6:10, 8:15, 11:45; PM: 12:15, 3:45, 5:50

<sup>16</sup> Connects with AT Red Route – AM: 6:15, 8:15, 11:45 AM; PM: 3:45, 5:45

<sup>17</sup> Connects with AT Blue Route – AM: 6:45, 8:45; PM: 12:45, 4:20, 6:45

<sup>18</sup> Connects with AT Red Route – AM: 7:15, 8:45; PM: 12:45, 4:45



## Estimated Ridership and Performance

To estimate the ridership for Alternative 4, the study team carried forward the same assumptions as used for Alternative 1 but increased the proportion of the total market for commuters that would use public transportation to 1% (low), 2% (medium) and 3% (high). The increase in the market share is intended to account for the fact that the service coverage will be extended considerably to the Etna Road employers (see Figure 17).

**Figure 17: Alternative 4 Estimated Demand and Performance Measures**

Service Alternative 4	Low	Medium	High
Annual Ridership	15,484	28,786	40,977
Passengers per Day	61.9	115.1	163.9
Passengers per Trip	6.2	11.5	16.4
Cost per Trip	\$60	\$60	\$60
Cost per Passenger Trip	\$8.88	\$4.78	\$3.36

Source: Nelson\Nygaard

## Appendix E. Public Comments Submitted in Writing or by Email

This would be a great service and many ideas were presented to make it more valuable for riders.

-M. M., Orford, Representing regional hospital

I'm very interested in seeing public transportation come to Plainfield and Cornish, NH. It would be good to have a bus that would go from Claremont to Lebanon. Maybe this would be a way to have more people attend River Valley Community College. That would be great for people who don't have cars or the elderly that need to get to appointments. Is it possible that there could be bus service like that from Lebanon to Cornish with a few trips a day?

-L. W. Plainfield

I am really impressed with our plan. For someone like myself with a visual impairment, this would really open up opportunities for me. Thank you.

-J. F., Lebanon

Creare is very interested to see this study and supportive as an employer to be at the table – as long as Etna Road continues to be included as part of the route.

-J. S., Cornish

If at all possibly, many DHMC employees work 8 am to 5 pm, and would probably be able to use a bus if it accommodated those hours more closely. I like the Moody Building stop, as I can walk there!

-S. T., Claremont

I live in Newport and commute to DHMC 5 times a week. I do not use the Ascutney bus because it is almost just as far to the bus stop as it is to drive to Lebanon. I would definitely use this 120 bus every day to get to work. I know of at least 3 other Newport commuters that would also utilize this bus. Could DHMC supply some money for the bus or even Dartmouth College/Dartmouth Medical School?

-B. A., Newport

Add an additional stop at the Visitors Center on North Street in Claremont. Add an additional stop at Corey Store on Central Parkway in Lebanon.

-J. C., Claremont

I am very interested in having a bus available on the Route 120 road. I live on Croydon Turnpike Road in Plainfield, just off the Route 120. I work Monday through Friday at DHMC and would love to have a bus available to myself and family to take advantage of. It would save time and gas to be able to rely on this service, not to mention thinking green and saving on traffic, congestion, emissions for the future. I also asked Terry McNamara that owns the Meriden Deli on Route 120 in Meriden that she would like to be considered as a possible bus stop for the

service. Another possible stop or parking place might be the Meriden Grange Hall on Bean Road, just off of the route.

-S. T., Plainfield

One difference between this version and the last is the scheduled arrival time at Etna Road and Great Hollow Road – the proposed times of 7:11 and 7:14 am would mean that none of our first shift Associates could take the bus as their start times are typically 6:50 am and 7:00 am. There is a much smaller office-based Associate population who may start anywhere between 7:30 and 8:00 am.

-J. L., Lebanon

Won't a Claremont to Lebanon route cannibalize the already existing Connecticut River Transportation Route that goes from Bellows Falls, Springfield, Ascutney (large amount of Claremont riders get on there) and Exit 9 (Windsor) before going to DHMC and the College. If Ridership is cannibalized from CRT it will make the run uneconomical and residents of Springfield and Bellows Falls could be negatively affected if the route was discontinued due to reduced ridership from a COMPETING option. Isn't this counter to what you are trying to accomplish?

-R. L., No town provided

On behalf of victim/survivors of domestic violence, sexual assault and stalking, Turning Points Network expresses the critical need for accessing transportation to and from the Upper Valley. Providing this service could make it possible for a battered partner to access medical services and treatment that may not be available to her/him otherwise, access safety for oneself and her/his children and get or keep a job. Lack of transportation is a barrier often faced by a survivor seeking to leave an abusive relationship. Available, accessible and affordable transportation will assist a survivor to meet immediate needs as well as gain long-term independence and ongoing safety.

-B. F., Newport

Schedule states Blue runs every 15 min. That is true between DHMC & Hanover, but not DHMC & Lebanon. Blue from Leb to DHMC runs quarter to quarter past the hour.

-Public Meeting Attendee

I ride the Connecticut River Transit in Vermont now everyday – even though I live in Claremont, but do not get back to Ascutney till 6:00 p.m. We pay a donation of \$3.00 each way. The transit delivers us to the East entrance of the hospital @ 6:45 a.m. and the other route delivers for 7:40 a.m. It picks ups in the evening @ 4:05 p.m. and 5:05 p.m. CRT picks up @ a number of locations as well as the DHMC East Entrance to accommodate those who work @ Colburn Hill and Centerra. There is a much earlier run that picks up @ 5:45 a.m. which goes to Hanover, Dartmouth College, Hanover Inn, and the VA, and I believe it also delivers dialysis patients to Lombard Road and the DHMC offices off Lombombard near FW WEBB and perhaps Hypertherm. It would be nice to have a transit from Claremont to Lebanon up route 120 and return to accommodate those who start @ 7 a.m. and those who start @ 8 a.m. I personally live off Washington Street, near Hannaford and did use the Community Alliance Bus from Claremont to Ascutney a number of times.

-B. D., Claremont

Just want you to know that I am very interested in anything one 120 in Cornish.

-D. K., Cornish

[I] wanted to know why we couldn't get a bus to run the evening shift from Claremont to DHMC. It would free up parking at the hospital And save wear and tear on our cars. Then we have the issue of crazy gas prices. IT'S AWFUL WE GET ZERO ANYTHING WORKING NIGHTS...

-D. F., Claremont

I live in Cornish and I am interested in what the bus schedule would be.

-J. S., Cornish

I'm contacting you regarding the recently announced funding for the Claremont to Lebanon public transportation audit. I live in Grantham, NH and would very much appreciate it if you all would bear in mind that many people living in Newport and points south on down into Goshen work at DHMC. It would be good to have a bus originating in Claremont come over to Newport and then up Route 10 through Croydon and Grantham and then onto I-89 and up to Lebanon. We have the park and ride at Exit 13 and many people would have that space available to leave their cars from points in New London, Andover & Sunapee. I work as a nurse at DHMC in Occupational Medicine so I have an opportunity to interact with many employees and chat about where they live. We really need some public transport option down this way, too.

-S. C., Grantham