

NASHUA REGIONAL TRANSIT EXPANSION STUDY

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NASHUA REGIONAL PLANNING COMMISSION

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I. PROJECT PURPOSE AND SCOPE

The Nashua Regional Planning Commission (NRPC), in close coordination with the Nashua Transit System (NTS), conducted an evaluation of the feasibility of regional transit service in the Greater Nashua and Souhegan Valley region. Transit service extensions beyond the borders of the City of Nashua have been identified as a regional need in previous planning documents, including the Nashua Transit System Comprehensive Plan for 2016-2025 and the 2019-2045 NRPC Metropolitan Transportation Plan. Approximately 58% of residents in the region live outside of Nashua and do not have access to fixed-route transit service. The Nashua Urbanized Area (UZA)/Transportation Management Area (TMA) is the largest urbanized area in New Hampshire and the only one not served by a regional transit system. The evaluation of new transit routes focuses on four major corridors that provide access to the largest concentrations of population and economic activity outside of the City of Nashua. These corridors include:

- NH 101A from the terminus of Amherst Street in Nashua to western Milford at the junction of NH Route 101;
- US 3 Daniel Webster Highway in Merrimack from Nashua to the Bedford town line;
- Continental Boulevard and Industrial Drive in Merrimack; and
- NH 3A in Hudson.

II. NTS COMPREHENSIVE PLAN

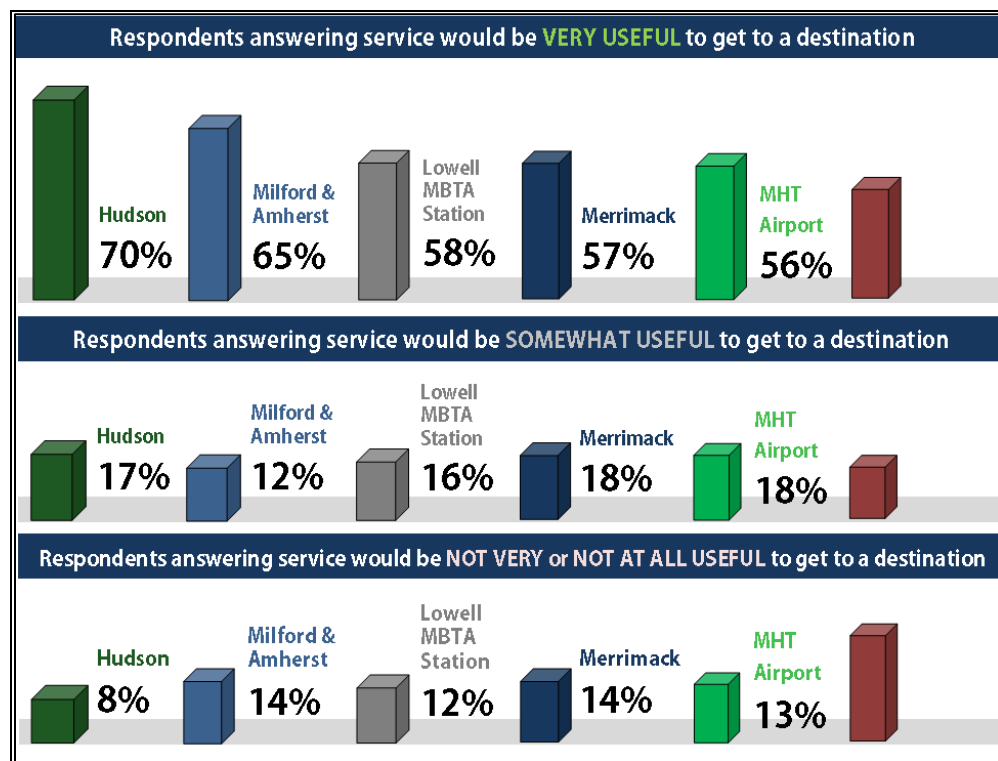
The planning rationale for the present feasibility study is an outgrowth of the 2016 NTS Comprehensive Plan developed for the Nashua Transit System. This Plan updated the earlier NRPC/City of Nashua Regional Transit Plan of 2003. In addition to service improvements within the City of Nashua, the 2003 Plan had identified the need for extending service to other NRPC communities and to points beyond the NRPC region. The 2016 NTS Plan evaluated the condition and effectiveness of existing transit services and prioritized future service expansions.

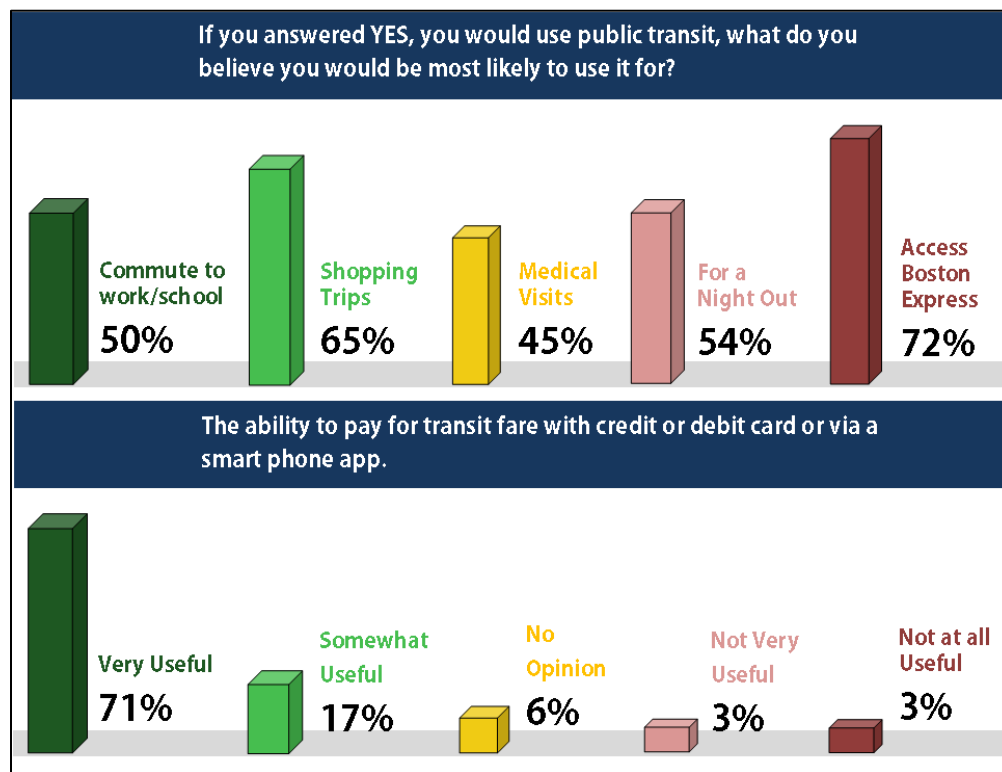
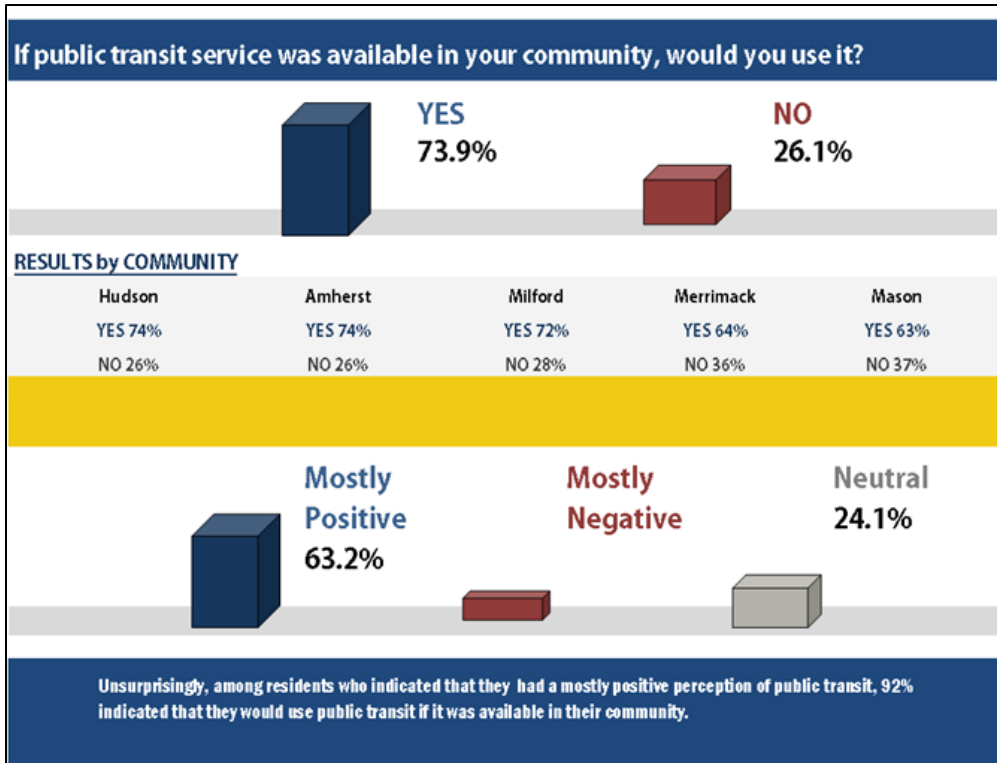
Survey efforts were conducted in 2015 to gauge the interest in service extensions beyond the region, including surveys of existing riders and general public surveys for residents of neighboring communities in the region. The following figures identify specific desired service areas, trip purpose and anticipated frequency of transit service use.

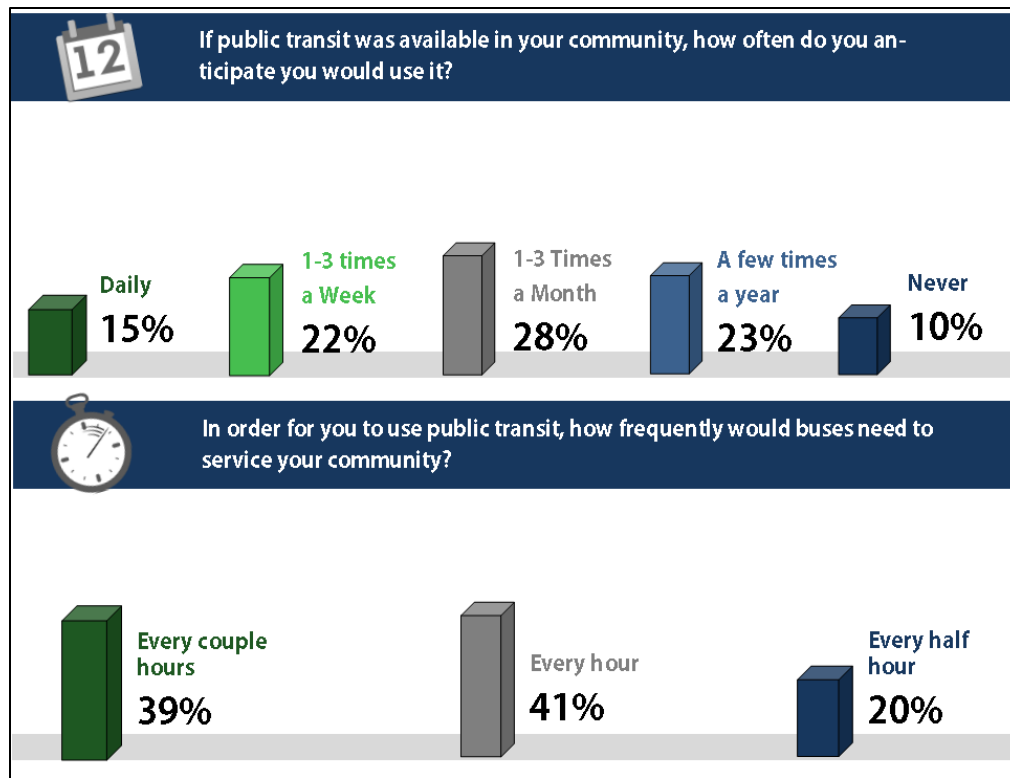
These surveys provide some useful information regarding the desires of existing riders and the general public for transit service enhancements. However, for the current study, NRPC

distinguished existing riders' opinions from those of the general public, since most of the latter are not transit users. Further, we obtained more specific origin-destination information from existing riders that would assist in the development of a new ridership estimation procedure. The results of these recent surveys are presented in the following section of this report.

2015 PUBLIC OUTREACH TRANSIT SURVEY







A. NTS Comprehensive Study Transit Trip Estimation

The NTS Comprehensive Plan included a correlation analysis for use in estimating ridership for NTS service extensions beyond Nashua. The premise of the analysis was that demographic and land use variables that correlate with ridership on existing routes can be used to infer ridership at new locations. Variables which were tested and found to correlate with ridership within a walkable distance (determined for that analysis to be 1/8 of a mile) were the following:

- Residential density
- Large housing complexes, including senior housing
- Zero auto households
- Low-income households
- Large attractions (supermarkets, medical institutions, etc.)
- Intensity of development
- Abundance of food and retail jobs

The ridership model equation developed for predicting new ridership was calculated as shown below. The R-square goodness-of-fit was .72, which indicates a reasonably good level of correlation between ridership and the independent variables tested.

$$\text{Ridership} = 41.97 + (.0986) \text{ Retail Jobs} - (.000441) \text{ HH Income} + (160.99) \text{ Major Attractions} + (76.8) \text{ Major Residential}$$

Estimates reported by area in the NTS Comprehensive Study are shown in the following table. In summary: 21,295 trips per year are predicted to Route 101A to Milford and Wilton; 21,210 to Continental Blvd/Industrial Dr. serving primarily the Merrimack Premium Outlets; 8,413 to Daniel Webster Highway in Merrimack and 8,197 to NH 3A in Hudson.

Following a review of the methodology and resulting ridership estimates used in the 2015 plan, NRPC concluded that transit estimation for the current study should be specified in greater detail. NRPC chose to separate trips by travel purpose, as well as identify trips generated at home ends with those attracted to activity centers. The revised transit trip estimation procedure and resulting estimates for new service areas are detailed later in this report.

B. [NTS Comprehensive Plan Recommendations](#)

The 2015 Comprehensive Plan recommended service enhancements and extensions in several phases, summarized as follows:

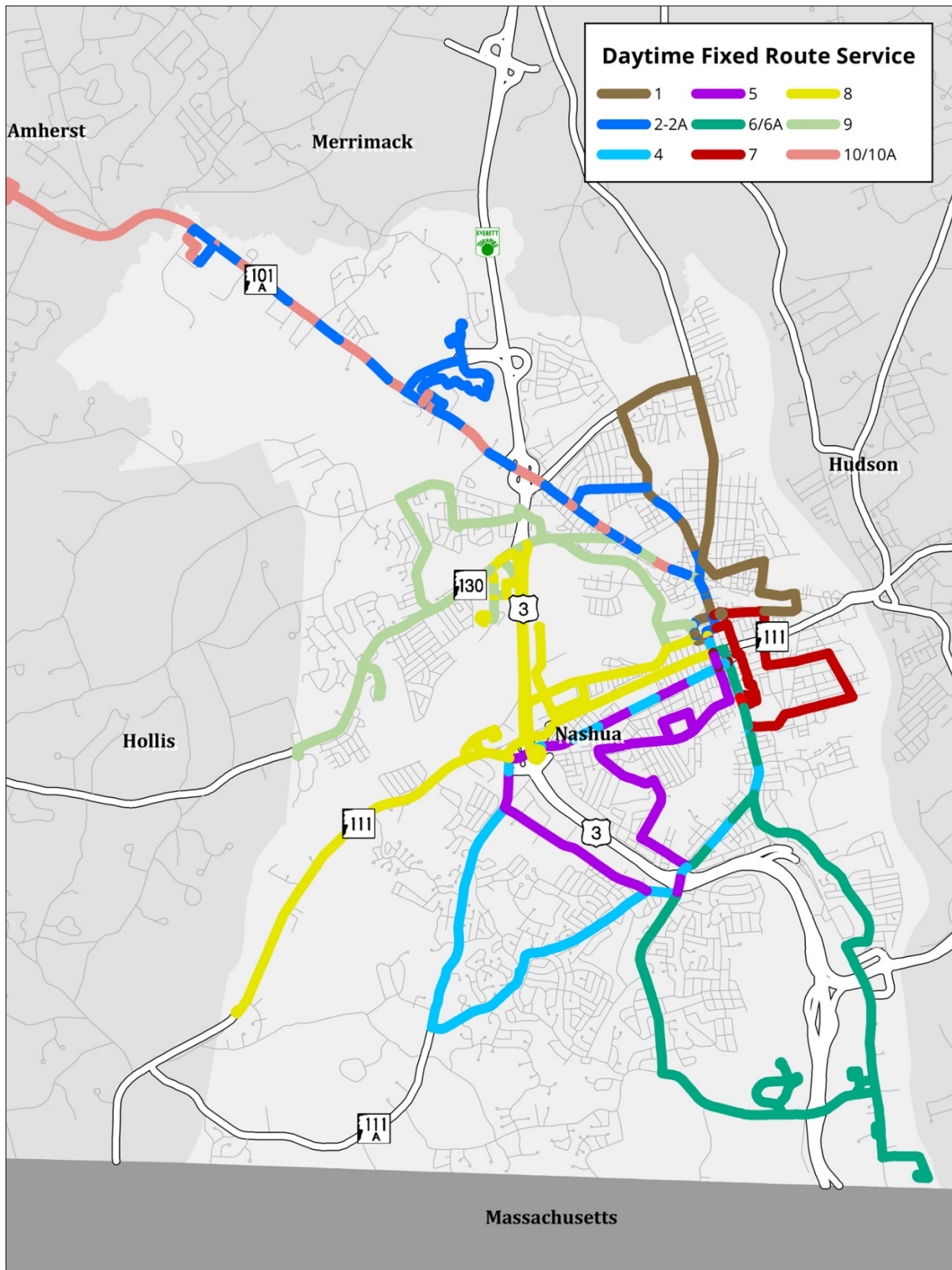
- [Expansion Within the Region Phase 1](#) – Extend service from Westside Plaza in Nashua to Walmart in Amherst. This has been implemented as a trial service funded through a Congestion Mitigation and Air Quality Improvement Program (CMAQ) grant to operate service through 2022. Service to the Merrimack Premium Outlets was also recommended, however as the Outlet management is not open to accommodating public transit at the site at this time and the access road to the property is private, a service extension to the Outlets has not been pursued.
- [Expansion Within the Region Phase 2](#) – Operate fixed-route service to other communities, including Hudson, Merrimack, Milford, and Wilton. This is the scope of the present study, with the exception of Wilton.
- [Expansion Beyond the Region](#) – Provide transit connections to the Boston-Manchester Regional Airport, Manchester Transit Authority, Lowell Regional Transit Authority, and park-and-ride facilities outside the region to access destinations in Massachusetts via commuter rail or commuter bus service. NRPC

will be undertaking another transit feasibility study in FY 2020-2021 which will evaluate the potential for transit connections in Middlesex County, Mass.

RIDERSHIP ESTIMATES FOR SERVICE EXTENSIONS NTS COMPREHENSIVE PLAN 2015

Potential Route	Potential New Stop	Annual Predicted Ridership	Predicted Ridership Category
101A to Milford & Wilton	1. Amherst Walmart	7229	Very Busy
	2. Milford Shaw's / New Apts	5561	Busy
	3. Milford Oval	893	Light
	4. Milford Market Basket	7154	Very Busy
	5. Wilton Town Center	458	Very Light
Outlets	6. Outlets	21,210	Very Busy
DW Hwy	7. Lillian's Motel - Clovelly Apts - Big One Ice Cream	940	Light
	8. So. Merrimack Dunkin Donuts	441	Very Light
	9. King Kone / Residences	2108	Moderate
	10. YMCA	589	Very Light
	11. CVS - Senior Center - Merrimack Town Center	1238	Moderate
	12. New Shaw's Plaza	5863	Busy
	13. Flatley Development	723	Light
Hudson	14. Hannaford	5561	Busy
	15. Walmart / Sam's Club	7154	Very Busy
	16. Condos adj. to Presentation of Mary	413	Very Light
	17. Additional Condos on 3A	630	Very Light

EXISTING NTS ROUTES



III. PUBLIC OUTREACH

The public outreach phase of the regional transit expansion study provided an opportunity for transit-dependent populations, traditionally underserved populations, and potential non-transit dependent populations to provide input on proposed routes, types of service and transit stop locations through interactive exercises. NRPC conducted outreach through on-line and in-person surveys, transit workshops held in each community, through site visits to large employers and attendance at various public events. Each of these outreach activities is more fully described below.

A. Nashua Transit On-Board Survey

Since existing NTS riders are anticipated to comprise the largest share of users of an expanded transit system, NRPC staff conducted an on-board survey of NTS riders during the spring of 2018 to identify desired service extension destinations and obtain information on rider demographics and travel characteristics. The results provided important input into estimating the potential for new service to the corridors that were evaluated for this study. The survey was conducted on all runs for each NTS fixed route and copies were made available at the Transportation Center in downtown Nashua. The survey was available in both English and Spanish.

The on-board survey yielded an impressive total of over 500 responses. Since there are about 1,400 NTS rides per day, or between 700-800 individual passengers, the percent of NTS riders surveyed is large enough to allow the survey results to be viewed as representative of the overall NTS rider population. Though all routes were surveyed, routes 6 and 6A were slightly underrepresented, probably due to high transfer rates. Night trips were also underrepresented, as riders were less inclined to participate during those hours.

B. NTS CityBus Rider Demographics & Travel Characteristics

Rider Profile. While fixed-route services are sometimes thought to serve primarily senior and disabled persons, NTS has a varied rider profile. Only 9% of respondents are 65 and older, with 27% falling into the 50-64 range, 20% are 35 to 49, 26% are 25 to 34 and 17% are 16 to 24. Over two-thirds are employed (41% full-time, 27% part-time). Retired persons account for 14% of riders, followed by unemployed/disabled (11%) and students (8%). Disabled persons make up 25% of all riders.

Just over 50% of riders reported household income under \$20,000 and there has been a significant reduction in income levels from those reported in previous surveys going back

to 1988. Another 23% are in the \$20k-\$30k range and 13% are between \$30k-\$40k. Two-thirds (67%) of riders identified themselves as White, 19% Hispanic, 8% African American, 3% Asian and 3% Native American. A portion of the Hispanic portion identifies race as White, hence the cumulative percentage exceeds 100%.

Only 35% of CityBus riders have a valid driver's license and for the youngest age groups, the average is only 21%, as shown in the following table. In addition, fewer than 20% of all riders in all age groups have a vehicle available to them.

Auto Availability by CityBus Rider Age Group

<u>Rider Age</u>	<u>Pct. of Total</u>	<u>Licensed Driver</u>	<u>Auto Available</u>
16 - 24	17%	21%	16%
25 - 34	26%	30%	15%
35 - 49	20%	35%	12%
50 - 64	27%	49%	16%
65+	9%	46%	13%

Trip Frequency. NTS riders are predominantly regular transit users. Over 80% ride NTS at least three days/week and 54% ride 5+ days/week. Only 5% reported that they ride once or twice a month and 3% ride less than once a month. Since over two-thirds of NTS riders are employed and an even larger share lack access to an automobile, high rates of trip frequency are unsurprising and underscore the essential nature of the service.

Reasons for Taking CityBus NTS is the only mode available for 60% of riders. Of the remaining riders, convenience was cited by 29% and cost by 21%. Avoiding traffic congestion, parking cost/availability and preservation of environment were insignificant factors at 3% or less for each reason. Only 15% of riders reported having a motor vehicle available for the trip. Other modes used by transit riders include walking (55%), getting a ride from family or friend (43%), using a taxi or other ride service (30%), bicycling (11%) and driving themselves (7%). These data indicate a very high degree of transit dependency and again, emphasize the importance of fixed-route service to the NTS clientele.

Transit Trip Characteristics. Nearly all riders (97%) walk from home to their bus stop and 95% walk to their activity destination (3% are picked up and driven to the destination). A walk time from home of 5 minutes or less is reported by 61% of riders, 25% walk 6 to 10 minutes, 12% walk 11 to 15 minutes and only 2% walk 16 minutes or more (20 min. maximum). For walk times from leaving the bus to their destinations, 82% of riders reported 1 to 5 minutes, 11% said 6 to 10 minutes and 7% walk 15 or more minutes.

Walk Time from Home

<u>Minutes</u>	<u>Pct.</u>	<u>Cumulative Pct.</u>
1	17%	17%
2	12%	29%
3 – 4	16%	45%
5	17%	61%
6 - 9	9%	70%
10	16%	86%
11 - 14	4%	90%
15	8%	98%
17 - 19	1%	99%
20	1%	100%

The number one trip purpose of CityBus, as reported by 49% of all respondents, is to provide home-to-work transportation. This was followed by shopping (27%), medical (8%), school (7%), social/personal (5%) and 4% other trip purposes. As a majority of respondents indicate that NTS is their only transportation option, its importance in sustaining employment among disadvantaged persons is evident; however, it is also apparent that NTS service is critical in providing businesses with access to employees. College and school trips have also risen in their share of total trips since a 2002 on-board survey, while shopping, social and medical trips have declined as a percentage of the total.

One-third (33%) of NTS riders transfer to another route, which is less than reported in surveys taken during the early 2000's and before. This indicates routes are operating more efficiently and NTS can serve more people with a single route.

Desired Service Area Extensions. As the NTS Feasibility Study has a defined work scope for evaluating potential service area extensions to Merrimack, Hudson, Amherst, and Milford, existing NTS transit riders were asked to identify desired destinations within these communities. The following table summarizes responses and indicates that service to Walmart in Amherst and Hudson is the most desired service extension. The Premium Outlets in Merrimack came in third at 35%. It is important to note that although the top three destinations are retail in nature, they are also centers of employment. Just over one-third also report Boston-Manchester Airport as an important destination to serve, although the airport is outside the scope of this study.

Desired Transit Destinations Outside of Nashua

Milford Medical Care	10%
Milford Oval	18%
Market Basket, West Milford	13%
Milford, Any	25%
Lowe's Plaza, Amherst	18%
Bed, Bath, Beyond Plaza, Amherst	19%
Walmart, Amherst	54%
Amherst, Any	57%
Milford-Amherst	60%
Hudson Town Center	20%
Hannaford, Hudson	21%
Ayotte's Stateline Market, Hudson	10%
Walmart, Hudson	46%
Hudson, Any	53%
Premium Outlets, Merrimack	35%
YMCA, Merrimack	15%
Shaw's Plaza / Exit 11, Merrimack	13%
King Kone DWH Area, Merrimack	19%
CVS/Sr Ctr/Town Center, Merrimack	10%
DWH/Exit 12 Area, Merrimack	9%
Merrimack, Any	46%
Target, Bedford	15%
Manchester-Boston Regional Airport	34%

C. [Survey of the General Public](#)

The transit expansion feasibility survey of the general public was administered online in 2018. The primary purpose of this survey was to reach those potentially interested in transit serves who are not current NTS riders, though all members of the public were able to participate. As was true for the on-board survey, a Spanish version was also available. There were approximately 325 responses to the survey. The distribution of communities of residence of the respondents is shown below. Merrimack residents accounted for over one-third of the responses, surprisingly well ahead of Nashua residents.

General Public On-Line Survey Community of Residence

Residence	Total	% Total
Merrimack	75	36%
Nashua	44	21%
Milford	21	10%
Amherst	12	6%
Brookline	8	4%
Hudson	8	4%
Wilton	6	3%
Hollis	5	2%
Other NRPC Area	8	4%
Other	22	11%
	209	

The demographic profile of respondents to the on-line survey differs significantly from that of existing NTS riders. Only 15% reported they were under 35 years of age, 20% were in the 35-49 age bracket, 30% reported 50-64 and 35% were 65 or older. In contrast, 43% of existing NTS riders are under age 35 and only 9% are 65 or older. A majority (58%) work full or part-time, 30% are retired, 6% are unemployed, 4% reported being disabled and 2% are students. Asked to identify their income range, 38% reported to be in the highest bracket of household income (\$80,000 or more), 14% said \$60,000 to \$80,000, 15% are in the \$40,000 to \$50,000 range, 22% said between \$20,000 and \$40,000 and only 12% had an income under \$20,000. Given that 50% of existing NTS riders have incomes below \$20,000, general survey respondents obviously have a significantly higher income range distribution than current users of NTS fixed-route service.

Asked to identify their race, 89% said white, 2% each reported as Asian/Pacific Islander, African American, Hispanic/Latino, and Native American. There were 5% who reported as "other". Nearly 20% of respondents reported they had a physical disability and nearly 30% said they were not always able to drive themselves, which puts this percentage of the respondents in the category of high potential transit user. Furthermore, while 10% have another driver available at various times, few have someone always available to provide the trip.

General Public On-Line Survey Vehicle Availability

Vehicle Availability	Total	% Total
Always able to drive myself	149	71%
Someone always available to drive me	3	1%
Someone sometimes available to drive me	21	10%
Vehicle is rarely available for my use	11	5%
Do not drive	25	12%
	209	

General On-line survey respondents were asked where they travel to and what the purposes of their trips are. Respondents were asked to select the destinations that they travel to on a regular basis for each type of trip purpose. There were 23 non-responses, and these are removed from the total when calculating percentages of travel.

Nashua predictably has the highest number of total destinations followed by Merrimack, but it is interesting to note that the number one trip purpose for Nashua-based trips was medical. Likely due to the location of both of the region's major hospitals within Nashua as well as the city's overall concentration of medical practices and facilities. Medical trips were a significant trip type for most communities as well and for this reason, medical trips are one of the specific transit trip purposes evaluated in the ridership estimation phase of this study.

Manchester was identified as a regular travel destination for 63% of respondents, with shopping and other trip purposes predominating. Although the City of Manchester is outside of the purview of this study work scope, its desirability as a destination is something to take note of for future transit service extension planning and the potential for coordination with Manchester Transit Authority.

**General On-Line Survey
Places Traveled to/Trip Purpose**

	Work		School		Medical		Shopping		Other		Total	
	Total	% Ttl	Total	% Ttl	Total	% Ttl	Total	% Ttl	Total	% Ttl	Total	% Ttl
Amherst	18	10%	0	0%	25	13%	52	28%	40	22%	85	46%
Bedford	13	7%	0	0%	30	16%	39	21%	34	18%	75	40%
Brookline	10	5%	0	0%	2	1%	3	2%	16	9%	28	15%
Hollis	7	4%	2	1%	4	2%	11	6%	32	17%	45	24%
Hudson	14	8%	4	2%	11	6%	20	11%	23	12%	47	25%
Litchfield	5	3%	0	0%	1	1%	3	2%	18	10%	24	13%
Lyndeborough	9	5%	0	0%	0	0%	0	0%	8	4%	17	9%
Manchester	21	11%	8	4%	52	28%	33	18%	69	37%	107	58%
Mason	4	2%	0	0%	0	0%	0	0%	3	2%	7	4%
Merrimack	33	18%	15	8%	52	28%	63	34%	70	38%	118	63%
Milford	26	14%	5	3%	36	19%	44	24%	45	24%	79	42%
Mont Vernon	8	4%	0	0%	3	2%	3	2%	11	6%	18	10%
Nashua	45	24%	20	11%	126	68%	118	63%	99	53%	166	89%
Pelham	4	2%	0	0%	1	1%	2	1%	7	4%	12	6%
Tyngsboro	4	2%	0	0%	2	1%	7	4%	16	9%	24	13%
Wilton	14	8%	2	1%	0	0%	2	1%	22	12%	33	18%
Other	9	5%	1	1%	8	4%	4	2%	12	6%	24	13%
Total											186	

Travel Corridors: General on-line survey respondents were asked to identify the primary routes they use to get to their destinations. As indicated in the table below, NH 101A to Milford (70%), Daniel Webster Highway in Merrimack (62%) and Continental Boulevard in Merrimack (54%) are among the most highly traveled routes in the region and are evaluated for transit service in this study. NH 3A/102 in Hudson (36%), also being evaluated for transit feasibility, was identified as a somewhat lesser traveled corridor by survey respondents.

**General On-Line Survey
Primary Routes Travelled**

Routes Traveled	Total	% Total
Daniel Webster Hwy, Merrimack	114	62%
Continental Blvd, Merrimack	100	54%
FEE Turnpike, Exit 8 to Bedford Toll	101	55%
Taylor Falls Bridge, Nashua/Hudson	29	16%
Canal/Bridge Sts, Nashua	54	29%
DW Highway - South Nashua	109	59%
Spitbrook Road/Exit 1, Nashua	73	39%
NH 101A, Milford to Merrimack	130	70%
Amherst St, Tnpk to Main St, Nashua	101	55%
East Hollis/NH 111, Nashua	57	31%
Ferry Street/NH 111, Hudson	23	12%
NH 102, Hudson	27	15%
NH 3A, Hudson	38	21%
Sagamore Bridge, Nashua/Hudson	24	13%
Total	185	

Respondents were asked to identify the mode of travel for the one place that they go to most frequently. About three-fourths said they drive alone, with the remaining 24% either sharing a ride, taking a public bus, a non-motorized mode or a ride-hailing service.

**General Public On-Line Survey
Mode of travel**

	Total	% of Total
Drive alone	140	76%
Drive or ride w/others	13	7%
Public Bus	14	8%
Walk	5	3%
Bike	2	1%
Taxi/Uber/Lyft/Other	2	1%
Total	185	

Again, focusing on the one place most frequently traveled to, general public on-line survey takers were asked the travel time for that trip. Somewhat over one-third put it in the 11 to 20-minute range and for 60% of respondents, 11 to 30 minutes is the travel time range for their most frequent trip.

**General Public On-Line Survey
Most Frequent Destination Travel Time**

	Total	% Total
10 or less	27	15%
11-20	65	35%
21-30	47	25%
31-40	20	11%
41-50	11	6%
60 or more	15	8%
Total	185	

Asked what nonweather-related issues are experienced during a typical trip, a majority of respondents reported vehicle traffic or congestion. While the use of a public bus does not shorten the travel time resulting from traffic congestion, it can reduce the stress of having to actively cope with traffic.

**General Public On-Line Survey
Travel Issues**

	Total	% Total
Vehicle traffic or congestion	111	53%
Lack of sidewalks or crosswalks	19	9%
Lack of bike lanes	12	6%
Insufficient parking	12	6%
Other	22	11%
	209	

General public on-line respondents were asked how often they typically ride either NTS or the demand-response Souhegan Valley Rides service. About 20% of respondents have used NTS and the stated, however, the frequency of use was distributed fairly evenly across the categories as opposed to the findings of the onboard riders' survey where most are every day or regular riders. Approximately 4% of respondents have used the Souhegan Valley Rides demand-responsive regional transit service.

**General Public On-Line Survey
Transit Use Frequency**

Frequency	Nashua Transit		Souhegan Valley Rides	
	Total	% Total	Total	% Total
5+ days/week	7	3.3%	1	0.5%
3-4 days/week	8	3.8%	1	0.5%
1-2 days/week	5	2.4%	1	0.5%
1-2 days/mo.	8	3.8%	2	1.0%
< 1 day/month	12	5.7%	3	1.4%
Never	169	80.9%	201	96.2%
Total	209			

Asked to identify destinations to which they would take the bus, the results correlated generally with the travel destinations stated previously, with one exception: travel to Continental Boulevard would attract a significantly lower share of bus trips than are traveled to generally by survey respondents.

**General Public On-Line Survey
Preferred Bus Destinations**

Preferred Bus Destinations	Total	% Total
NH 101A, Milford to Nashua)	62	30%
Lowell Rd/NH3A, Hudson	25	12%
Daniel Webster Hwy, Merrimack	48	23%
Continental Blvd, Merrimack	20	10%
Manchester	2	1%
Total	209	

Respondents were then asked to identify specific bus stop locations they would prefer. This produced a well-distributed set of responses across several regional activity areas, as shown in the following table.

**General Public On-Line Survey
Preferred Bus Destinations**

Preferred Bus Stop Locations	Total	% Total
Milford Medical Care, Milford	34	16%
Milford Oval	49	23%
Market Basket, West Milford	48	23%
Lowe's Shopping Plaza, Amherst	45	22%
Shopping Plaza, Amherst	66	32%
Walmart, Amherst	92	44%
Hudson Town Center, Hudson	17	8%
Hannaford, Hudson	21	10%
Ayotte's Market, Hudson	11	5%
Walmart, Hudson	39	19%
Premium Outlets, Merrimack	73	35%
YMCA, Merrimack	42	20%
Shaw's Plaza – Exit 11, Merrimack	49	23%
King Kone and Surrounding Residences, Merrimack	29	14%
CVS/Senior Center/Town Center, Merrimack	43	21%
Shaw's – Exit 12, Merrimack	33	16%
Target, Bedford	37	18%
Manchester-Boston Regional Airport, Manchester	74	35%
Other Merrimack-Milford-Hudson	9	4%
Total	209	

The next question on the general public on-line survey addressed the maximum one-way fare potential users would be willing to pay for bus service, noting that the current regular fare on NTS fixed-route transit is \$1.25 and \$2 for the Souhegan Valley Rides service. The resulting distribution shows that for a regional service, most bus riders would be willing to pay significantly more than the fare for current NTS service that is confined to the city limits.

**General Public On-Line Survey
Maximum Potential Fare**

Maximum Fare	Total	% Total
\$1	19	11%
\$2	76	44%
\$3	39	23%
\$4	7	4%
\$5	10	6%
Other	21	12%
Total	172	

As transit must make numerous stops along a route for boardings and alightings, travel time for most trips will be longer than the same trip made by a private automobile. For this reason, potential bus riders were asked how much longer they would be willing to travel by transit as opposed to driving for a trip. The following results seem to indicate that potential users understand the travel time tradeoff and are willing to incorporate significant increases in trip time to make their journey by bus.

**General Public On-Line Survey
Maximum Potential Fare**

Add. Travel Time	Total	% Total
10 min. or less	53	31%
15 minutes	44	26%
20 minutes	42	24%
25 minutes	5	3%
30 minutes	16	9%
Other	5	3%
Total	165	

General public on-line respondents were asked to indicate the hours of operation for transit service would meet their needs. Transit service beginning at 6:00 AM meets the

travel needs of most respondents. The vast majority (85%), however, indicated they needed evening service past regular commuting hours. This may indicate that regional transit service may need to include an emphasis on evening service.

**General Public On-Line Survey
Desired Transit Hours of Operation**

First Bus/Start						
	Before 6 AM	6:00 AM	7:00 AM	8:00 AM	9:00 AM	Total
Mon-Fri	22 15%	35 23%	46 31%	25 17%	22 15%	150
Sat.	10 8%	13 10%	39 30%	26 20%	41 32%	129
					Total	153
Last Bus/End						
	6:00 PM	7:00 PM	8:00 PM	9:00 PM	10:30 PM	Total
Mon-Fri	23 15%	19 13%	23 15%	38 26%	46 31%	149
Sat.	18 14%	15 12%	16 12%	26 20%	55 42%	130
					Total	153

Asked to identify all trip purposes that general public on-line survey respondents would use bus service for, personal business such as shopping and medical appointments were the lead responses. Nearly 40% would utilize the service for work trips. There was a lower percentage of employment-based trip purposes and higher percentage of medical trip purposes identified by online survey respondents versus those responding via board NTS survey; this may reflect the significantly older demographic composition of online survey respondents.

**General Public On-Line Survey
Trip Purposes**

Bus Trip Use	Total	% Total
Work	67	39%
School	20	12%
Medical Appointments	100	58%
Groceries & Basics	101	59%
Total	172	

Asked what amenities would be necessary to persuade respondents to use the bus, 78% said convenient bus stop locations, 75% noted easy to find route and schedule information

and 60% said sheltered stops. Lesser priorities included real-time mobile app of bus arrival (39%), mobile ticketing (31%) and accessible features for disabled persons (28%).

D. [NRPC Metropolitan Transportation Plan Survey](#)

Another survey effort conducted prior to commencement of the present transit feasibility study but with relevance to the analysis is a general public online survey conducted for the update of the NRPC Metropolitan Transportation Plan in 2018. A total of 573 responses regionwide were obtained. One of the key questions pertinent to transit expansion is the importance attributed to various potential transportation initiatives in the region. The table below lists several proposed projects and identifies fixed-route transit service extensions to either Milford, Merrimack or Hudson as important to 42% of survey respondents. This result equals or surpasses preference for projects which would arguably impact a much broader segment of the population, such as NH 101A widening or removal of turnpike ramp tolls in Merrimack.

NRPC Metropolitan Transportation Plan Survey Results - 2018

Transportation Projects in NRPC Long-Range Plan	Important	Not Important
Nashua/Manchester Passenger Rail to Boston	65%	28%
FEE Turnpike widening - Exit 8 to Bedford Tolls	49%	28%
Construct Route 3 Exit 36 southbound interchange	49%	30%
Expand NTS to Milford, Merrimack and/or Hudson	42%	34%
NH 101A widening at select locations, Milford to Nashua	41%	31%
Third Merrimack River Bridge NH 102 to DW Hwy.	41%	32%
Remove FEE Turnpike ramp tolls at Exit 11	37%	37%
Hudson Parkway construction from NH 3A to 111, Hudson	34%	34%
NH 101 widening to four lanes, Wilton to Bedford	30%	46%
Additional NH 101 interchange in Milford	26%	50%

E. [Employer Surveys](#)

During the conduct of this study, NRPC became aware that Hitchiner Manufacturing Company, located on NH 101A Elm Street in close proximity to the NH 101 Bypass interchange in western Milford, was interested in the potential of a transit route extension that would enable to the company to attract employees from Nashua who did not have regular access to a private automobile. The company undertook an employee survey with

the assistance of NRPC to gauge potential interest. Completed surveys were received from 227 employees. A total of 39 of the survey respondents commute from Nashua, representing 17% of the company's commute trips. The remainder of the questionnaire was targeted to the 39 Nashua residents. Drive alone in a personal vehicle was reported by 21 (84% of respondents to the question) and 4 (16%) said they carpool with another co-worker. None responded that they are dropped off at work by someone else or use a taxi or a ride-hailing service. None responded that a vehicle is rarely available to make the trip (either as a driver or passenger). There were 19 (78%) who would consider taking a public bus to the workplace.

Asked "if cost-effective and convenient bus service were available between Hitchiner in Milford and the area where you live, how often would use the service?", 13 of 26 respondents (50%) said frequently or always, 12 (46%) responded sometimes and 1 (4%) said rarely. Since the 25 positive responses exceeds the previous total regarding trips to the workplace, it suggests that some respondents would use transit for non-work trip purposes to the area or along the route to Nashua. A question regarding other trip types made between the route found that grocery trips (48%) and other retail/service trips (44%) were made on at least an occasional basis.

Asked if they knew of someone who lives in Nashua who would be interested in working at Hitchiner but does not currently due to lack of reliable transportation, 9 (36%) responded that they did. Seventeen (17) or 68% of question respondents work on the first shift, which would be most conducive to using transit service. A similar survey was also conducted at the neighboring Alene Candle facility. Although not identified as a destination in either the onboard or on-line surveys, the large concentration of manufacturing jobs in this section of Milford coupled with employer interest in potential transit service suggests that strong consideration should be given to prioritizing service to the area.

F. Transit Workshop Outreach Events

NRPC staff conducted eleven public outreach events, in workshop format, throughout the study area. The purpose of the events was to gather essential information related to perceptions around transit and potential demand for expanded transit service along proposed corridors in the study area. Staff was specifically interested in assessing the likelihood that individuals would ride transit if it were available and the possible trip origins and destinations that could be associated with the proposed corridors. Staff was also interested in determining the level of understanding of the costs and benefits of expanding public transit availability.

Workshop Format. The workshops typically began with a formal presentation that explained the project purpose & need, introduced the project partners, and described the types of transit service that are currently available in the region. A group discussion about public transit followed the presentation. The discussion was an opportunity for stakeholders to provide details about local perceptions of transit and preferred origins and destinations for possible transit routes. The final component of each workshop was an interactive mapping exercise where stakeholders were asked to review large maps of the study areas and indicate with push pins their preferred origins and destinations. In some cases, the specific format of the workshop was altered to fit the nature of the venue or event. The results of the exercise were incorporated into a Geographic Information Systems (GIS) format. This allowed the NRPC staff to analyze and summarize the results.



Workshop in Hudson - 2019

The workshops were promoted and advertised through the NRPC website (events and announcements section) Facebook, Constant Contact, and other media as well as through the assistance of the towns and partner organizations. A flyer was developed to publicize the workshops.

Workshop Locations. The workshops were held in diverse locations in order to reach transit-dependent and underserved populations, students, large employers, and elected officials. The locations included local libraries, a Nashua Community College, a human service agency, and a senior housing community. Workshop locations included the following:

- Hudson Public Library
- Hunt Community (Nashua)
- Merrimack Public Library
- Milford Public Library
- Nashua Public Library
- Nashua Community College
 - o Student Senate
 - o Lunchtime event
 - o Evening continuing education event
- SHARE – Milford
 - o Lunchtime event
 - o Dinner time event

Summary of Hudson Public Library Workshop. The consensus of those in attendance was that if a public transit route were to be extended into Hudson it should cross into Hudson via the Sagamore Bridge, travel south to the Massachusetts border (via River Rd) and return via River Road, then Lowell Road (NH3A) to as far north as the Hannaford's shopping center on Derry Road. The route would then return south on Derry Road and travel into Nashua via the Taylor Falls bridge. Other observations included the following:

- Destinations should include the businesses along Lowell and Derry Roads, including Sam's Club, Walmart, Goodwill, Market Basket, Hannaford's, and senior communities.
- Focus should be on providing transportation for industrial employees that work along the Lowell Road corridor.
- There may be enough demand for transit loops within industrial parks along the corridor. At a minimum, there should be stops very nearby.
- There would be a need for pull-outs on Lowell Rd so that busses don't hold up traffic and add to existing traffic congestion.
- There is enough commuting along Lowell Road to consider the potential for a Park and Ride somewhere along the corridor.
- There should be a connection to future commuter rail station in Nashua.

- The industrial park on NH 111 is an important destination that should be connected somehow.

Summary of Merrimack Public Library Workshop: The consensus of those in attendance was that public transit is necessary between Nashua, Merrimack, and Manchester.

Additional observations included the following:

- Destinations should include community colleges, industrial parks and private companies like BAE
- Private employers are looking for innovative ways to get their employees to work. BAE and other companies could potentially partner with NTS (public/private partnership) or other entities to solve logistical and funding issues.
- It would make a lot of sense for private industries to contribute funding for transportation, especially for non-emergency medical trips
- The creation of a regional or county transportation authority should be considered. The authority would have more flexibility to provide regional public transit service than NTS or human service transportation providers.
- Some people use Uber/Lift to avoid rush hour instead of using public transportation. These types of public transit could potentially coordinate with other more traditional public transit providers.
- Twin Rivers Associates is a daycare program for adults with disabilities. It operates under the umbrella of the Institute for Professional Practices New Hampshire, which serves children and adults with autism and other behavioral challenges from its offices in Concord, Merrimack, Stratham. The Twin Rivers daycare program has been very successful in Stratham, but it has been difficult getting traction in the Merrimack area because of transportation issues.

Summary of Milford Public Library Workshop: The consensus among the group at this workshop is that a public transit route between Nashua and Milford is needed. Other observations included the following:

- The Souhegan Valley Transportation Collaborative (SVTC) coordinates demand-response public transit between six towns in the Milford area and the City of Nashua. The service is known as the Souhegan Valley Rides/Blue Bus and has provided over 33,000 rides since its inception in 2008. SVTC riders are generally transit-dependent individuals who don't have access to reliable transportation or a variety of reasons (disabled, no driver's license, no access to a car) are not able to drive themselves.
- The utilization of the Souhegan Valley Rides/Blue Bus confirms there is the demand for public transit service in the NH101A corridor between Milford and Nashua.

- Transit dependent population centers in Milford include 128 Sage Road, Powers Street, Capon Road, and the downtown area.
- Destinations for transit-dependent population include employment centers, health care/counseling/mental health appointments, social services and state assistance appointments, grocery, pharmacy, childcare, court appointments, and social/civic activities.
- The biggest concern is the length of time from these proposed routes.
 - o Headways, especially for commuting to work, would need to be relatively short.
 - o Commute to work trips would need to have ½ hour headways and minimal transfers.
- Smaller buses (same size as Souhegan Valley Rides/Blue Bus) are probably more appropriate than full-sized buses.
- There was transit service along 101A into Milford during the early 2000's but it was discontinued.
- The most logical and potentially the most successful way to reintroduce transit service along the corridor could be a pilot program similar to the current CMAQ-funded route between the Amherst Walmart and Westgate Plaza in Nashua.

Summary of Nashua Public Library Workshop: NRPC staff held a workshop at the Nashua Public Library “Hit the Road” event on September 21st. The event was an effort by the library to highlight transportation issues in Nashua. Comments from those in attendance included the following:

- In favor of expansion to Hudson, Milford, and Merrimack.
- Coordinate with/go to Manchester, Concord, Billerica (Massachusetts).
- Put public transit stops near transit dependent population.
- Put stops near places like Cotton Mill apartments in Nashua.
- Lower the fare.
- Aspirations of expanding transit routes are well-intentioned but unrealistic.
- Include bike-ped infrastructure in expansion.

Summary of Nashua Community College Workshops: NRPC staff facilitated three events at the Nashua Community College (NCC), including a conversation with the NCC student senate and two workshops. The purpose of the student senate conversation was to explain the purpose of the study, gather input from student leaders and NCC staff regarding their attitudes about public transit, and to identify the most appropriate opportunities for implementing the workshops with the student body. The student body workshops that followed were an opportunity for students to provide input regarding their attitudes about public transit.

The workshops were similar to ones held at local libraries. Staff invited students to discuss their perceptions of public transit and to pin the map with origins and destinations. Staff spoke with approximately 15 students on Monday, April 8th and with approximately 20 students on Wednesday, April 17th. Those students who spoke with staff were generally enthusiastic about public transit. Comments from students included the following:

- NCC is a commuter college and although there is an NTS bus stop directly in front of the school, most students get to and from campus in a car.
- Transit is a good backup option if their car breaks down.
- They would use transit if the headways were better.
- They would use transit if it was closer to their trip origin.

Summary of SHARE Outreach Workshops: The mission of the SHARE Program is to provide food, clothing, and emergency financial assistance to area families in need who do not qualify for government assistance or for whom that assistance is insufficient or delayed in coming. SHARE also collaborates with other organizations to provide access to services and information, with a goal to promote self-reliance while maintaining the dignity of clients.

NRPC staff held workshops at lunchtime and dinner congregate meal events at SHARE in Milford. Attendees were encouraged to discuss their perceptions of public transit and to pin the map with origins and destinations.

- Several attendees participated in the interactive mapping exercise and indicated origins and destinations on the map. The information was later incorporated into the GIS mapping system at NRPC.
- Several of the attendees use the Souhegan Valley Rides/Blue Bus service for some of their transportation.
- Having low fees would be key to success for a Milford Route
- It would be nice to be able to catch a bus in Milford and then be able to go to the Nashua Mall
- It would be beneficial for the bus to come and stop at Parkhurst Place in Amherst
- It would be beneficial to have a bus schedule that serves work commuters

Summary of Hunt Community Workshops: NRPC staff presented a summary of NRPC MPO duties and projects to a gathering at the Hunt Community in Nashua. The residents are not part of the traditional transit-dependent population, but the sentiment of the group was public transportation is important for the community. There was a generally positive attitude of public transit and some individuals said they would have no objection to using NTS if they needed to go somewhere on an established (or new) route.

IV. RIDERSHIP ESTIMATION

A. Ridership Estimation Methodology

NRPC maintains a regional travel model for highway forecasting and estimation of project impacts on roadway travel. Most MPO travel models for large urban areas have a mode split module which estimates the division of trips between transportation alternatives, including single-occupancy vehicle, high-occupancy vehicles (carpooling), transit or walk/bicycle. These models utilize comparative impedances (travel time and costs) to allocate trips between modes. However, small and medium-sized urbanized areas typically do not have sufficiently high transit use to reliably develop this type of model. Nashua Transit System reports an annual total of 397,000 weekday trips for the most recent fiscal year completed, which works out to 1,525 unlinked (i.e. transfers count as a separate trip) trips per weekday. By contrast, the NRPC model estimates 1,240,000 weekday vehicle trips in the region. With auto travel representing 99.8% of total trips (other than walk, bicycle or other minor modes), it is clear that a mode split share model will not yield reliable estimation for transit trips. When NRPC developed an earlier version of the regional model utilizing the minuTP program in 1991, the agency was advised by a Federal Highway Administration modeling expert, Dane Ismart, that development of a direct estimation technique rather than a mode share model would be the appropriate tool for transit ridership estimation.

The procedure that was developed for the current study utilizes the relationship between rider demographics and activity center size with levels of transit use. These correlations are developed through regression analysis, using independent variables that are likely to be correlated with the resulting dependent variable – transit ridership.

Transit ridership estimation is done for four trip purposes: home-based work (HBW), which accounts for half of all linked trips (transfers not included as separate trips); home-based medical (HBM) accounting for 6.2% of trips, home-based school (HBSC), which make up 5.4% of trips and other home-based trips (HBO), representing 33% of the total. Non-home based trips, such as a trip from work to a shopping area account for nearly 6% of total trips; however, these are fairly random without a real basis for estimation, so they are incorporated into the final ridership estimates by factoring the results from the estimated trip purposes.

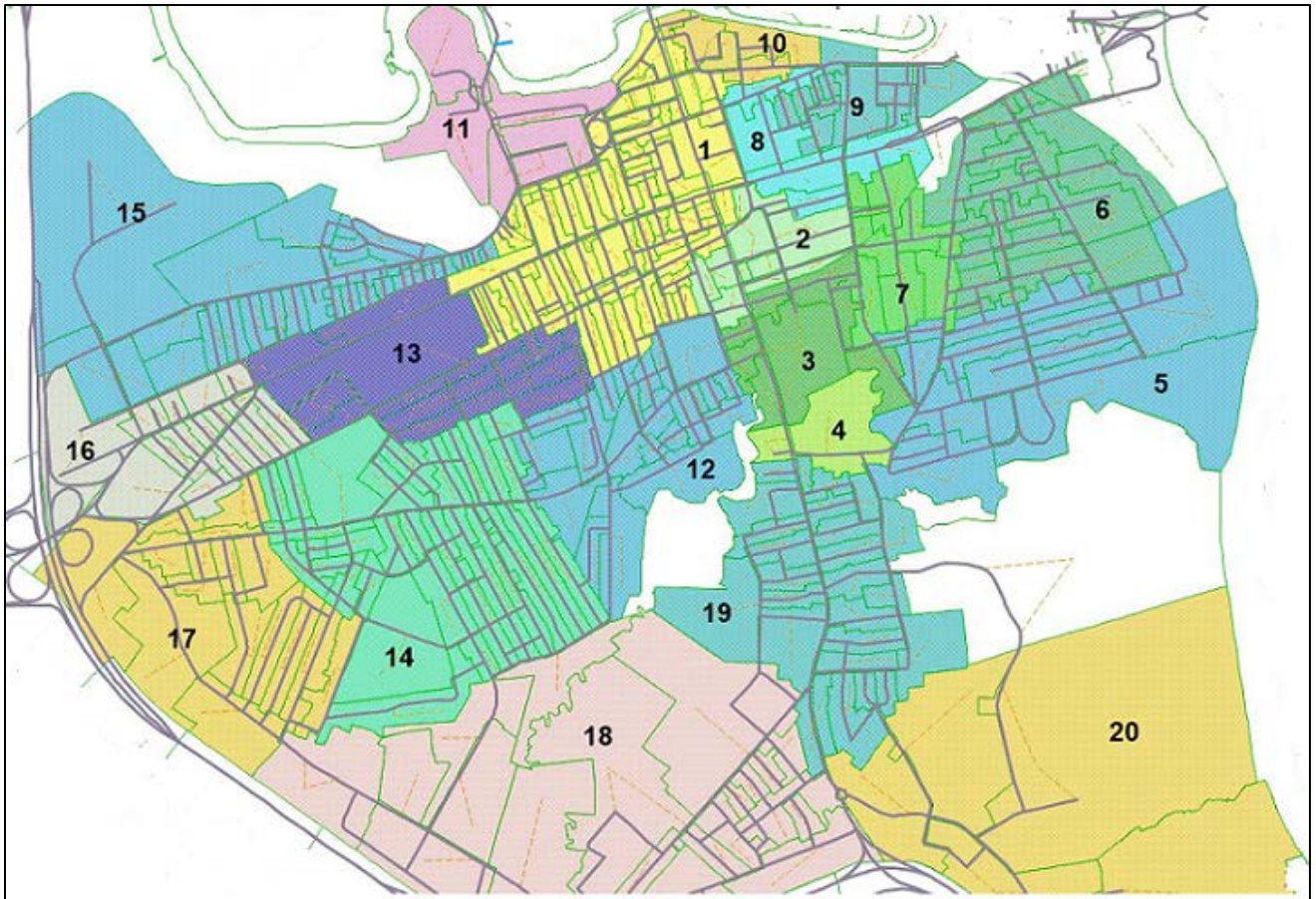
The transit estimation regression procedure utilizes data from the NTS on-board survey, annual ridership data by bus stop and population and employment data in the TransCAD traffic analysis zone (TAZ) layer. While the TransCAD model is not used for transit

forecasting, its GIS and database capabilities are well suited for developing inputs into the regression analysis. To conduct the estimation the NTS service area was divided into 60 transit analysis zones that are conveniently walkable to NTS routes. The zones are illustrated on the pages which follow. Areas in Nashua that have not been color-coded and assigned a zone number are outside of the transit walkable area, defined as residences within one-third mile of a route.

NASHUA CENTRAL TRANSIT ZONES

Area # NTS Area Description

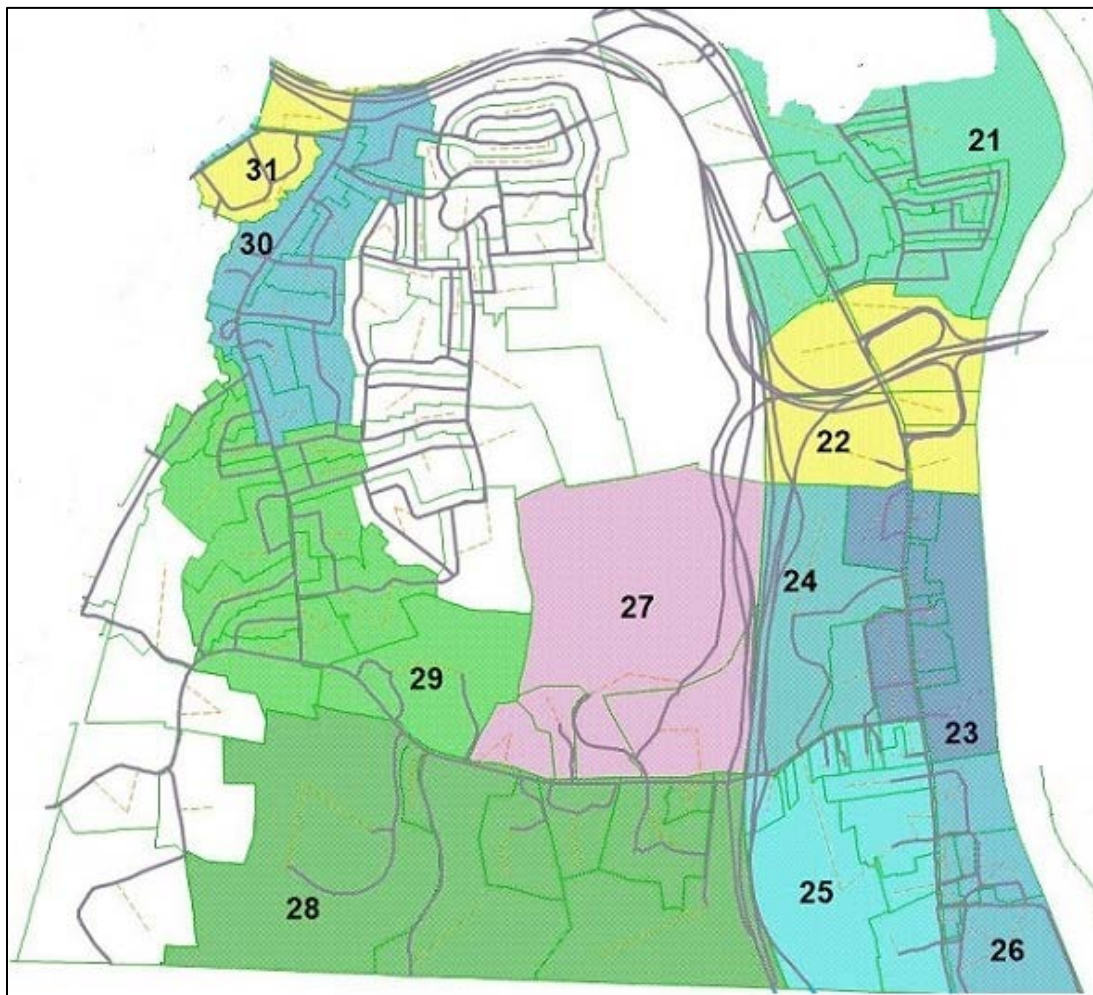
- 1 CBD/Tree Streets
- 2 SNH Med Center
- 3 300 Main St. Market Plaza
- 4 Hunt Senior Residence
- 5 South Crown Hill Residential
- 6 North Crown Hill Res/School
- 7 Marshall/Bowers Sts Resid
- 8 E Hollis/W Pearl Residential
- 9 Temple St East Residential
- 10 Library/Temple Commerc
- 11 Clocktower/Tech Way Comm
- 12 Lake Street East
- 13 Kinsley St Central
- 14 Lake St West/Cleveland
- 15 Ledge & Simon Sts
- 16 W Hollis/Kinsley Sts West
- 17 Lund Rd/FEET Exit 5
- 18 Lund Rd/E Dunstable Resid
- 19 Main St South to DWH
- 20 River College

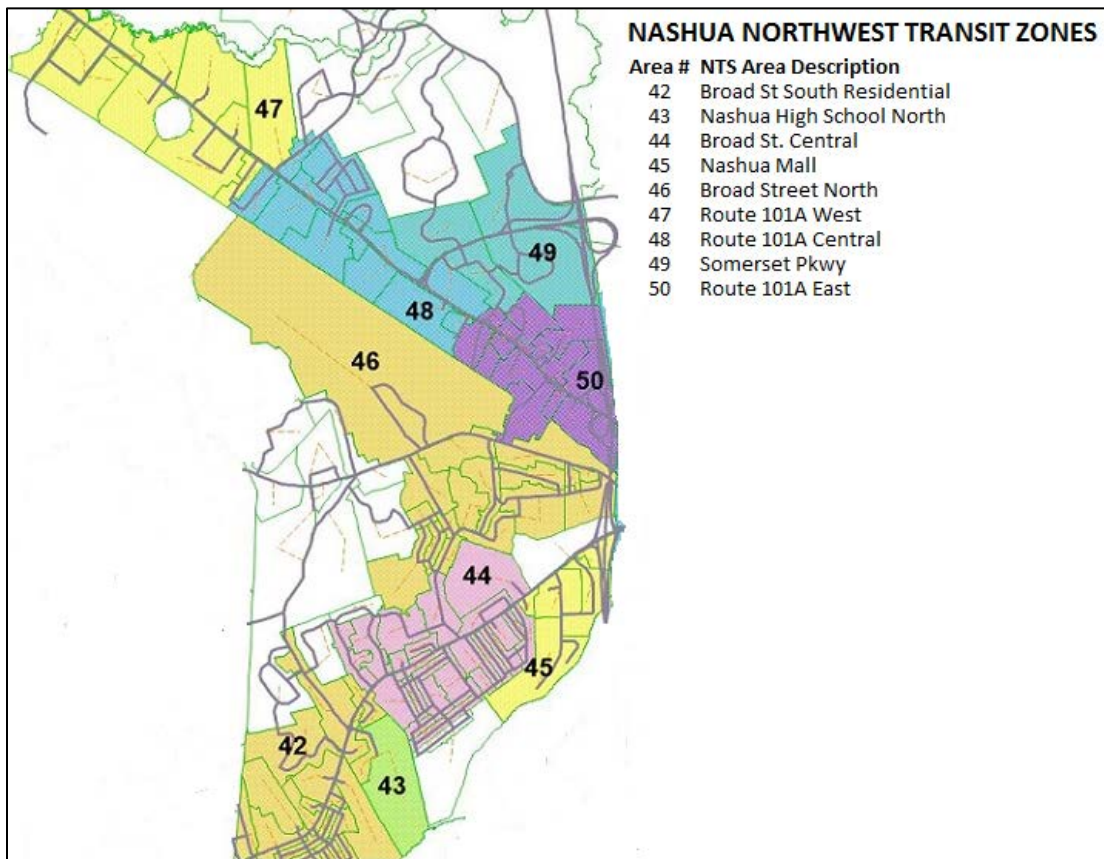
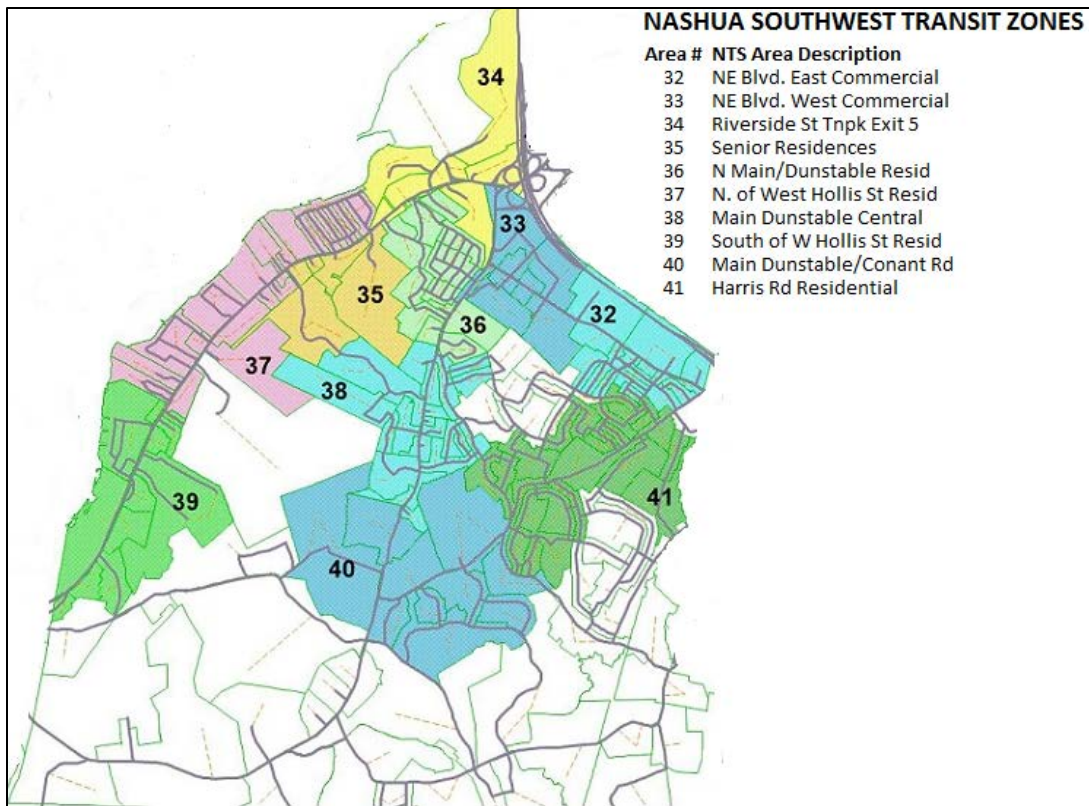


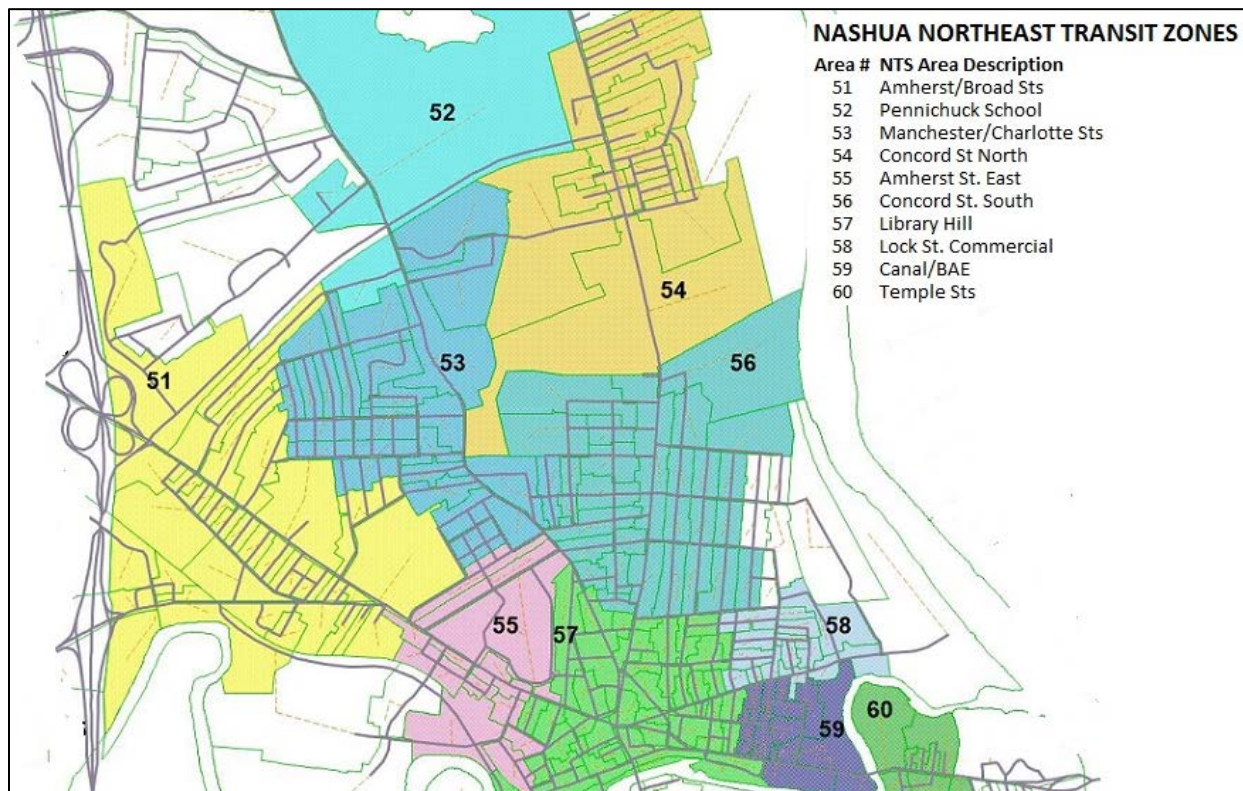
NASHUA SOUTHEAST TRANSIT ZONES

Area # NTS Area Description

- 21 S Main/DW Hwy
- 22 Sagamore Br Commercial
- 23 DWH S. of Sagamore Br.
- 24 Royal Crest/Plaza
- 25 DWH S. of Spit Brook Rd
- 26 Pheasant Lane Mall
- 27 Tara Blvd
- 28 Spit Brook Rd Residential
- 29 E. Dunstable S. Residential
- 30 E. Dunstable N. Residential
- 31 Greenbriar Senior Res







Virtually all NTS trips are accessed by walking, with only 5% of riders being driven to or from their bus stops or using another mode such as taxi. The walk time distribution is shown below. Based on a leisurely walk time of 2 mph, a distance of one-third mile would be covered in a ten-minute period. The cumulative distribution shows 86% of riders walking ten minutes or less. With only 14% of riders walking a greater distance from their home to a transit stop, one-third mile was established as the walkable transit service area for developing the ridership estimation methodology.

Walk time from home	Pct.
1 to 5 min	61%
6 to 10 min	25%
11 to 15 min	12%
16 to 20 min	2%

Walk Time to Destination	Pct.
1 to 5 min	82%
6 to 10 min	11%
15 or more min	7%

Trip estimation is done for both trip productions (the trip end to or from a home) and trip attractions (the trip end to or from an activity center). As noted, the estimation is done for four home-based trip purposes. The first step in the process was to calculate the number of annual linked trips from the total passenger boardings of 397,000. The on-board survey yielded data on the rate of transfer. This was applied to the total annual ridership to produce a linked trip total of about 333,000. Trip purpose information from the survey produces the following breakdown:

Trip Purpose	Yearly Trips
Home-Based Work	165,100
Home-Based Medical	20,685
Home-Based School	17,915
Home-Based Other	110,725
Non-Home Based	18,845
Total	333,270

The key to developing a useful transit estimation forecasting procedure is to identify the strongest correlations between existing riders and socioeconomic data that point to transit dependency. Several independent variables were tested to estimate regression equations for trips produced at the home end. These included:

- **Total households**
- **Poverty households**
- **Senior population** age 65 or more
- **Minority population**, which includes non-whites but also Hispanics
- **Zero-Auto households**

The latter proved to provide the best fit of data for all trip purposes. This outcome was consistent with key findings of the on-board survey: only 35% of riders have a driver's license, 15% have an auto available for the trip and 7% also drive sometimes for trips.

Independent variables tested to develop estimation for trips attracted to activity centers included:

- **Total employment** - This was found not to be a preferred variable for any trip purpose.
- **Retail employment** - This variable provides best-fit for the HBO and HBO trip purpose estimation.
- **Non-retail employment** - Utilized for HBW trip equation.

- **Health care employment** – Used for HBM estimation. It was necessary to separate health care employment from the aggregate health/educational employment category that resides in the NRPC employment database. This was done by reviewing specific businesses within each transit zone where there existed employment within this category. First, education employment was removed (school employment for the most part) and second, health employment that was not actually providing patient medical care.
- **Other employment** – Used in conjunction with retail employment for the HBO trip estimation, this is comprised of the portion of non-retail employment that excludes health and school employment. The latter two categories correlate with those trip purposes rather than the HBO trip purpose, which is inclusive of shopping, social-recreational, and other personal business trips.
- **School employment** – This was tested but not utilized, as school enrollment proved to be a superior explanatory variable.
- **School enrollment** – Tested and proved to be the preferred explanatory variable for HBSC trips.
- **Service Index** – The need to include a service index variable, accounting for frequency to activity centers, became apparent by the fact that the number of trips into the downtown Nashua area for the HBO purpose was disproportionately high relative to the employment levels in the area. The fact that the Nashua downtown business district is serviced from all areas of Nashua without transfer is a major factor in the number of attraction trips to the downtown district. To incorporate frequency of service as a variable for HBO trips, a service index for transit zones was calculated as follows:
 1. Count the number of daily runs within walking access to transit zones for each route.
 2. Sum the total runs for all transit zones within an NTS service area
 3. Divide the above total by the number of transit zones within the NTS service area.

A transit area with just one route accessible and operates 12 runs per day would have a service index of 12. At the other end of the spectrum, the downtown transit area has 10 routes operating 12 runs per day in some of its TAZs, which would have a service index of 120 for this portion of the transit area. Other TAZs are accessible to only some routes but the minimum number of accessible routes for a downtown TAZ is 36. Overall, the service index for the downtown transit area is 95.3.

The table on the following page provides total ridership for each Nashua transit area one through sixty, along with the independent variable inputs that are used in the estimation for the various trip purposes. The Appendix of this report provides further detail on the breakdown of individual trip purposes by observed and estimation production-to-attraction and attraction-to-production trips.

NTS RIDERSHIP & MODEL ESTIMATION INPUTS BY TRANSIT SERVICE AREA

Area #	NTS Area Description	Obsvd	Estimated	Obsvd	Estimated	HBW	HBW
		HBW-PA	HBW-PA	HBW-AP	HBW-AP	Obsvd Brd	Est Board
1	CBD/Tree Streets	38,900	35,926	9,780	2,371	48,680	38,296
2	SNH Med Center	0	1,649	0	2,302	0	3,951
3	300 Main St. Market Plaza	0	782	2,950	1,496	2,950	2,278
4	Hunt Senior Residence	700	2,244	395	330	1,095	2,575
5	South Crown Hill Residential	455	2,407	1,365	344	1,820	2,751
6	North Crown Hill Res/School	1,105	1,486	270	111	1,375	1,597
7	Marshall/Bowers Sts Resid	310	-138	0	125	310	-13
8	E Hollis/W Pearl Residential	700	5,114	420	1,454	1,120	6,568
9	Temple St East Residential	700	1,107	0	179	700	1,286
10	Library/Temple Commerc	320	1,161	320	291	640	1,452
11	Clocktower/Tech Way Comm	0	1,595	495	1,083	495	2,677
12	Lake Street East	1,000	3,923	0	589	1,000	4,512
13	Kinsley St Central	170	2,136	200	145	370	2,281
14	Lake St West/Cleveland	0	512	0	1,251	0	1,763
15	Ledge & Simon Sts	1,200	3,490	1,115	1,242	2,315	4,732
16	W Hollis/Kinsley Sts West	270	-734	0	303	270	-430
17	Lund Rd/FEET Exit 5	320	-788	175	631	495	-157
18	Lund Rd/E Dunstable Resid	120	133	120	187	240	320
19	Main St South to DWH	900	-680	270	345	1,170	-335
20	River College	620	-680	0	460	620	-220
21	S Main/DW Hwy	360	-626	720	4,223	1,080	3,598
22	Sagamore Br Commercial	1,110	-355	1,380	1,694	2,490	1,339
23	DWH S. of Sagamore Br.	0	295	3,600	2,822	3,600	3,117
24	Royal Crest/Plaza	3,000	1,649	3,600	1,260	6,600	2,909
25	DWH S. of Spit Brook Rd	740	1,974	5,180	7,365	5,920	9,339
26	Pheasant Lane Mall	0	-788	14,850	14,312	14,850	13,524
27	Tara Blvd	335	-84	1,925	3,043	2,260	2,959
28	Spit Brook Rd Residential	1,640	1,216	0	324	1,640	1,540
29	E. Dunstable S. Residential	490	-409	0	282	490	-127
30	E. Dunstable N. Residential	0	-680	1,180	95	1,180	-585
31	Greenbriar Senior Res	370	-788	370	282	740	-506
32	NE Blvd. East Commercial	0	-788	3,100	1,513	3,100	725

NTS RIDERSHIP & MODEL ESTIMATION INPUTS BY TRANSIT SERVICE AREA Cont.

Area #	NTS Area Description	Obsvd	Estimated	Obsvd	Estimated	HBW	HBW
		HBW-PA	HBW-PA	HBW-AP	HBW-AP	Obsvd Brd	Est Board
33	NE Blvd. West Commercial	1,040	295	2,420	1,465	3,460	1,760
34	Riverside St Tnpk Exit 5	0	-355	300	831	300	476
35	Senior Residences	250	3,761	0	116	250	3,877
36	N Main/Dunstable Resid	0	78	0	66	0	144
37	N. of West Hollis St Resid	0	3,544	0	92	0	3,636
38	Main Dunstable Central	0	24	0	83	0	107
39	South of W Hollis St Resid	615	782	0	106	615	888
40	Main Dunstable/Conant Rd	370	-626	0	231	370	-394
41	Harris Rd Residential	560	-247	0	63	560	-183
42	Broad St South Residential	1,110	349	0	78	1,110	427
43	Nashua High School North	0	-788	160	226	160	-563
44	Broad St. Central	160	1,053	0	120	160	1,173
45	Nashua Mall	900	1,486	4,660	4,767	5,560	6,254
46	Broad Street North	1,120	3,382	225	703	1,345	4,085
47	Route 101A West	3,460	2,461	6,040	6,872	9,500	9,333
48	Route 101A Central	1,640	-138	9,620	5,343	11,260	5,205
49	Somerset Pkwy	660	241	1,540	1,166	2,200	1,407
50	Route 101A East	1,790	999	1,500	3,408	3,290	4,407
51	Amherst/Broad Sts	940	-355	1,040	772	1,980	417
52	Pennichuck School	160	-680	0	137	160	-543
53	Manchester/Charlotte Sts	340	-409	0	96	340	-313
54	Concord St North	260	-409	0	84	260	-325
55	Amherst St. East	760	-138	0	175	760	37
56	Concord St. South	660	-626	0	212	660	-413
57	Library Hill	6,300	6,306	380	832	6,680	7,138
58	Lock St. Commercial	1,350	-626	0	60	1,350	-566
59	Canal/BAE	1,400	1,270	260	1,313	1,660	2,583
60	Temple Sts	355	187	0	67	355	253
Total		82,035	82,084	81,925	81,937	163,960	164,021

The table below provides the results of regression estimation for all trip purposes, along with r-squared for each equation to indicate the goodness of fit. Trip productions for all trip purposes, using 0-auto households as a single variable, are well correlated. On the trip attraction side, home-based medical trips show a good fit to the data and home-based work trips are adequately correlated. Home-based other and home-based school show weaker correlations; however, the use of other variables in multiple regression did not improve the fit of data.

NASHUA TRANSIT SERVICE TRIP ESTIMATION BY TRIP PURPOSE

	R-sq
HBW PA = $-788 + 54.15 * 0\text{-AutoHH}$	.915
HBW AP = $36 + 5.09 * \text{RetEmp} + 0.758 * \text{NonRetEmp}$	.729
HBO PA = $20 + 22.74 * 0\text{-AutoHH}$	.878
HBO AP = $-792 + 3.09 * \text{RetEmp} + 0.46 * \text{OtherEmp} + 34.35 * \text{SvcInd}$	.513
HBM PA = $5.01 * 0\text{-AutoHH}$	.861
HBM AP = $14 + 1.61 * \text{HealthEmp}$	.885
HBSC PA = $-32 + 5.15 * 0\text{-AutoHH}$	.848
HBSC AP = $-33 + 0.564 * \text{SchEnroll}$	.490
NHB trips are 5.7% of total trips for all zones	

In the application of equations to the new service areas, it was found that the large negative constant for HBW trips was resulting in substantial variability in trip estimates from one transit area to the other. Since a single variable (0-auto households) is used for all production trip purposes, it was decided to simply utilize the actual aggregate (zones 1 to 60) trip rates for each trip purposes, thereby bypassing the use of constants. These simplified trip production equations are the following:

$$\text{HBW PA} = 33.81 * 0\text{-AutoHH}$$

$$\text{HBO PA} = 21.65 * 0\text{-AutoHH}$$

$$\text{HBM PA} = 5.10 * 0\text{-AutoHH}$$

$$\text{HBSC PA} = 4.17 * 0\text{-AutoHH}$$

B. Ridership Estimates for Transit Route Extensions

The transit ridership forecasting procedure which was estimated and calibrated for existing NTS fixed routes was then applied to the three service areas being considered for service. Maps are provided which illustrate the new routes and the transit zones which contain the inputs used for predicting ridership. Tables then follow which provide the zonal inputs and the resulting trip estimates.

All service extensions are assumed to be on the basic NTS operating schedule – twelve runs per day along a route operated at one-hour headways between 6 AM and 6 PM on weekdays. Saturday service would be operated eight runs per day.

US 3 & Continental Boulevard/Industrial Drive, Merrimack

Two routes serving Merrimack are evaluated. The first is an extension of the existing NTS Route 1 serving French Hill/Greeley Park, which operates on Concord Street north to its junction with the Henri Burque Highway (US Route 3). The new route service area begins at this intersection and continues north along Daniel Webster Highway to the Merrimack/Bedford line. The second route would operate along Continental Boulevard from its southern terminus at NH 101A (affording transfers to/from Route 2 at this stop) and north to the intersection of Greeley Street and DW Highway (US 3). Operating the route along Industrial Blvd. between Continental Blvd. and DW Highway is also included in the analysis. However, with the present unwillingness of the Premium Outlets property management to permit bus operations to its location, this segment is likely to draw minimal ridership.

The following are key residential complexes and commercial sites likely to generate significant transit ridership along the new service corridors:

1. Daniel Webster Highway Route

- Clovelley Apartments, Nashua
- St. Joseph Hospital OB/GYN
- Thomas More College
- BAE Systems
- KMC Systems
- Merrimack Public Library
- Mastricola Upper Elementary School
- Merrimack High School
- Merrimack Town Offices/District Court
- London Court Apartments
- Shaw's Plaza
- Apple Blossoms Child Center
- SuperDogs Day Care
- Saint-Gobain Performance Plastics
- Merrimack Medical Center

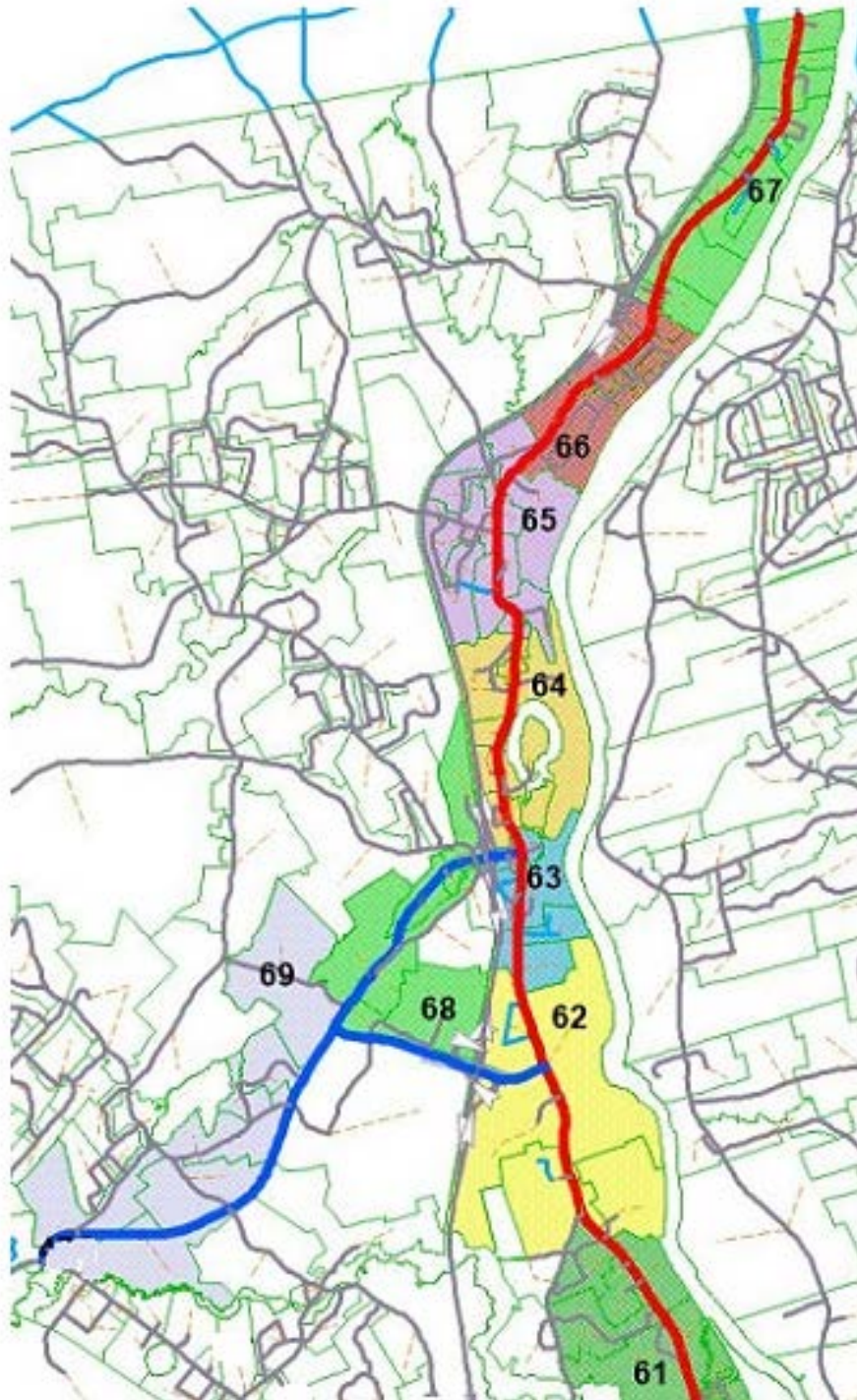
2. Continental Blvd./Industrial Dr. Route

- Thornton's Ferry School
- Premium Outlets Blvd (businesses located near Industrial Dr. only)
- Getinge manufacturer
- BAE Systems/Amcor Plastics, TechNH
- Shaw's Plaza
- Merrimack KinderCare
- St. Joseph Family Medicine
- Executive Drive residential units (under construction)

As shown in the following route map and service area, there are nine transit zones defined for the route extensions, numbered 61 through 69. The table which follows is divided into two sections. The first provides all the variables which are inputs to the ridership estimation for each transit zone: zero-auto households and the various categories of employment. The Service Index, used for estimating home-based other trips, is a standard 12.0 for all route extensions (each zone is served by 12 runs operated hourly). Since transit zones are variable in size (having been derived from the somewhat irregularly shaped TAZs from the regional model), they were individually scrutinized for walkability to routes and where a portion of the transit zone was deemed to be beyond the one-third mile walk distance from the route, a proportionate reduction was made in the input variables.

The second part of the table provides the estimated trips for each trip purpose, separated by production to attraction and attraction to production. The columns are shaded to facilitate identifying the totals for each trip purpose and are highlighted yellow to illustrate the total trips for all combined purposes. It will be noted that the trip purposes are not balanced for P's and A's. For example, there are an estimated 3,681 trips from home to activity centers for HBO trips but only 185 are attracted to the transit corridor from home locations. What this means is that about 3,500 HBO trips are made by Merrimack residents to non-DWH route locations. Other than travel to other new transit routes, these riders would have existing Nashua route stops for their transit trip destinations.

Merrimack US 3, Continental Blvd Transit Extensions & Transit Zones



The operation of a Daniel Webster Highway transit route to the Bedford town line is estimated to generate 17,800 trips per year. Of this total, 11,000 or 62% are estimated to be production trips from Merrimack residents in the corridor and about 5,800 are attraction trips to Merrimack activity centers. The non-home-based trip estimate of about 1,000 is derived by applying the 5.7% factor to total trips for each zone. The NHB trips may have one, both or neither trip end within Merrimack but result from the implementation of the new transit route.

Weekday ridership on NTS currently comprises 89% of total trips and Saturday's account for 11%. Assuming the same proportion for service extensions, the 17,800 annual trips work out to 62 trips per weekday and 38 Saturday trips.

TRANSIT ROUTE RIDERSHIP ESTIMATES NTS SERVICE EXTENSION TO MERRIMACK

US 3 - Daniel Webster Highway to Merrimack/Bedford Line

RIDER ESTIMATION INPUT VARIABLES

Town	Area	HH O- Veh	Totl Emp	Ret Emp	Hlth Emp	Sch Enroll
Nash/Merr	61	0	622	9	53	90
Merrimack	62	0	1,033	26	0	0
Merrimack	63	2	676	32	142	0
Merrimack	64	75	486	18	0	0
Merrimack	65	21	963	78	0	1,597
Merrimack	66	45	332	95	0	0
Merrimack	67	27	513	27	0	0
Total		170	4,625	285	195	1,687

ANNUAL ESTIMATED RIDERSHIP: DANIEL WEBSTER HIGHWAY ROUTE TO MERRIMACK/BEDFORD LINE

Town	Area	HBW P-->A	HBW A-->P	HBO P-->A	HBO A-->P	HBM P-->A	HBM A-->P	HBSC P-->A	HBSC A-->P	Total P-->A	Total A-->P	NHB Trips	Total Trips
Nash/Merr	61	0	511	0	0	0	99	0	18	0	628	38	666
Merrimack	62	0	893		162	0	0	0	0	0	1,055	63	1,119
Merrimack	63	68	651	43	0	10	243	8	0	129	894	61	1,085
Merrimack	64	2,536	445	1,624	0	383	0	313	0	4,855	445	318	5,617
Merrimack	65	710	1,069	455	5	107	0	88	504	1,359	1,578	176	3,114
Merrimack	66	1,521	665	974	17	230	0	188	0	2,913	682	216	3,811
Merrimack	67	913	507	585	0	138	0	113	0	1,748	507	135	2,390
Total: DW Hwy Rte		5,748	4,741	3,681	185	867	342	709	522	11,004	5,789	1,008	17,801

For a route operated along Continental Boulevard and Industrial Drive, the annual ridership estimate is 2,844. This works out to just 10 weekday trips on average and 6 Saturday trips. Nearly three-fourths of these trips are generated as attractions to Merrimack commercial and office centers. The ridership estimate would be significantly higher if the owners of the Premium Outlets were willing to allow the shops to be serviced by transit. It is estimated that up to an additional 6,500 additional trips annually could result from the Outlets being conveniently accessible to transit service. Without this ridership base, the Continental/Industrial Drive route has little viability.

TRANSIT ROUTE RIDERSHIP ESTIMATES NTS SERVICE EXTENSION TO MERRIMACK

Continental Blvd & Industrial Drive

RIDERSHIP ESTIMATION INPUT VARIABLES

Town	Area	HH 0-Veh	Totl Emp	Ret Emp	Hlth Emp	Sch Enroll
Merrimack	68	4	729	199	16	0
Merrimack	69	6	47	0	0	485
Total		10	776	199	16	485

ANNUAL ESTIMATED RIDERSHIP: CONTINENTAL BLVD & INDUSTRIAL DRIVE ROUTE

Town	Area	HBW P-->A	HBW A-->P	HBO P-->A	HBO A-->P	HBM P-->A	HBM A-->P	HBSC P-->A	HBSC A-->P	Total P-->A	Total A-->P	NHB Trips	Total Trips
Merrimack	68	135	1,414	0	471	20	41	17	0	172	1,925	126	2,224
Merrimack	69	203	37	137	0	31	0	25	153	395	190	35	620
Total: Ctl/Ind Dr Rt		338	1,451	137	471	51	41	42	153	568	2,115	161	2,844

NH 101A Transit Extension, Merrimack To Western Milford

NTS Route 2/2A operates service at half-hour headways to Westside Plaza near the Merrimack/Nashua line. There have been two extensions of this route operated on a provisional basis, one of which is ongoing.

Between February 2002 and May 2004, limited bus service was operated between Westgate Plaza and Milford Oval. Six runs per day were operated for three hours in the morning and afternoon periods. Total ridership for the period was 11,550, which works out to about 5,000 trips per year. This service was begun as a pilot project and continued under the CMAQ program.

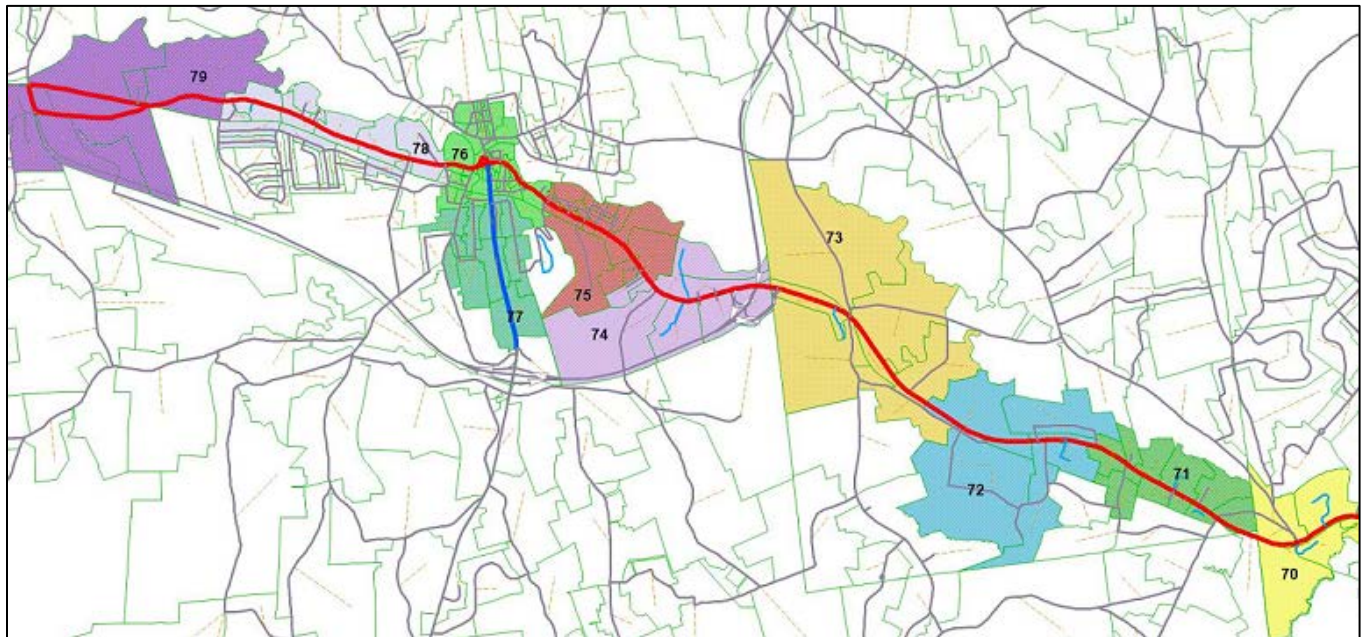
In September 2017 NTS began a pilot service to Walmart in Amherst, with intermediate stops at Petco and TGI Fridays. Service was limited to Tuesday and Friday mornings. With

additional funding provided through successful CMAQ applications, Route 10/10A provides Tuesday and Friday service from 8:20 AM through 8:15 PM. The day runs are transfers from Route 2 at Westside; the night runs are operated directly from the Transit Center. Saturday service is operated between 9:15 AM to 4:15 PM.

For the approximate six-month period from March 5 through September 14, 2019, the average weekday ridership on Route 10 was 23, Route 10A night service was 3.6 and the Saturday average was 41.6. Factored to a full year the annual weekday ridership is about 7,060. It should be noted that since service is provided on only two weekdays, the weekday average may not reflect what is likely to occur if service were to be provided every weekday since its utility for employment-based trips is limited and other riders are forced to make their trips on these days (or Saturday) if they wish to travel by bus. Factoring the actual daily averages for a full year for the service levels now provided results in 4,550 annual trips for day service only and 4,900 with night service. Ridership has been increasing steadily; for FY 2019 total trips on Routes 10/10A were 2,533.

The following figure illustrates the NH 101A extended transit route and transit zones for analysis. An adjunct route on NH 13 to the NH 101 interchange serving low-income families is also evaluated.

NH 101A Transit Extension to Milford & Transit Zones



Key origins and destinations potentially served by an extended NH 101A transit route include:

- Connection, Inc.
- Amherst Plaza
- Goodwill Store
- Meadow Brook Crossing Shopping Mall
- Walmart
- Amherst Orthodontics
- SCC Chiropractic
- Shaw's/Rite Aid, Milford
- Walgreens
- Heritage Estates Apartments
- St. Joseph's Urgent Care
- Milford Oval including Town Offices & Public Library
- Jacques Memorial Elementary School
- SHARE Outreach
- Keyes Memorial Field
- Brookstone Manor Apartments
- Milford Shopping Center
- Growing Imaginations daycare
- Early Learning Center
- Hitchiner Manufacturing
- Alene Candle
- Primary Care of Milford
- Market Basket
- Ninth Circuit Court
- Maple Brook Dentistry
- Phelan Rd./Jones Rd. business offices

The next table presents the breakdown of transit estimation input variables and forecasted trips for each new transit area along NH 101A. Annual ridership is estimated at 27,500, which would break down to average weekday ridership of 96 and 59 for the Saturday average. About 56% of projected trips are trips from NH 101A corridor establishments to various home destinations. Most of the trips generated by corridor residents emanate from Milford, which has a significant low-income population, many without access to vehicles.

This is followed by a table presenting the ridership forecast for an adjunct of the main route, which would travel along NH 13 between the Milford Oval and the interchange with NH 101 Bypass. Although the route generates a modest annual total of 4,161 trips, which

averages to 15 on weekdays and 9 on Saturday, the additional route mileage for this segment is modest. About 90% of the trips produced by this route would be from residences rather than to commercial areas. This corridor has a significant concentration of low-income and zero-auto households, thus providing a decent ridership base in a compact area.

TRANSIT ROUTE RIDERSHIP ESTIMATES, NTS SERVICE EXTENSION TO MILFORD

NH 101A - Route 2 Extension to Milford

RIDERSHIP ESTIMATION INPUT VARIABLES

Town	Area	HH 0-Veh	Totl Emp	Ret Emp	Hlth Emp	Sch Enroll
Merrimack	70	0	426	252	0	0
Amherst	71	0	640	312	0	0
Amherst	72	1	776	420	0	0
Amherst	73	4	198	19	35	0
Milford	74	28	431	250	11	0
Milford	75	57	217	45	43	0
Milford	76	48	677	93	83	282
Milford	78	22	596	132	0	0
Milford	79	2	1,134	271	26	0
Total		162	5,096	1,792	198	282

ANNUAL ESTIMATED RIDERSHIP: NH 101A ROUTE TO MERRIMACK, AMHERST & MILFORD

Town	Area	HBW P-->A	HBW A-->P	HBO P-->A	HBO A-->P	HBM P-->A	HBM A-->P	HBSC P-->A	HBSC A-->P	Total P-->A	Total A-->P	NHB Trips	Total Trips
Merrimack	70	0	1,413	0	399	0	0	0	0	0	1,812	109	1,921
Amherst	71	0	1,836	0	613	0	0	0	0	0	2,449	147	2,596
Amherst	72	34	2,407	22	903	5	0	4	0	65	3,310	203	3,578
Amherst	73	135	231	87	0	20	71	17	0	259	302	34	595
Milford	74	947	1,409	606	391	143	32	117	0	1,812	1,832	219	3,863
Milford	75	1,927	358	1,234	0	291	84	238	0	3,690	442	248	4,380
Milford	76	1,623	917	1,039	110	245	148	200	126	3,107	1,302	265	4,673
Milford	78	744	1,022	476	201	112	0	92	0	1,424	1,223	159	2,806
Milford	79	68	2,032	43	701	10	55	8	0	129	2,788	175	3,092
Total: NH 101A Ext		5,477	11,625	3,507	3,319	826	390	676	126	10,486	15,459	1,557	27,502

NH 13 - Milford Oval to NH 101 Interchange

RIDERSHIP ESTIMATION INPUT VARIABLES

Town	Area	HH 0-Veh	Totl Emp	Ret Emp	Hlth Emp	Sch Enroll
Milford	77	58	70	27	0	0

ANNUAL ESTIMATED RIDERSHIP: NH 13 ADJUNCT ROUTE TO NH 101 INTERCHANGE, MILFORD

Town	Area	HBW P-->A	HBW A-->P	HBO P-->A	HBO A-->P	HBM P-->A	HBM A-->P	HBSC P-->A	HBSC A-->P	Total P-->A	Total A-->P	NHB Trips	Total Trips
Milford	77	1,961	171	1,256	0	296	0	242	0	3,754	171	236	4,161

NH 3A Transit Extension, Hudson

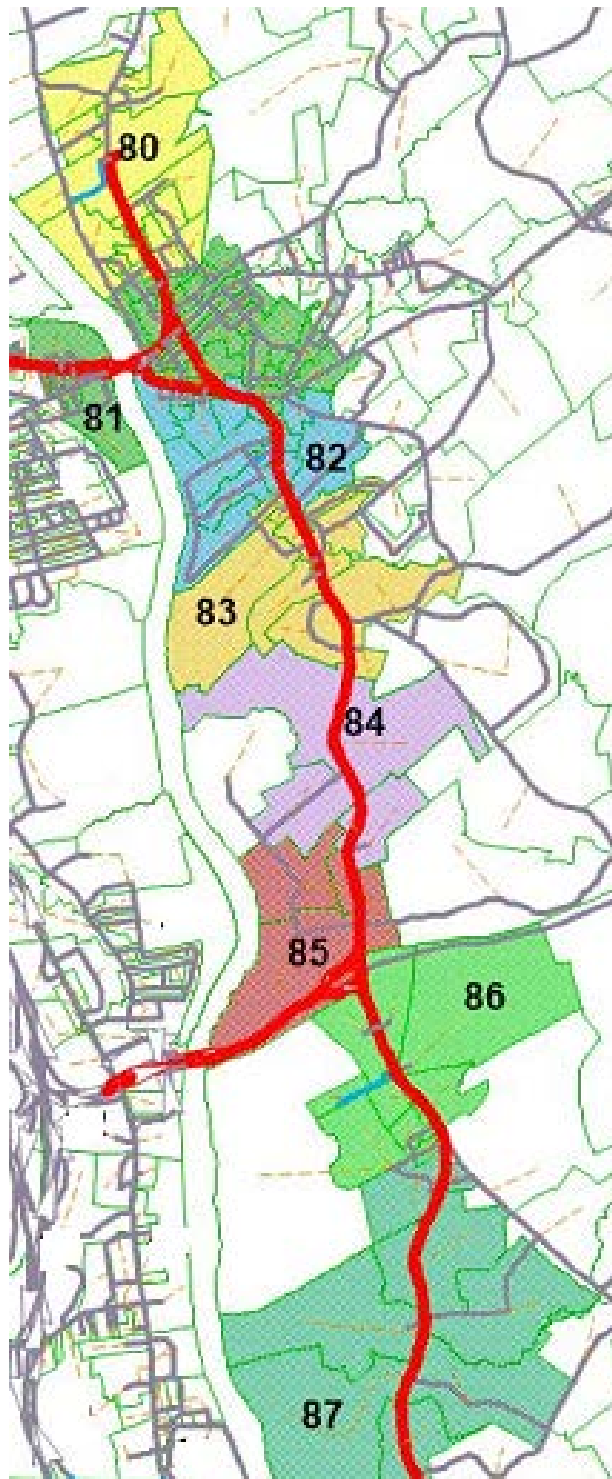
A service extension to NH 3A in Hudson could utilize both Merrimack River bridges connecting with downtown Nashua via the Taylor Falls/Veterans Memorial Bridges and the south Nashua business district via the Sagamore Bridge. Transit service along the NH 3A corridor is evaluated from the Massachusetts state line north to the Hudson Mall shopping area where NH 3A and NH 102 run concurrently. As shown in the following map eight transit zones (80 through 87) are analyzed for ridership.

The route provides new transit to the following:

- Hudson Mall
- Dr. H.O. Smith School
- Hudson Municipal Offices
- Hudson Gardens Apartments
- Stonewood School Day Care
- Walmart, Sam's Club, Market Basket and numerous other commercial establishments along NH 3A
- Executive Drive/Flagstone Drive office buildings (Sagamore Business Park)

Hudson does not have the high transit-dependent population as seen along the DW Highway in Merrimack nor does it have as strong a commercial attraction base for transit as does the NH 101A corridor. The 16,700 annual trips (58 per average weekday, 36 per average Saturday) that are estimated are about 25% household production trips and 75% commercial/office attracted trips. As is the case for all routes, the difference would be made up from trips being made from residences in Nashua to Hudson destinations.

NH 3A Transit Extension to Hudson & Transit Zones



TRANSIT ROUTE RIDERSHIP ESTIMATES, NTS SERVICE EXTENSION TO HUDSON

NH 3A - Hudson

INPUT VARIABLES

Town	Area	HH 0-Veh	Totl Emp	Ret Emp	Hlth Emp	Sch Enroll
Hudson	80	4	456	222	30	0
Nash/Hud	81	36	479	37	0	452
Hudson	82	11	194	27	0	0
Hudson	83	2	430	42	0	613
Hudson	84	2	306	57	0	0
Hudson	85	2	1,180	450	207	0
Hudson	86	1	570	376	0	0
Hudson	87	4	503	88	0	0
Total		62	4,118	1,298	237	1,065

ANNUAL ESTIMATED RIDERSHIP: NH 3A ROUTE, HUDSON

Town	Area	HBW P-->A	HBW A-->P	HBO P-->A	HBO A-->P	HBM P-->A	HBM A-->P	HBSC P-->A	HBSC A-->P	Total P-->A	Total A-->P	NHB Trips	Total Trips
Hudson	80	135	1,308	87	366	20	62	17	0	259	1,736	120	2,114
Nash/Hud	81	1,217	521	779	0	184	0	150	88	2,330	609	176	3,116
Hudson	82	372	265	238	0	56	0	46	0	712	265	59	1,036
Hudson	83	68	508	43	0	10	0	8	124	129	632	46	807
Hudson	84	68	479	43	0	10	0	8	0	129	479	37	645
Hudson	85	68	2,842	43	1,142	10	348	8	0	129	4,333	268	4,730
Hudson	86	34	2,061	22	796	5	0	4	0	65	2,858	175	3,098
Hudson	87	135	760	87	75	20	0	17	0	259	835	66	1,160
Total: NH 3A Rte		2,096	8,745	1,342	2,380	316	410	259	212	4,013	11,747	946	16,706

V. OPERATIONAL/FINANCIAL ANALYSIS AND FUNDING ALTERNATIVES

A. Operational and Financial Analysis: Existing NTS Service & Other NE Operators

A scrutiny of the transit system's operations and performance measures will provide one indicator of its ability to provide additional services, whether it be in the form of more frequent service, expanded hours, or in the case of the present study, expansion to new service areas. The next table provides a comparison of NTS operational statistics with those of two other NH transit systems (MTA and COAST) and five additional transit systems in New England. The statistics utilize the number of annual passenger trips, revenue miles and passenger miles (passenger trips multiplied by the average trip length) to produce system-level measures of effectiveness in the form of trips per revenue mile (T/RM) and passenger miles per system revenue miles operated (PM/RM).

NTS has a higher T/RM rate than the other NH systems and is most comparable to Lowell RTA and Cape Ann Transportation among the non-NH services. COAST operates longer routes and therefore has a high PM/RM despite having a significantly lower system T/RM. Only the Greater Portland Maine transit system appears to have a clear lead in these performance measures; others are within a similar range.

B. Operating Performance Measures

Other observations included the following: The next table provides a comparison of financial performance measures for the same transit systems. Nashua Transit has substantially lower operating costs per vehicle revenue mile than the other systems and only MTA rivals NTS in terms of cost per vehicle revenue hour. Where NTS lags is with respect to farebox revenue. The regular adult NTS cash fare is \$1.25 compared with \$2.00 for MTA. MTA provides the required senior discount half fare of \$1.00 but on NTS bus routes seniors ride free of charge. In terms of net operating cost per passenger trip, MTA is 46% higher than NTS and COAST is 75% higher. The Portland, Maine transit system is the leader in this regard, with a \$3.34 net operating cost per trip. This is despite an operating cost per VRM of \$7.92 and is attributable to the high capture rate of operating costs by farebox revenue (24%) compared with NTS (17%).

FINANCIAL PERFORMANCE MEASURES, NH & OTHER NEW ENGLAND TRANSIT SYSTEMS

	Fare Rev	Operating Cost	Operating Deficit	Op Cost/VRM	Op Cost/VRH	Op Cost/VPM	Farebox Revenue	Net Op Cost/Pass Trip
<u>NH Transit Systems</u>								
Nashua Transit System	\$360,000	\$2,128,438	\$1,768,438	\$4.78	\$64.54	\$1.03	\$360,000	\$4.08
Manchester Transit	\$613,478	\$3,292,348	\$2,678,870	\$6.19	\$67.84	NA	\$613,478	\$5.98
Coop Alliance Seacoast Transit	\$672,193	\$3,816,284	\$3,144,091	\$5.86	\$90.99	\$1.04	\$672,193	\$7.15
<u>New England Transit Systems</u>								
Lowell Regional Transit	\$1,171,651	\$9,172,328	\$8,000,677	\$6.86	\$100.73	\$1.33	\$1,171,651	\$5.61
Greater Portland, ME Transit	\$1,942,610	\$8,117,917	\$6,175,307	\$7.92	\$98.84	\$1.27	\$1,942,610	\$3.34
Lewiston-Auburn ME Transit	\$203,664	\$1,460,842	\$1,257,178	\$7.13	\$90.08	NA	\$203,664	\$3.50
Cape Ann Transp, Gloucester	\$157,834	\$1,755,375	\$1,597,541	\$8.42	\$105.42	\$2.24	\$157,834	\$8.02
Housatonic Area Transit, CT	\$782,303	\$5,266,019	\$4,483,716	\$5.08	\$86.67	\$1.08	\$782,303	\$6.25

The above tables indicate that NTS operates relatively efficiently, particularly with respect to cost control. The next table provides ridership and financial performance data at the route level and these will serve as a benchmark in evaluating the estimated performance measures of potential new routes. In terms of riders per VRM, Route 7 to French Hill north of the downtown is the leader at 2.11. As a relatively short route, it also has the lowest net operating cost. It should be noted, however, that individual route statistics have to be tempered by the fact that about one-third of riders must transfer to another route to complete their trip and the second route may be one of the less productive based on this statistic.

What is noteworthy is the fact that Route 10/10A to Walmart has an extremely low ridership per VRM ratio at 0.25, which is less than half of Routes 4, 8 and 9 which are the next least utilized. Walmart is obviously a popular shopping destination and both the onboard surveys and general public surveys ranked it as a key transit service destination. However, the fact that transfers must be made at the terminus of Route 2 for most runs and the regular fare being doubled for travel beyond Nashua's border (and a reduced fare charge for seniors, who are able to travel within Nashua for free) coupled with limited days of service likely results in lower route productivity along this route extension that would be the case otherwise. Average NTS riders per VRM is .97.

OPERATIONAL ANALYSIS: NTS EXISTING ROUTES, FY 2019						
NASHUA ROUTES	Annual Riders	Annual Miles	Riders/ Rev Mi.	Operating Cost (OC)	Revenue	Net Operating Cost
Route 1	22,779	23,751	0.96	\$113,530	\$18,371	\$95,158
Route 2	65,423	47,164	1.39	\$225,445	\$54,670	\$170,775
Route 2A	48,324	39,319	1.23	\$187,946	\$40,441	\$147,505
Route 4	16,478	29,444	0.56	\$140,742	\$13,601	\$127,141
Route 5	30,018	28,275	1.06	\$135,155	\$26,955	\$108,200
Route 6	68,448	44,536	1.54	\$212,883	\$57,788	\$155,095
Route 6A	47,188	41,453	1.14	\$198,144	\$38,497	\$159,647
Route 7	31,401	14,895	2.11	\$71,199	\$28,373	\$42,826
Route 8	34,771	64,107	0.54	\$306,432	\$27,847	\$278,585
Route 9	25,814	45,725	0.56	\$218,565	\$20,231	\$198,333
North	15,199	17,481	0.87	\$83,560	\$11,199	\$72,361
South	19,267	18,630	1.03	\$89,049	\$15,498	\$73,551
Central	6,107	20,416	0.30	\$97,588	\$4,542	\$93,047
Walmart/10A	2,533	10,084	0.25	\$48,199	\$1,987	\$46,212
NTS All Routes	433,750	445,280	0.97	\$2,128,438	\$360,000	\$1,768,438

Note: Walmart ridership and productivity have significantly increased in FY 20, which is not reflected in this table.

C. Operational and Financial Analysis: NTS Route Expansion

System performance and financial data were prepared for new routes using average operational costs (the same method as was used for existing routes). The results are shown in the following table. There exists the possibility that the marginal costs of route extensions are lower than average costs, as is often the case for system's operations resulting from economies of scale but this is cannot easily be determined in the limited analysis being performed for this study; hence, the use of average cost.

If all new routes studied were to be implemented, the impact on NTS system operations would be considerable. The operating cost that is projected to result from new routes is \$953,660, which would be a 54% increase over the existing \$1,768,400 annual cost. However, ridership from all new routes is estimated at about 69,000. This represents an increase of only 16% over current ridership. However, the additional 223,500 route miles would be a 59% increase from the existing 445,280. The productivity of new routes in total would be far less than the existing systemwide measure – new routes are estimated to generate 0.31 riders per vehicle revenue mile compared with 0.97 for current routes.

OPERATIONAL ANALYSIS: TRANSIT ROUTE EXTENSIONS						
NEW ROUTES	Annual Riders	Annual Miles	Riders/ Rev Mi.	Operating Cost	Revenue	Net Operating Cost
Merrimack						
DW Hwy	17,801	66,239	0.27	\$316,621	\$29,550	\$287,072
Cntl Dr/Ind Blvd	2,844	18,380	0.15	\$87,858	\$4,721	\$83,137
Hudson						
NH 3A	16,706	64,852	0.26	\$309,991	\$27,732	\$282,259
Merrimack-Amherst-Milford						
NH 101A	27,502	65,233	0.42	\$311,814	\$45,653	\$266,161
NH 13 segment	4,161	8,774	0.47	\$41,940	\$6,907	\$35,033
Total - New Route	69,014	223,478	0.31	\$1,068,224	\$114,563	\$953,661

Daniel Webster Highway & Continental Blvd. Routes

The US 3 Daniel Webster Highway route extending from the northern end of Concord Street in Nashua to the Bedford line is a 9.55-mile route. Operating on a regular schedule of 12 runs per weekday and 8 runs on Saturday, annual route revenue miles are calculated at 66,240. This results in an annual operating cost of \$316,600. With route revenue estimated at \$29,500 from 17,800 annual passenger trips, the net cost for this route is \$287,000. This exceeds the cost for any current NTS route, including Route 8 Nashua Mall/West Hollis Street, which has annual patronage of 34,770. Riders per VRM is only 0.27, which is half the level of Routes 4 and 8, which have the lowest productivity measures for existing daytime routes. A shorter route that terminates below Bedford Road might prove to be more efficient, though it would also result in fewer total riders.

The Continental Boulevard/Industrial Drive route produces only 2,840 trips resulting in a rider/VRM ratio of just 0.15. Without transit access to the Premium Outlets, the route has little chance to produce positive results. If access to the Premium Outlets were possible, an increase in annual ridership of around 6,500 would increase the productivity to 0.50 riders per VRM bringing it into the range of NTS' lower riders per VRM routes and the estimated \$83,100 net cost would be reduced to \$72,300.

NH 3A Transit Route, Hudson

The Hudson NH 3A transit route is 9.35 miles in one direction and would operate 64,850 revenue miles annually. With 16,700 trips projected, the riders per VRM is calculated at 0.26, indicative of a relatively unproductive route. The annual net cost is estimated at \$282,000, close to the level predicted for a Daniel Webster Highway route, which had about 6.5% higher estimated ridership. Eliminating the section of the route south of Walmart to

the Massachusetts state line would improve productivity to a degree, as this is a low ridership segment.

NH 101A to Western Milford & NH 13 from Oval to NH 101 Bypass Transit Routes

A transit route along NH 101A to the Jones Rd./Phelan Rd. business park area in western Milford is estimated to produce 27,500 riders over 65,230 vehicle revenue miles, a rate of 0.42 passengers per VRM. Fare revenue is estimated at \$45,650 and operating cost at \$311,800. This results in a projected annual net operating cost of \$266,000, somewhat lower than the DW Highway route in Merrimack and the US 3A route in Hudson. Of the three long routes evaluated, the NH 101A route has the highest level of feasibility by a significant margin. Still, it underperforms any of the current NTS daytime routes.

The short NH 13 adjunct route is only 1.26 miles one-way and relatively productive compared to other new routes. Only 8,770 annual route miles would be operated, resulting in a rider per VRM statistic of 0.47 for the 4,160 annual riders. With operating costs kept low at around \$42,000 for the short route segment, the annual net operating cost is projected at only \$35,000. However, this route can only be implemented in conjunction with the main NH 101A transit extension.

D. Complementary Paratransit Service Requirement

The Americans with Disabilities Act (ADA) requires public transit agencies that provide fixed-route service to provide “complementary paratransit” service to people with disabilities who cannot use the fixed-route bus or rail service because of a disability. The ADA regulations specifically define a population of customers who are entitled to this service as a civil right. The regulations also define minimum service characteristics that must be met for this service to be considered equivalent to the fixed-route service it is intended to complement.

Service characteristics: In general, ADA complementary paratransit service must be provided within 3/4 of a mile of a bus route or rail station, at the same hours and days, for no more than twice the regular fixed-route fare.

While the transit agency is required to provide paratransit for trips with origins and destinations within 3/4 of a mile of a route/station, paratransit eligible customers who are outside the service area could still use the service if they are able to get themselves into the service area. The ADA further requires that paratransit rides be provided to all eligible riders if requested any time the previous day. The ADA allows providers to negotiate trip times with the customer, but no more than an hour before or an hour after the requested time.

Eligibility: The ADA regulations provide three categories of paratransit eligibility. All three categories include people who may be able to ride fixed-route transit for some trips and not for other trips, and eligibility may be conditional based on the person's ability to ride fixed-route for certain trips. The three categories are defined in response to the frequently asked question "what are the three categories of eligibility for ADA complementary paratransit?"

The eligibility determination process for ADA complementary paratransit is developed by the transit system in consultation with the local community. To qualify for this service, it is usually necessary to submit an application, and may also require supporting documentation, an in-person interview and/or an in-person assessment of the applicant's ability to use fixed-route service. Some transit systems have more rigorous processes and strictly limit eligibility to those people who are functionally unable to ride fixed-route service. Other transit systems have less restrictive eligibility or may use the ADA paratransit application process to determine eligibility for other kinds of demand-responsive services, described below.

Relationship to other kinds of demand-responsive services: It is important to note that a community may offer other kinds of transportation services or in addition to, or instead of, the fixed-route and ADA complementary paratransit services. Such services may be offered on a general public basis (for example, open to all people with disabilities, senior adults, and/or the general public), or could be limited to people who participate in specific social service programs. The service characteristics vary widely from community to community. Sometimes these services are provided in coordination with the ADA complementary paratransit. A customer may be eligible to use the ADA complementary paratransit for some trips but find it necessary to use other demand-responsive services for other trips. For example, while the ADA complementary paratransit may only operate within 3/4 mile of the fixed-route service, another service may be available throughout the county.

Existing Paratransit Services and Requirements for New Fixed-Route Service Areas

Nashua Transit System provides paratransit demand-responsive service through its City Lift service. It is available to persons who qualify as disabled under the Americans with Disabilities Act (ADA) who are not able to use the fixed-route CityBus service, as well as to seniors 65 years of age or older. It is available to Nashua residents and limited service is available to residents of Merrimack and Hudson under contract with NTS. Service is also available to residents of Amherst, Brookline, Hollis, Milford, Mont Vernon, and Wilton through the Souhegan Valley Rides/Blue Bus system which also contracts with NTS.

The NH 101A and NH 13 route extension corridors are already covered for the paratransit requirement through the existing service agreement with Souhegan Valley Rides/Blue Bus.

The "limited service" available to Merrimack and Hudson residents probably does not meet the complementary paratransit service requirement without the addition of supplemental service. Furthermore, in the unlikely event that all service extensions were implemented, the system would be required to make paratransit available between any origin/destination in the $\frac{3}{4}$ mile service area. A Hudson resident within $\frac{3}{4}$ of a mile from US 3A, for example, could request a paratransit trip to a Phelan Rd. business office in the western part of Milford.

A ridership and revenue/expense analysis for new paratransit trips cannot be reliably estimated as was done for fixed-route extensions. It is uncertain to what degree the Merrimack and Hudson paratransit markets are served and the degree of demand that will be induced by the provision of additional demand-responsive service to new fixed-route corridors. The NTS demand-responsive van has a similar cost per revenue mile as does the fixed-route bus but carries significantly fewer passengers and has a longer average trip length per passenger. This results in paratransit capturing only 3.2% of its operating expenses through farebox revenue compared with 18.8% for the fixed routes.

E. [Public Transportation Funding Sources](#)

Financing the construction, operation, and maintenance of public transportation systems involves many different types of funding sources, including federal and non-federal grants, cooperative agreements, loans, and revenue sources. Different types of financing arrangements such as leases and public-private partnerships have been used to fund the procurement of materials and activities.

The Fixing America's Surface Transportation (FAST) Act was signed into law in December 2015. The act, which supports transit funding through the fiscal year 2020, reauthorized FTA programs and included changes to improve mobility, streamline capital project construction and acquisition, and increase the safety of public transportation systems across the country.

This chapter outlines funding from a variety of sources, including the Federal Transit Administration (FTA), the NH Department of Transportation (NHDOT), local sources and private sources.

An important factor common to nearly all the federal funding programs listed below is that they require non-federal (local, state, or private) matching dollars. Securing adequate matching funding is a challenge for all transit systems in New Hampshire.

Municipal contributions are the foundation of the non-federal funding that public transit agencies rely on to match FTA dollars and other federal funding streams. Maintaining

municipal contributions and growing them to keep pace with increasing costs of providing service is an ongoing challenge.

The following pages summarize funding sources that could potentially be used to support expanded public transportation service in the Greater Nashua/Souhegan Valley region.

United States Department of Transportation

Federal Transit Administration (FTA) Urbanized Area Formula Program (Section 5307):

In Large Urbanized Areas with populations over 200,000, transit agencies are designated recipients of Section 5307 funding and receive funds directly from FTA. Apportionment of funding in Large UZAs is based on a combination of population, population density, and route miles of service. Until recently, in urbanized areas with populations greater than 200,000 these funds could be used only for eligible capital and preventative maintenance expenses. However, beginning with MAP-21 in 2012, small transit agencies in Large UZAs have the flexibility to use up to 75% of their Section 5307 apportionment for transit operation.

This was a critical fix for NTS. Following the 2010 U.S. Census, the Nashua NH-MA Urbanized Area crossed the 200,000-population threshold, and prior to the change in MAP-21, NTS would have lost access to FTA operating funding. Funds for the Nashua Urbanized Area are now divided up among NTS, CART (absorbed by MTA in 2019), and the Lowell Regional Transit Authority (LRTA) every year based on negotiation among the three transit agencies.

The Nashua region is also potentially eligible to receive a limited amount of Boston Urbanized Area (UZA) transit funding because the Town of Pelham is within the Boston UZA. However, the funding would need to be spent for transit service in Pelham, which is not a community that is part of the expansion that was analyzed in this study.

FTA Bus & Bus Facilities Program Grants (Section 5339, 5339B, 5339C): The Bus and Bus Facilities grant program provides capital assistance for transit agencies to purchase new or used buses, as well as construct bus-related maintenance or passenger facilities. Section 5339 funding is available directly to the region through the Nashua Urbanized Area, while another pool of Section 5339 funding accrues to the State and is available annually through a competitive grant process. NTS is using this funding source to upgrade the Transit Center near Nashua City Hall and to purchase one CNG bus.

FTA Capital Assistance Program for Elderly & Disabled Persons (Section 5310): This program provides formula funding directly to transit agencies (in areas over 200,000 in population), and to states for rural and small urban areas. The purpose of the program is to assist private-nonprofit groups and certain public bodies in meeting the transportation

needs of elders and persons with disabilities when transit service is unavailable, insufficient, or inappropriate to meeting these needs.

NHDOT manages a pool of Section 5310 funding used only for vehicle replacement and requires that applicants participate in regional coordination efforts where they exist. NTS participates in the Nashua Region Coordinating Council (RCC) and has used Section 5310 capital grants to purchase one paratransit van.

NHDOT allocates two additional amounts of funding that are tied to participation in the Nashua RCC:

Section 5310 Purchase of Service funding that is used to support the Souhegan Valley Rides Blue Bus demand-response service; and,

Section 5310 Formula Funding that supports mobility management priorities identified through the RCC.

The following table shows the trend in FTA funding available for the Nashua Transit System. A significant reduction in urbanized area formula funding occurred when the Nashua, NH region was designated as a large urbanized area (200,000 population) based on the 2010 Census. From a level of \$2.32 million across all funding categories in 2012, a reduction by 37% to \$1.45 million in 2015 had to be absorbed by NTS. Federal funding has drifted somewhat higher to a level of \$1.58 million in 2019, but this is still 32% off the peak level from seven years ago. Unless urbanized federal funding levels can be restored to previous levels through the next re-authorization of funding by Congress, maintaining present service levels will become increasingly difficult and the prospects for extending NTS service to new areas would be severely constrained. By their own estimates, NTS is projecting a shortfall of operating funding in excess of \$400,000 by FY 2022.

Nashua Transit Annual Allocation of FTA Funds

FY	FTA 5307	FTA 5310	FTA 5339	Total
2010	\$2,308,820	\$0	\$0	\$2,308,820
2011	\$2,313,797	\$0	\$0	\$2,313,797
2012	\$2,317,819	\$0	\$0	\$2,317,819
2013	\$1,487,477	\$129,659	\$159,093	\$1,776,229
2014	\$1,286,185	\$42,372	\$134,167	\$1,462,724
2015	\$1,273,139	\$41,813	\$132,628	\$1,447,580
2016	\$1,300,137	\$43,601	\$122,055	\$1,465,793
2017	\$1,297,250	\$69,615	\$125,337	\$1,492,202
2018	\$1,328,255	\$70,953	\$171,311	\$1,570,519
2019	\$1,419,563	\$0	\$159,926	\$1,579,489

Federal Highway Administration (FHWA) Surface Transportation Program (STP)

Among the many USDOT funding streams, the Surface Transportation Program (STP) provides the greatest flexibility in potential uses. These funds are typically used for highway construction and are managed by the NHDOT. However, they may be used for any capital project, including transit vehicles and facilities, bicycle and pedestrian facilities. Nationally, 4%- 5% of STP funds are used for transit projects such as bus procurement or transit facilities, while the vast majority are used for highway projects. States or MPOs may elect to transfer (or “flex”) a portion of STP funding for any projects eligible for funds under FTA programs except urbanized area formula (Section 5307) operating assistance. The program requires a non-federal share of 20%.

While the New Hampshire Department of Transportation has not frequently flexed FHWA funds for transit use, the supplemental pool of FTA Section 5310 funding for Purchase of Service described above was flexed from the Surface Transportation Program.

Congestion Mitigation and Air Quality (CMAQ) Program

These funds are available to states for programs that reduce traffic congestion and improve air quality. All states receive CMAQ funds and since New Hampshire is in attainment for transportation-related air pollutants, the state’s CMAQ allocation has been transferred to the Surface Transportation Program fund allotment.

CMAQ funding for transit can be used to purchase buses, vans or rail equipment; for transit passenger facilities; or for operating support for pilot transit services. Funding may be used for all projects eligible under FTA programs including operating assistance for up to five years. A non-federal match of 20% is required. New Hampshire CMAQ funds are typically available on a two-year cycle.

Because of the requirement to demonstrate air quality benefits, when CMAQ funds are used for transit it is typically for fixed-route commuter transit, where it can be demonstrated that the bus is taking cars off the road. The NTS fixed-route service to the Walmart in Amherst is being funded through the CMAQ program. The program will be sustained for three years under this funding source but must then be funded through conventional FTA urban formula funds for service to be continued.

Rural Transit Assistance Program (RTAP) (Section 5311(b)(3))

The Rural Transit Assistance Program (RTAP) provides funding to State Departments of Transportation through the Federal Transit Administration’s 49 U.S.C Section 5311 Formula Grants for Other than Urbanized Areas (CFDA 20). Program funds are used to assist in the design and implementation of training and technical assistance projects and other support services tailored to meet the needs of transit operators in nonurbanized areas. The program does not fund operational or capital expenditures. There is no local match requirement.

In New Hampshire, the RTAP training program is administered by RLS & Associates, Inc. (RLS) under a contract with the New Hampshire Department of Transportation (NHDOT).

Portions of several communities along the corridors that are being studied for expansion are outside of the Nashua UZA and therefore possibly eligible for projects that could be funded through the RTAP program.

State of New Hampshire Funding

The State of New Hampshire contributes very little to support public transportation. According to the US Department of Transportation statistics for FY2016, New Hampshire ranks 49th in total public transportation funding for all states, including federal and state allocation. Public transit funds that are allocated the State of New Hampshire amount to only \$0.51 per capita, the lowest of the 6 New England states. The state has also historically contributed a 10% match toward capital bus purchases by public transit agencies. However, none of the state funding for public transit is used for operating expenses.

The table below compares New Hampshire's state funding levels with the other New England states. While it is not reasonable to make comparisons with the three states whose transit systems (including bus, light rail, and heavy rail) serve in large part either the Boston or New York City metro areas, the data shows New Hampshire lagging considerably behind the similar states of Vermont and Maine. Matching Maine's state funding for operating assistance level would help reduce one hurdle in transit expansion, the provision of 50% local match against federal operating assistance.

NEW ENGLAND STATE TRANSIT FUNDING LEVELS

State	2017 Population	2017 State Funding	2017 Per Capita Funding	2017 State Funding for Operating	Per Capita Funding for Operating
Massachusetts	6,859,819	\$2,005,445,417	\$292.35	\$1,955,368,899	\$285.05
Connecticut	3,588,184	\$632,110,145	\$176.16	\$364,010,145	\$101.45
Rhode Island	1,059,639	\$57,309,695	\$54.08	\$48,420,242	\$45.70
Vermont	623,657	\$7,928,915	\$12.71	\$6,745,749	\$10.82
Maine	1,335,907	\$1,263,595	\$0.95	\$1,147,845	\$0.86
New Hampshire	1,342,795	\$679,318	\$0.51	\$0	\$0.00

Developing a dedicated source of state funding for public transportation has been a longstanding goal of the NH Transit Association, the state's regional planning commissions, and other organizations. Building support for increased state investment among policymakers will be important for any transit expansion in the Greater Nashua/Souhegan Valley region.

Local Funding Sources

Municipal contributions form the core of the non-federal funding that NTS relies on to match FTA dollars and other federal funding streams. The majority of the NTS fixed-route transit system operates within the City of Nashua and therefore contributions by the City are an important component of the non-federal funding match.

If transit service were to be expanded along any of the corridors analyzed in this study, the municipalities served would need to provide some portion of the non-federal match for capital and operating expenses of the system. Developing relationships and funding commitments with those communities, maintaining municipal contributions and growing them to keep pace with increasing costs of providing service will be both necessary and challenging.

One means of generating local funding under New Hampshire law is a surcharge on local vehicle registration fees. Beginning on July 1, 1997, in addition to the motor vehicle registration fee collected, the legislative body of a municipality may vote to collect an additional fee for the purpose of supporting a municipal and transportation improvement fund. The additional fee collected can be up to \$5.00. Of the amount collected, up to 10 percent, but not more than \$0.50 of each fee paid, may be retained for administrative costs. The remaining amount could be deposited into the municipal transportation improvement fund to support improvements in the local or regional transportation system including roads, bridges, bicycle and pedestrian facilities, parking and intermodal facilities and public transportation.

Use of the local option fee has several advantages as a local funding source for public transportation: it is established as a dedicated source of funds for transportation, it is stable from year to year and not subject to an annual appropriations process, and, it has the capacity to raise sufficient amounts of money to fund the local match obligation of an expanded fixed-route transit service.

Business Support

There are examples nationally, and some in New Hampshire, of businesses supporting transit systems. In Nashua, for example, BAE Systems has provided support for the Route 11/Downtown Connector. The incentive for BAE to provide this support was parking. The service allows BAE employees to park in an underutilized Park & Ride and in downtown Nashua parking garages and travel the rest of the way to the BAE downtown facility, and therefore reducing the need for additional employee parking on site.

In the Upper Valley of New Hampshire, Dartmouth Hitchcock Hospital and Dartmouth College are major supporters of Advance Transit, the regional public transportation system. Other businesses in the Upper Valley have contributed funds toward a capital fund drive to obtain local match for federal funds. In Manchester, the Manchester Transit Authority has

generated matching support from supermarkets for weekly shopping shuttle services. If a transit system significantly improves access for its clientele, then a business may choose to support that transit system. With historically low unemployment rates, businesses outside of Nashua may also have an incentive to contribute to the expansion of public transit to access the region's sizable pool of transit-dependent workers.

In addition, any transit systems bring in additional dollars through the sale of products and services. One of the most common sources of such income is the sale of advertising space inside or outside the vehicles. NTS generates revenue in this way which is then used to partially fund the non-federal funding match requirement.

Since substantial funding would be needed to provide new service, the limitation of available public funding presents a major roadblock. Federal Transit Administration funding can provide up to 50% of the operating assistance required but the pool of funds has declined in recent years. A 32% reduction in FTA formula funds to the Nashua Urbanized Area since 2012 has resulted due to reclassification as a Transportation Management Area (the category for UZAs greater than 200,000 in population). It is something of a paradox that formula funds would decline as an area is bumped up to a higher level for metropolitan transportation planning and programming but that is the situation faced by the Nashua area. Stakeholders in the region and the state should make it a priority to push for restoration of funding to pre-TMA levels in the next transportation bill reauthorization.

VI. CONCLUSIONS

Demographic trends point to an increasing need for alternatives to single-occupancy private automobiles. Older adults make up a large and growing portion of the non-driving population, along with individuals with disabilities. The American Association of Retired People (AARP) estimates that one in five Americans over the age of 65 doesn't drive. The number of people in this age group in New Hampshire is projected to nearly double over the next twenty years, from 220,670 in 2015 to 373,200 in 2030 and 408,500 in 2040. Similar trends are projected for the City of Nashua and the communities in which transit service extensions have been considered in this study. Nashua's over-60 population is projected to rise by 76% from 6,522 in 2015 to 11,455 in 2040. Similar growth rates are projected for Milford, increasing by 77% from 843 to 1,495 and Hudson, estimated to increase by 80% from 1,822 to 3,278. Merrimack's senior population is projected to increase by 113%, from 1,694 to 3,601. The need for alternative transportation services for these persons will become increasingly apparent.

How population numbers among other transit-dependent groups, such as low-income and zero-auto households, will change is uncertain, but we do know from comparing recent with past on-board survey results that the need for transit is growing among persons of working age who need public transportation for commuting. Also, inflation-adjusted household income among bus riders has declined since an on-board survey conducted thirty-years ago.

Another trend impacting transit is the declining interest in driving among young people. According to a recent report by the University of Michigan's Transportation Research Institute, only 76.7% of people aged 20 to 24 in 2014 possessed a driver's license, a sharp decline from 79.7% in 2011, 82% in 2008 and 91.8% in 1983. Given the importance of retaining and attracting younger people in an aging state, providing a range of transportation alternatives, including public transportation, is becoming increasingly important.

The corridors that were evaluated for fixed-route service – Daniel Webster Highway in Merrimack, 101A to Milford and NH 3A in Hudson – have substantially less transit ridership potential than is now captured on existing NTS routes in Nashua, at least in the short-term. Given high rates of overall vehicle ownership in the region, the bulk of the transit user market, comprised substantially of low-income households and those without vehicles, resides in Nashua. While this in part results from the lack of bus service outside city boundaries, access to a wider range of housing alternatives coupled with closer proximity to jobs, shopping and services are a major factor in the concentration of lower-income persons in the core area of Nashua.

Fixed-route transit has not been able to attract substantial shares of the region's non-transit-dependent population due to the relative convenience of auto travel over public buses in an area characterized by suburban and rural-residential development patterns. Parking is not in short supply nor expensive in the region and congestion is not so severe as to dissuade people from driving themselves. Fixed-route buses are at a time-disadvantage to driving since routes do not necessarily take the shortest path for peoples' trips and they make numerous stops along the way. In general, transit enjoys much greater appeal to the public in major metropolitan areas where high parking costs coupled with a short supply of parking and significant traffic congestion make personal driving a negative experience.

Of the corridors studied, the NH 101A/NH 13 route extension is the most viable as it provides the highest ridership potential and the lowest operating cost over farebox revenue. The corridor has about the same number of transit-dependent households as does the Daniel Webster Highway route in Merrimack but has far more commercial attractions contributing to higher estimated ridership. Importantly, the corridor also runs through multiple towns including Merrimack, Amherst, and Milford in addition to Nashua. The

Walmart on 101A in Amherst is among the highest priority destinations for exiting NTS users and there is demonstrated demand by larger employers within the corridor for transit services to access potential transit-dependent employees. Nashua Community College is also located in the corridor and has a large regional draw, especially among younger people. Further, the corridor is already well-served by paratransit demand-responsive service.

Additional outreach to stakeholders within communities along the corridor should be pursued to gauge support for expanded transit service, refine potential demand including timing and frequency of service and to evaluate the potential for municipal and business financial contributions. Consideration should also be given to pursuing CMAQ grant funding to support a pilot transit extension along the corridor. In addition, alternatives that could supplement the extension of traditional fixed-route transit should also be pursued with local communities, businesses, and other interested parties. Such alternatives could include the use of demand response van shuttles and contracts with ride-hailing services such as Uber and Lyft to provide reduced fare service.