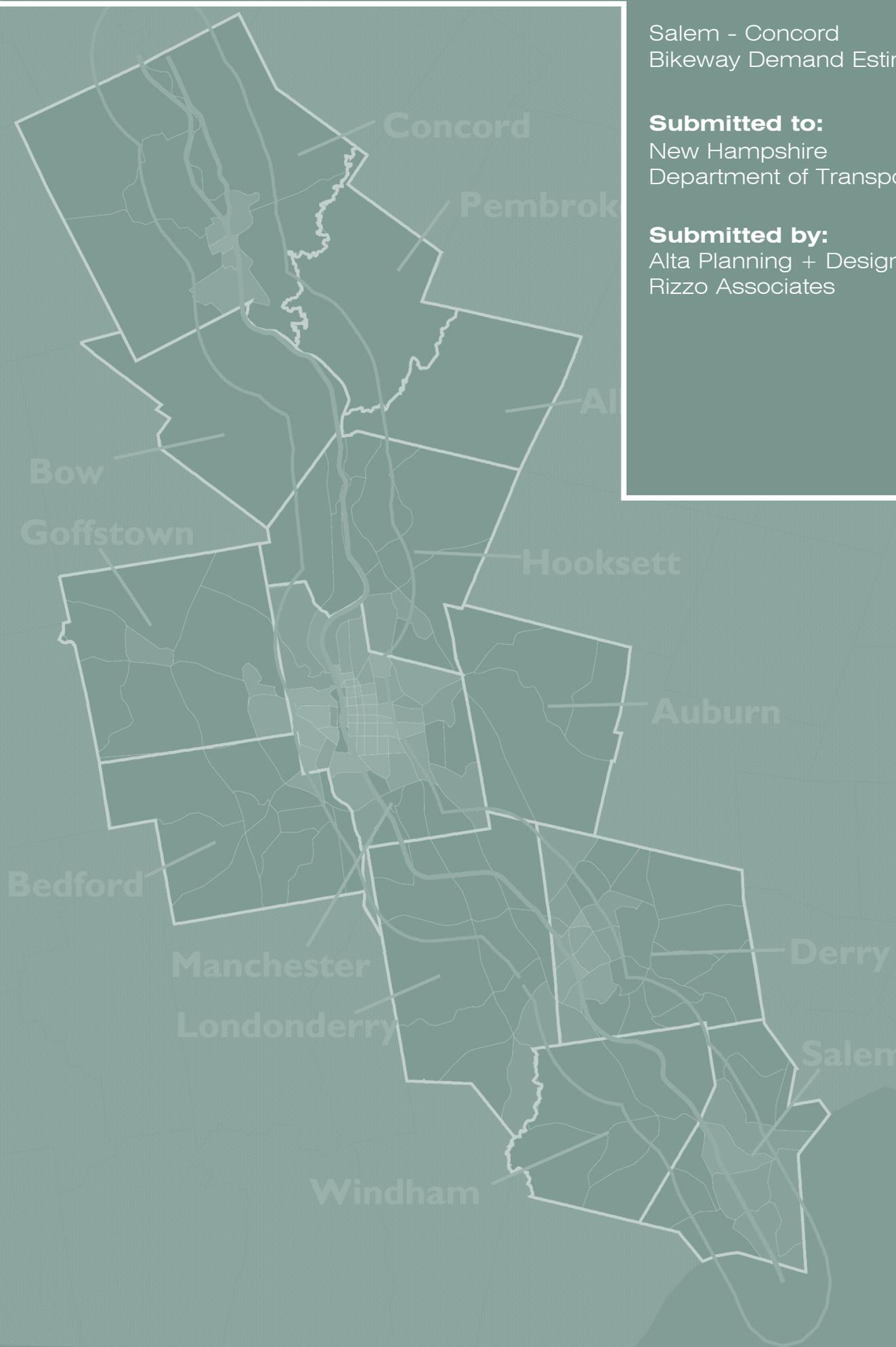


Salem - Concord
Bikeway Demand Estimate

Submitted to:
New Hampshire
Department of Transportation

Submitted by:
Alta Planning + Design
Rizzo Associates



Salem - Concord Bikeway Demand Estimate

Submitted to:

New Hampshire Department of Transportation

Prepared by:

Alta Planning + Design
and Rizzo Associates

November 2003

CONTENTS

Executive Summary	iv
1. Population and Employment Data for Communities in the Corridor	1
2. Journey to Work Data for Communities in the Corridor	5
3. Use of Similar Facilities in New England	7
Burlington, Vermont Bikeway	7
Norwottuck Rail Trail (Western Massachusetts)	10
Minuteman Bikeway (Eastern Massachusetts)	12
4. Projecting Use of the Salem-Concord Bikeway	17
5. Projecting Bicycle Use at I-93 Park and Ride Lots	22
Appendices	
A Population Projections	
B Employment Projections	
C Population and Employment Densities	
D Journey to Work Data	

TABLES

1.	Population Forecasts for Study Corridor	3
2.	Employment Forecasts for Study Corridor	4
3.	Mean Travel Time to Work Aggregated by Town	5
4.	Mode Split Aggregated by Town	6
5.	Overview of Three Selected Trails	7
6.	Burlington Bikeway User Counts	8
7.	Annual Estimate of Use: Burlington Bikeway	9
8.	Norwottuck Rail Trail User Counts	11
9.	Annual Estimate of Use: Norwottuck Rail Trail	11
10.	Demographics of Northampton, Hadley, and Amherst, MA	12
11.	PM Peak Period User Counts on Minuteman Bikeway	13
12.	PM Peak Hour User Counts on Minuteman Bikeway	13
13.	Relationship of PM Peak Hour Counts and Daily Trail Counts	14
14.	Annual Estimate of Use: Minuteman Bikeway	15
15.	Summary of Use and Trip Rates for Three Trails	16
16.	Projected Use of Salem - Concord Bikeway in 2007(Off-road segments)	18
17.	Detailed Population and Bikeway Use Projections	19
18.	Estimate of Potential Bicycle Volumes Based on Traffic Volumes	23
19.	Estimate of Bicycle Demand Based on Park and Ride Occupancy	25

FIGURES

	<u>Follows page</u>
1 Traffic Analysis Zones	2
2 Census Tracts	2
3 Population Density	4

EXECUTIVE SUMMARY

In April 2003 a study was released which investigated the feasibility of constructing a bicycle and pedestrian transportation facility (bikeway) from Salem to Concord, New Hampshire. The recommended route for the bikeway includes two off-road paths primarily in abandoned railroad corridors: 1) Concord to Hooksett and 2) Manchester to Salem.

This follow-on report estimates average daily and annual use of the bikeway's two off-road paths. The estimate is based in part on observed trips and demographic analysis of three similar bicycle and pedestrian facilities in New England. The facilities are:

- Burlington Waterfront Bikeway in Vermont
- Minuteman Bikeway in Eastern Massachusetts
- Norwottuck Rail Trail in Western Massachusetts

The Norwottuck Rail Trail in western Massachusetts was judged to be the most comparable facility to the Salem-Concord Bikeway. On an average day one trip on the rail trail takes place for every 48 residents living within 2 miles of the facility. The trips are made for a variety of purposes including school, work, shopping, and recreation. This observed trip rate for the Norwottuck Rail Trail was being applied to the Salem-Concord Bikeway catchment area to estimate its potential use. This is also the most conservative estimate of use among the three corridors that were evaluated.

In summary, the northern off-road path linking Concord and Hooksett is estimated to attract about 1,000 daily trips in 2007. The southern off-road path linking Manchester and Salem is estimated to attract about 2,000 daily trips in 2007. The two trails combined would have about 3,000 daily users in 2007. Trail use would rise to about 3,600 daily users in 2025 based on projected population growth in the corridor.

Based on a study of similar trails, weekend use on the Salem-Concord Bikeway is estimated to be about 3 times greater than weekday use. Also, due to cold weather and snow conditions, Winter use drops off by about 75 percent compared to Spring through Fall use. In the Spring through Fall 2007, average weekday use is estimated to be about 2,500 trips per day, while weekend use is estimated to be 7,800 trips day. In a typical month from Spring through Fall, 122,600 trips are projected to take place on the path in 2007.

1. POPULATION AND EMPLOYMENT DATA

The recommended alternative for the Salem-Concord bikeway is a rail-to-trail with some shared-use path on new alignment in Hooksett and some on-road segments primarily in Manchester. The overall bikeway corridor includes portions of 13 towns and cities. From south to north, they are Salem, Windham, Derry, Londonderry, Bedford, Manchester, Auburn, Goffstown, Hooksett, Allenstown, Bow, Pembroke, and ends in Concord.

Sections 1 and 2 provide demographic and trip-making data for the study corridor. In this section, population and employment projections are provided for the study corridor for 2007, 2017, and 2025. A variety of different resources have been used to provide base data and growth factors for estimating future population and employment.

Data Sources

Population and employment data were obtained from various sources, including the regional planning commissions that include portions of the study corridor, New Hampshire state agencies, and the U.S. Census.

Southern New Hampshire Planning Commission (SNHPC). SNHPC provided data at the Traffic Analysis Zone (TAZ) level for the towns of Manchester, Derry, Hooksett, Londonderry, Goffstown, and Bedford. These data included population projections from 2005 to 2025 in five year intervals, as well as employment projections for retail and non-retail employment for the same time period.

Rockingham Planning Commission (RPC). The RPC provided TAZ level data for Salem and Windham, the study area towns within their region. Population data were provided for 2000, while employment data from 1990 and 2000 were provided.

Central New Hampshire Regional Planning Commission (CNHRPC). The CNHRPC provided 2000 data on households and employment for Concord, Bow, Pembroke, and Allenstown. The information provided did not correspond to TAZs, and the population data was by household rather than direct population. In order to provide information consistent with the other data sources, U.S. Census data and New Hampshire State data were used.

New Hampshire Office of State Planning. Population projections for future years (2005, 2010, 2015, 2020, and 2025) are available for each municipality in New Hampshire from the Office of State Planning. These population projections were used to develop municipality-wide population growth factors that were applied to disaggregated baseline data for Salem, Windham, Concord, Bow, Pembroke, and Allenstown.

New Hampshire Division of Employment Security. Employment data for 1990 and 2000 are available for each municipality in New Hampshire from the Division of Employment Security. The 2000 employment information provides the baseline data for Salem, Windham, Concord, Bow, Pembroke, and Allenstown, and the 1990 data provide a reference for estimating employment growth.

U.S. Census. U.S. Census population data by census tract were used to provide disaggregated population estimates for 2000 for the municipalities in the CNHRPC: Concord, Bow, Pembroke, and Allenstown. The 2000 U.S. Census was also utilized for Journey-to-Work data as summarized in Section 2.

Figure 1 shows the study area and all of TAZs within the demand corridor. Figure 2 shows census tract boundaries within the corridor. The bikeway alignment is illustrated on both figures within a 4-mile wide corridor representing the area served by the facility.

Population and Employment Projections

The data described above were used to project population and employment for the target years of 2007, 2017, and 2025. The following is a summary of development of these projections for each municipality in the study corridor.

Manchester, Derry, Hooksett, Londonderry, Goffstown, and Bedford. The SNHPC provided future year (2005, 2010, 2015, 2020, and 2025) projections by TAZ for population and employment. TAZ-level population and employment forecasts for 2007 and 2017 for these towns were developed using straight-line interpolation from 2005 and 2015 data. SNHPC data for 2025 data were used directly for that year.

Salem and Windham. The RPC provided 2000 population data, and 2000 and 1990 employment data by TAZ for these municipalities. Population forecasts for 2007, 2017, and 2025 were projected from the 2000 TAZ population data by using town-wide population growth projections from the NH Office of State Planning. Employment forecasts for these future years were based on a straight line growth assumption using 1990 and 2000 employment data.

Concord, Bow, Pembroke, and Allenstown. Population data for these towns are based on 2000 U.S. Census data. Future population data were projected from the 2000 census tract population data by using town-wide population growth rates based on the NH Office of State Planning forecasts. Employment forecasts for these future years were based on 2000 municipal employment data from the NH Division of Employment Security, with a straight line growth projection from 1990 employment levels.

Table 1 summarizes the population forecasts by town for the towns in the study corridor, and Table 2 summarizes the employment forecasts by town. The full data sets are provided in Appendices A and B, with data by TAZ or census tract, as appropriate.

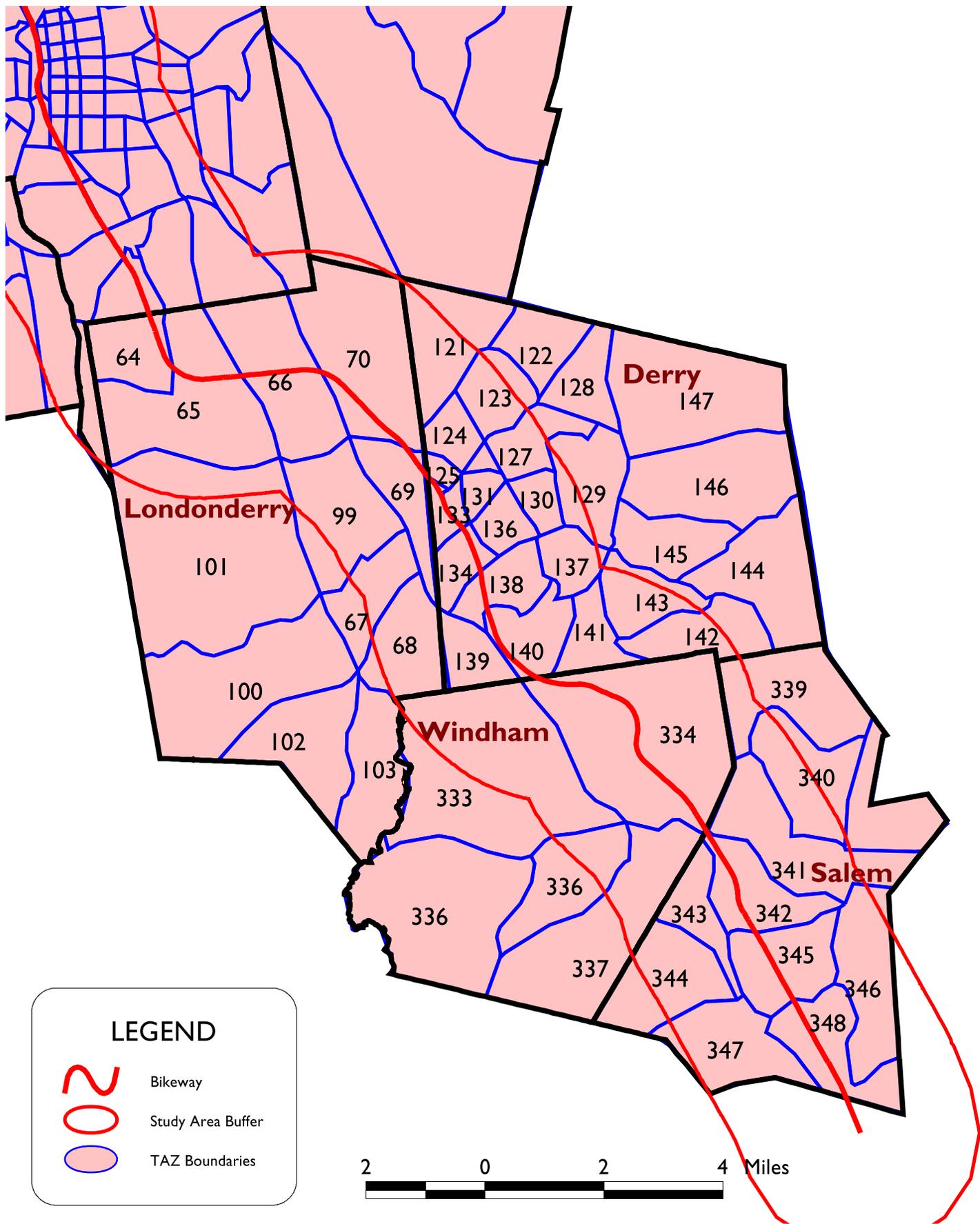


Figure 1A: TAZ Boundaries for Salem, Windham, Derry, and Londonderry

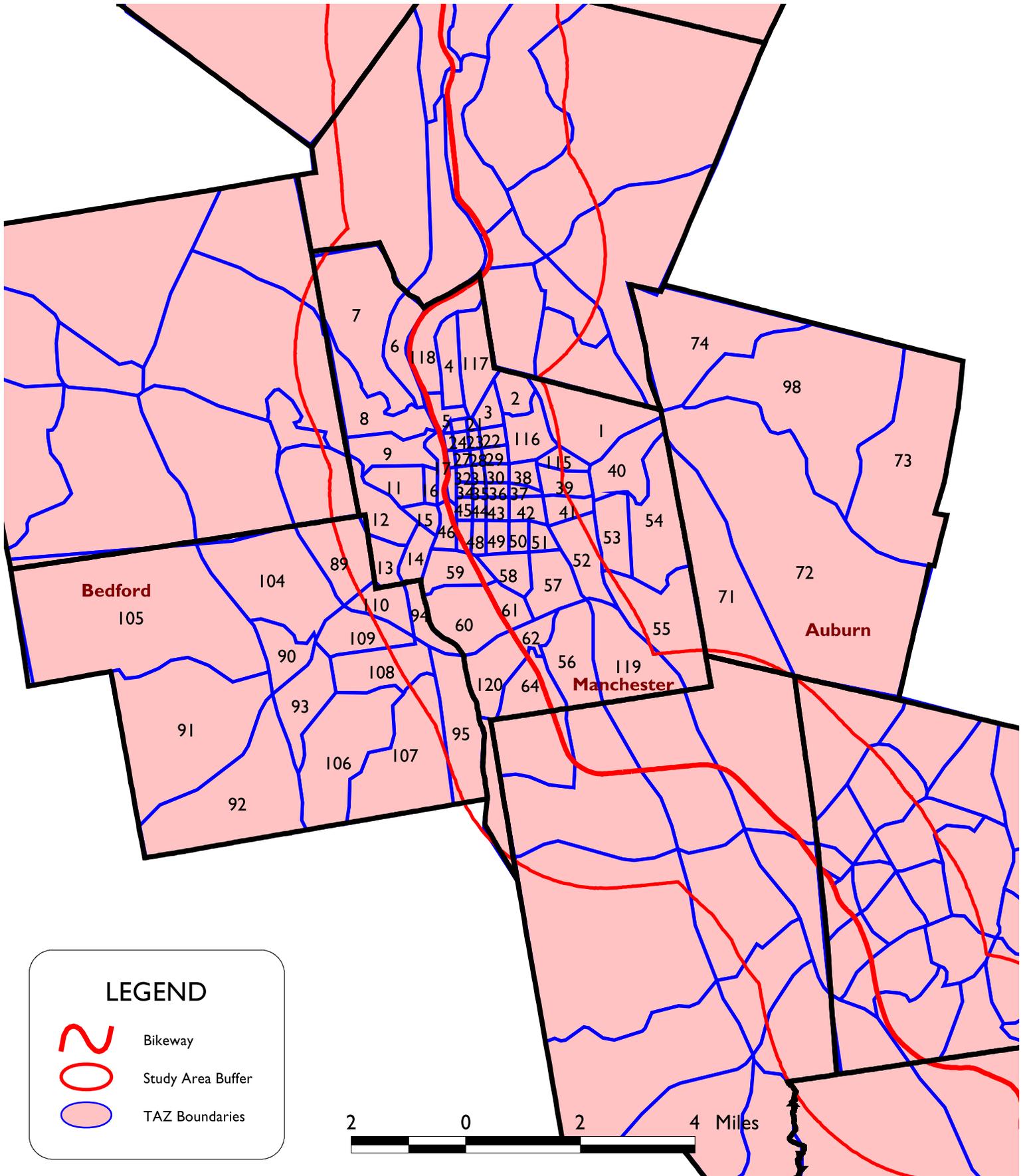
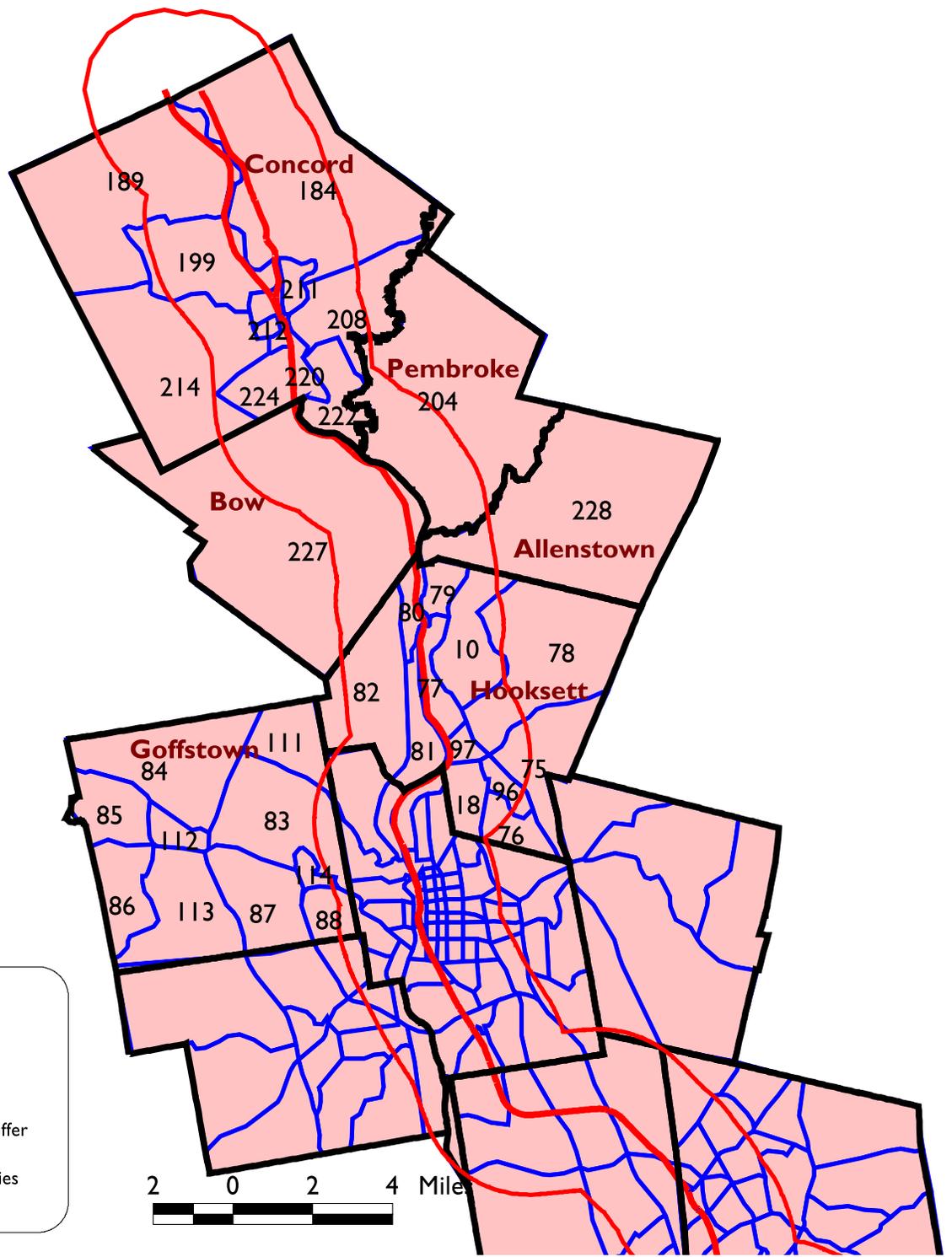


Figure 1B: TAZ Boundaries for Bedford, Manchester, and Auburn



LEGEND

-  Bikeway
-  Study Area Buffer
-  TAZ Boundaries



Figure 1C:

TAZ Boundaries for Goffstown, Hooksett, Allenstown, Bow, Pembroke, and Concord

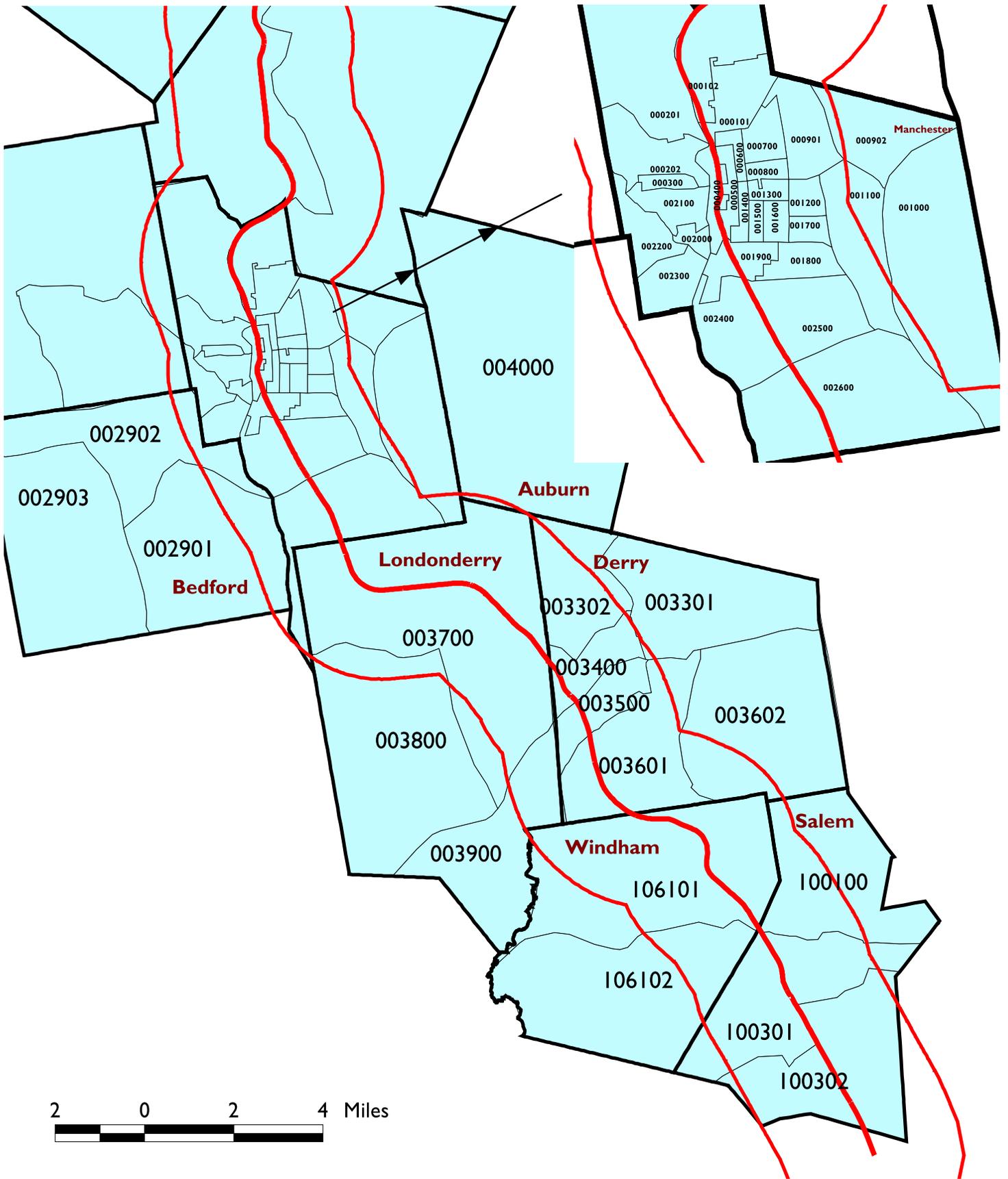


Figure 2A:

Census Tract Boundaries for Salem, Windham, Londonderry, Derry, Bedford, Auburn, and Manchester

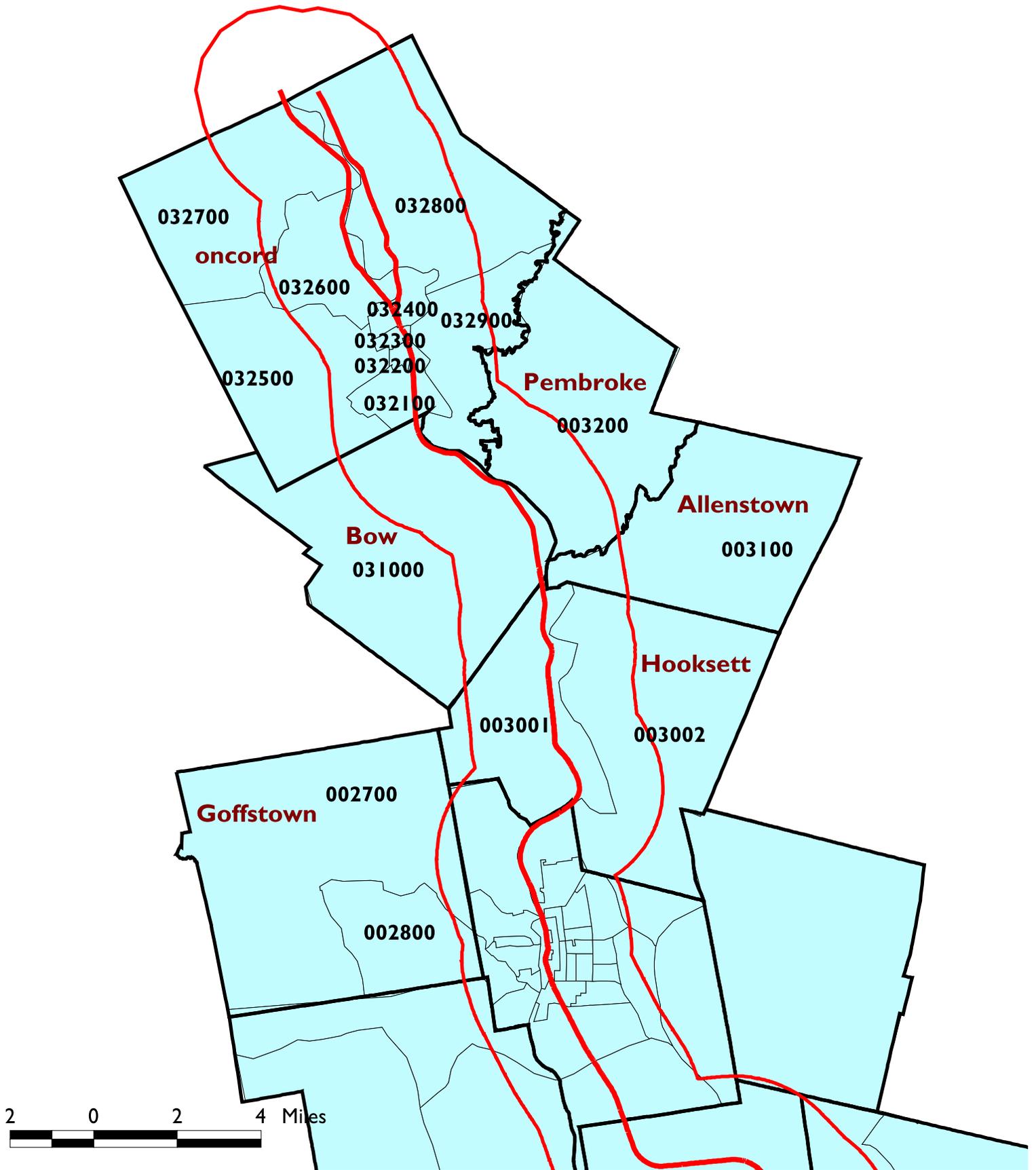


Figure 2B: Census Tracts for Goffstown, Hooksett, Allenstown, Bow, Pembroke, and Concord

Salem-Concord Bikeway Demand Estimate

Table 1. Population Forecasts for Study Corridor

Town	2000 (2001*)	2007	2017	2025
Allenstown	4,930*	5,246	5,788	6,230
Auburn	4,682	5,140	5,726	6,110
Bedford	18,274	21,140	24,356	26,490
Bow	7,280*	8,222	9,934	11,300
Concord	41,120*	43,760	48,478	52,050
Derry	34,021	37,010	40,902	43,830
Goffstown	16,929	18,498	20,720	22,180
Hooksett	11,721	13,484	16,072	18,020
Londonderry	23,236	25,944	29,090	31,260
Manchester	107,006	115,204	124,596	130,470
Pembroke	6,990*	7,474	8,394	9,150
Salem	28,112	30,088	32,666	34,330
Windham	10,709	12,912	13,762	14,750

Salem-Concord Bikeway Demand Estimate

Table 2. Employment Forecasts for Study Corridor

Town	2000	2007	2017	2025
Allenstown	548	751	1,041	1,273
Auburn	983	1,321	1,883	2,401
Bedford	12,769	16,511	23,200	29,835
Bow	3,379	4,133	5,209	6,071
Concord	21,980	25,447	30,339	34,253
Derry	8,690	9,915	12,010	13,954
Goffstown	4,133	4,838	6,051	7,252
Hooksett	6,843	8,760	12,032	15,250
Londonderry	11,597	15,544	22,506	29,569
Manchester	67,037	72,841	83,544	93,931
Pembroke	4,380	4,934	5,705	6,323
Salem	21,167	26,469	34,042	40,102
Windham	2,167	2,851	3,838	4,628

Population and Employment Densities

Detailed data on population and employment densities in 2000 are provided in Appendix C. Densities were determined by dividing the total population or number of employees in a census tract by the area in square miles. Population density ranges from 160 to approximately 20,000 people per square mile. The highest densities are found in Manchester and in the southern part of Concord, near the proposed bikeway alignment. Population density for the demand corridor is shown in Figure 3.

Employment density ranges from 90 to approximately 8,000 employees per square mile. The highest densities are found in Manchester and in the southern part of Concord, near the proposed bikeway alignment. Overall, the southern part of the corridor has a higher employee density.

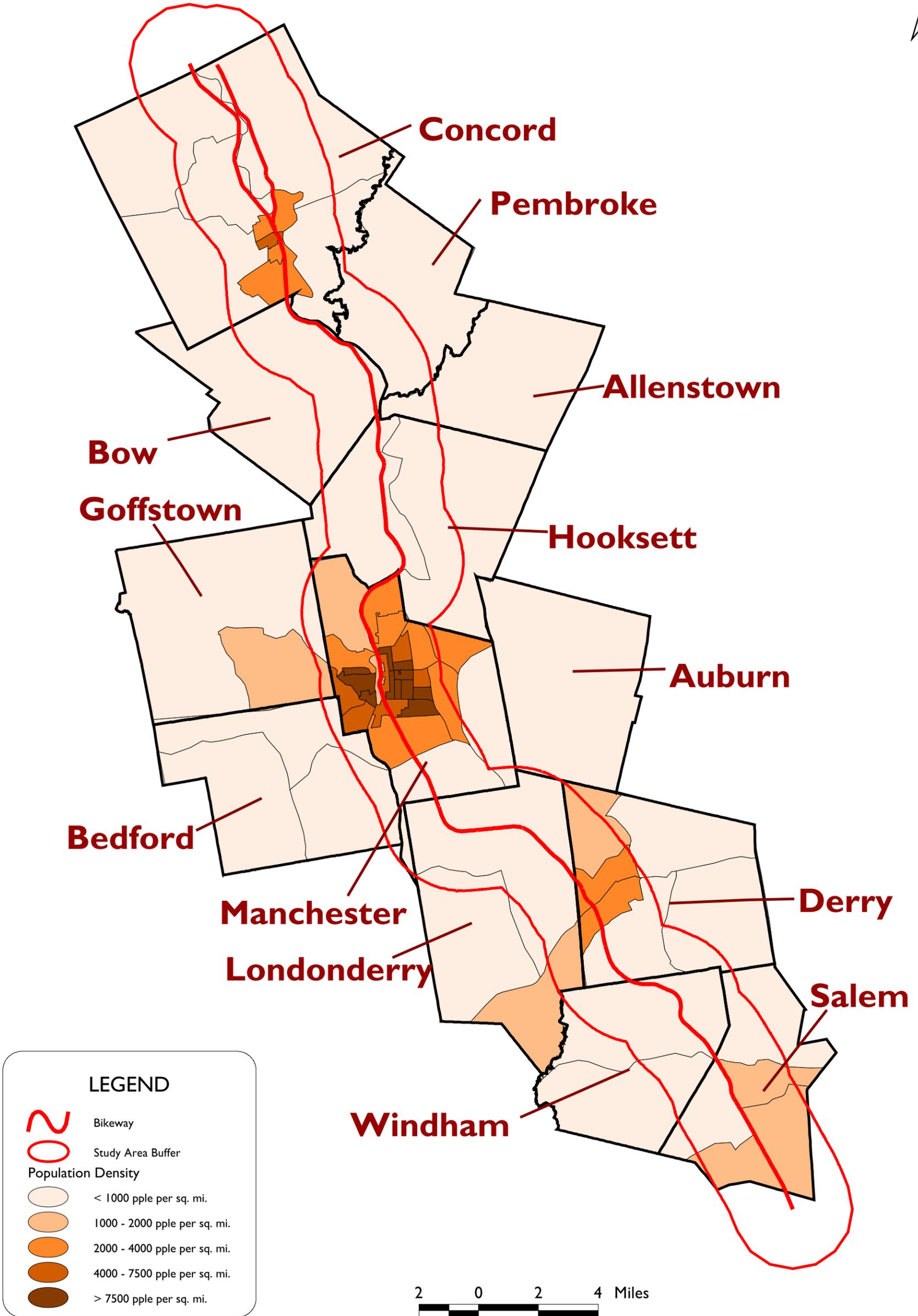


Figure 3: Population Density (People per Square Mile)

2. JOURNEY TO WORK DATA

US Census journey-to-work data provide information on travel characteristics in the study corridor. Journey to work data for 2000 were obtained from the Census Bureau and analyzed using ArcView GIS. Table 3 shows the mean travel times for the demand corridor. Travel times to get to work range from 15 to 40 minutes. The average travel time is 25 minutes. The longer commutes are found in the locations that are farther from the employment centers. Mean travel times around Manchester are in the lower portion of the range, approximately 15 to 25 minutes. Derry, Windham, and Allenstown have the longer commutes ranging from 30 to 40 minutes. The Census does not account for mode when compiling travel times.

Table 3. Mean Travel Time to Work Aggregated by Town (2000 U.S. Census)

Town	Mean Travel Time (minutes)
Allenstown	28
Auburn	27
Bedford	27
Bow	25
Concord	20
Derry	31
Goffstown	25
Hooksett	25
Londonderry	30
Manchester	22
Pembroke	24
Salem	26
Windham	32

Mode share data for these commutes were also obtained from the Census Bureau and are summarized in Table 4. Commute options were categorized by either personal vehicle (car, van, or truck); public transportation (bus, subway, railroad), taxi, motorcycle, bike; other; or working at home. The majority of workers, over 90 %, take private vehicles to work. Of that 90%, only 10 % carpool into work, while the remaining persons drive alone. Approximately 80% taking public transportation took the bus, while the rest took taxis, and a very small portion (less than 5 percent) took a train. A total of approximately 200 people commute by bike, which account for less than 1 percent of all commuters.

Salem-Concord Bikeway Demand Estimate

Table 4. Mode Split Aggregated by Town (2000 U.S. Census)

Town	Total	Drove		Public Transit		Bike		Walk		Other*	
Allenstown	2,647	2,537	96%	--		--		20	1%	90	3%
Auburn	2,644	2,504	95%	11	<1%	--		7	<1%	122	5%
Bedford	9,066	8,284	91%	26	<1%	--		49	<1%	707	8%
Bow	3,654	3,431	94%	--		--		--		223	6%
Concord	20,045	18,273	91%	245	1%	3	<1%	812	4%	713	4%
Derry	18,251	17,271	95%	137	1%	--		252	1%	591	3%
Goffstown	8,912	8,040	90%	7	<1%	27	<1%	427	5%	411	5%
Hooksett	6,285	5,706	91%	103	2%	--		226	4%	250	4%
Londonderry	12,516	11,791	94%	160	1%	13	<1%	77	1%	475	4%
Manchester	54,808	50,891	93%	746	1%	66	<1%	1589	3%	140 2	3%
Pembroke	3,866	3,633	94%	14	<1%	--		63	2%	156	4%
Salem	14,850	14,208	96%	23	<1%	27	<1%	146	1%	439	3%
Windham	5,579	5,309	95%	16	<1%	--		47	1%	197	4%

*Includes persons who work at home and travel modes not captured in the other categories. Carpooling is included in "Drove" category.

3. USE OF SIMILAR FACILITIES IN NEW ENGLAND

Introduction

In order to produce an estimate of the Salem-Concord Bikeway’s potential demand, demographic and travel data were solicited and collected for a number of existing multi-use trails in New England. The purpose of collecting the use and demographic data was to help understand the relationship between the use of the trail and demographics of the nearby towns. Use data as well as supplementary survey data from three paved, off-road trails were collected and analyzed. The trails were chosen because of their functional similarities to the off-road segments of the Salem-Concord Bikeway and because data were available for these facilities. The trails that have been selected for analysis in this task include the Burlington Waterfront Bikeway in Burlington, Vermont, the Norwottuck Rail Trail in Hampshire County, Massachusetts, and the Minuteman Bikeway in eastern Massachusetts¹For each of the three trails, the trail use was summarized and a trip rate was developed for the trails’ adjacent towns. This rate refers to the number of trips generated by the respective trail in per capita terms. This rate can thus be applied to the towns along the Salem-Concord Bikeway and serve as a starting point for demand estimation. Each trail’s characteristics are listed in Table 5 below.

Table 5. Overview of Three Selected Trails

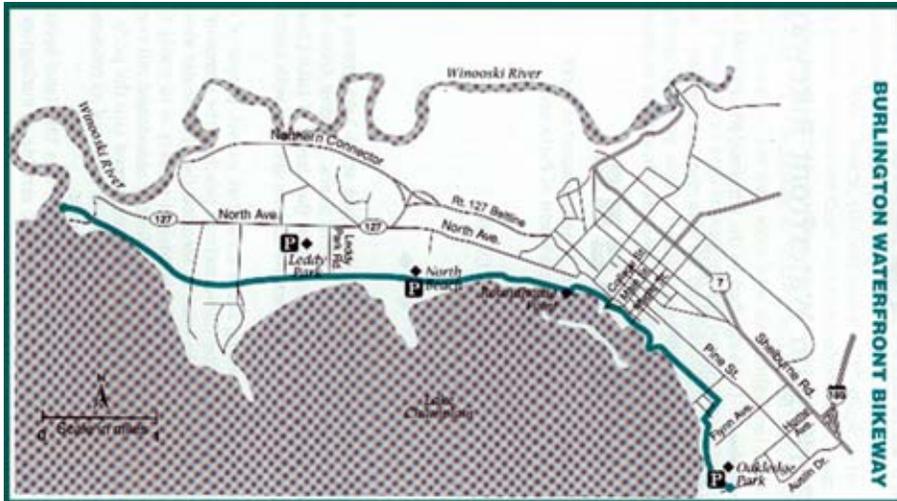
Trail/Location	Type of Trail	Surface	Length (miles)	Year Constructed
Burlington Waterfront Bikeway/ VT	Waterfront and Rail with Trail	Paved asphalt	7.5	1994?
Minuteman Bikeway/ MA	Rail to Trail	Paved asphalt	11	1993
Norwottuck Rail Trail/ MA	Rail with Trail	Paved asphalt	9	1993

Burlington Waterfront Bikeway

The Burlington Waterfront Bikeway is a 7.5 mile paved multi-use trail in Burlington, Vermont. About two miles of the trail are along an active railway line, with trains that travel at a maximum speed of 10 miles per hour. The trail is used by bicyclists, pedestrians, wheelchair users, skaters, and in winter by cross-country skiers. The bikeway connects the downtown area of Burlington with beaches on Lake Champlain, parks, neighborhoods, and the Winooski River. The path is used for utilitarian as well as recreational trips.

¹ No useful data were available for the Brunswick and Cape Cod Trails.

Salem-Concord Bikeway Demand Estimate



Burlington Waterfront Bikeway in Burlington, Vermont

Path Use

Weekday counts have varied from 800 to 1600 users per day and use of the trail typically remains consistent from Spring through Fall. (Chittenden County MPO, 2002). The use varies by location, with the higher number of recorded users closer in downtown Burlington. The Chittenden County MPO conducted manual counts of bikeway users over a 12-hour period at two locations on the bikeway in the summers of 2000 and 2002. The breakdown of users is shown on Table 6. Shore Road is a suburban location at the northern end of Burlington, while Union Station and Waterfront Park are located in downtown Burlington.

Table 6. Burlington Bikeway User Counts (Weekdays): Burlington, VT 2000, 2002

Location/Date	Daily Cyclists	Daily Walkers	Daily Other	DAILY TOTAL	PEAK HOUR COUNT
<u>AUG 2000</u>					
Union Station	641	874	107	1622	193
Shore Road	529	205	151	885	177
<u>JUL-AUG 2002</u>					
Waterfront Park	585	442	86	1113	137
Shore Road	539	185	117	841	139
AVERAGE	574	426	115	1115	162

Source of Data: Chittenden County MPO

Based on the counts conducted by the Chittenden County MPO, the average **daily weekday users** on the Burlington Bikeway is **1115**.

As previously mentioned, seasonal use of the trail varies. Based on a doctoral dissertation that looked at the use of a similar trail (Minuteman Bikeway in

Salem-Concord Bikeway Demand Estimate

Massachusetts), trail use remains fairly constant in Fall, Winter, and Spring, but drops off by 75 percent in the Winter (Troped, 1998). The research also found that weekend use is 3 times greater than weekday use. Using these assumptions, total annual use of the trail has been estimated in Table 7.

Table 7. Annual Estimate of Use: Burlington Bikeway in Burlington, VT

Season	a. No. of Days	b. No of Weekdays	c. Estimated Avg. No. of Users (Weekdays)	d. No. of Weekend Days	e. Estimated Avg. No. of Users (Weekend Days)	f. Estimated No. of Users per Year (b*c) + (d*e)
Spring, Summer, Fall	274	195	1115	79	3345	481,680
Winter	91	65	279	26	836	39,871
						521,551

Using the total annual figure of 521,551, we can estimate the overall average daily use at about **1430 users per day**. In his research for his doctoral dissertation, Phillip Troped found that the mean distance traveled to a similar bikeway (Minuteman Bikeway in Massachusetts) was 0.54 miles with a standard deviation of ± 0.61 . Assuming a normal distribution, 95 percent of the weekday trail users on this section live within 1.76 miles of the trail (two standard deviations from the mean). This number can be rounded to two miles.

Using this information, as well as demographic information from Burlington, we can then determine the trip-generation rate of the bikeway per person.

Demographic Characteristics of the Area

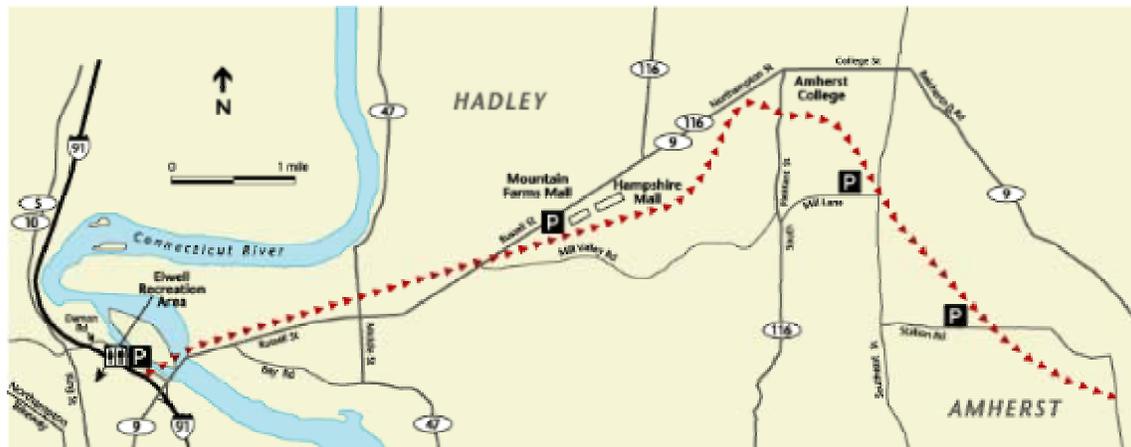
The land area of Burlington is 10.6 square miles. In 2000, the population of Burlington was 38,889 (US Census), giving Burlington a population density of 3,682 persons per square mile. The entire Burlington Bikeway is within the city of Burlington. Since the trail is along the waterfront, the catchment area for the trail using a 2-mile buffer is 15 square miles (2 mile wide buffer area east of the trail * 7.5 miles of trail). By applying the average density for the city of Burlington to this buffer area, we can then estimate the population living within this corridor as about 55,230 people (15 sq. mi. * 3682 people/sq. mi.)

Trip Generation for the Burlington Bikeway

Based on the 2000 Census, and previously mentioned estimates, the Burlington Bikeway generates **one daily trip for every 39 people** living within 2 miles of the trail. This number is derived by dividing the population within the 15 square mile buffer, 55,230, by 1430, the average number of users per day.

Norwottuck Rail Trail

The Norwottuck Rail Trail is a 9-mile long paved multi-use trail in western Massachusetts. The 10-foot wide trail is adjacent to an active railroad operated by the New England Central Railroad and was developed as a recreational trail in 1993. The trail is used by bicyclists, pedestrians, wheelchair users, skaters, and in winter by cross-country skiers. The bikeway connects the communities of Northampton, Hadley, Amherst, and Belchertown in Hampshire County. The area is home to five colleges, with a combined enrollment of over 30,000 students. The path is used for utilitarian as well as for recreational trips.



Norwottuck Rail Trail in Western Massachusetts

Path Use

According to the Massachusetts Department of Environmental Management, more than 300,000 people use the trail each year. The Pioneer Valley Planning Commission (PVPC) conducted a survey of 696 trail users in the fall of 1995 to gather information on both the numbers and types of users of the trail. The PVPC has also conducted user counts as recently as 1999 at a trail location in Hadley. Use of the trail typically remains consistent from Spring through Fall. Weekday counts during these three seasons typically vary from 400 to 600 users per weekday and 1000 to 1600 users on weekend days (Pioneer Valley Planning Commission, 1996). The number of users obviously drops dramatically during the colder days of winter. The use also varies by location, with the higher number of recorded users closer to Amherst and Northampton. Based on the 1995 user survey, 65 percent of the trail users are bicyclists, 19 percent are pedestrians/joggers, 15 percent are skaters, and 1 percent are wheelchair users.

Salem-Concord Bikeway Demand Estimate

Table 8. Norwottuck Trail User Counts: Northampton, MA, 1999

Date	AVG. DAILY TOTAL	AVG. PEAK HOUR COUNT
Weekdays		
9/1999	495	83
Weekends		
9/1999	1326	185

Source of Data: Pioneer Valley Planning Commission

Counts conducted by the Pioneer Valley Planning Commission in September 1999, show an average of **495 daily users on weekdays** and **1326 daily users on weekends** (see Table 8).

As previously mentioned, seasonal use of the trail varies. Based on a doctoral dissertation that examined use of a similar trail (Minuteman Bikeway in Massachusetts), trail use remains fairly constant in Spring, Summer, and Fall, but drops off by 75 percent in the Winter (Troped, 1998). According to the counts conducted by the PVPC, daily use is approximately 2.7 times higher on weekends compared to weekdays. Using the average trail volumes from the counts, total annual use of the trail has been estimated in Table 9.

Table 9: Annual Estimate of Use: Norwottuck Rail Trail in Hadley, MA

Season	a. No. of Days	b. No of Weekdays	c. Avg. No. of Users (Weekdays)	d. No. of Weekend Days	e. Avg. No. of Users (Weekend Days)	f. Estimated No. of Users per Year (b*c) + (d*e)
Spring, Summer, Fall	274	195	495	79	1326	201,279
Winter	91	65	124	26	332	16,692
						217,971

Using the total annual figure of 217,971, we can estimate the overall average daily use at about **600 users per day**. In his research for his doctoral dissertation, Phillip Troped found that the mean distance traveled to a similar bikeway (Minuteman Bikeway in Massachusetts) was 0.54 miles with a standard deviation of ± 0.61 . Assuming a normal distribution, 95% of the weekday trail users live within 1.76 miles of the trail (two standard deviations from the mean). This number can be rounded to two miles.

Using this information, as well as demographic information from Hadley, Northampton, and Amherst, we can then determine the trip-generation rate of

Salem-Concord Bikeway Demand Estimate

the bikeway per person. The three towns were used because the "catchment area" for the trail at the survey location in Hadley includes parts of each of the towns.

Demographic Characteristics of the Area: Northampton, Hadley, Amherst

The total land area of the three towns is 85.5 square miles. In 2000, the total combined population of Hadley, Northampton, and Amherst was 68,645 (US Census), giving the area a population density of 803 persons per square mile. The catchment area for the 9-mile trail using a 4-mile buffer is 36 square miles. By applying the average density for the cities of Northampton, Hadley, and Amherst to this buffer area, we can then estimate the population living within this corridor as about 28,900 people (36 sq. mi. * 803 people/sq. mi.)

Table 10. Demographics of Northampton, Hadley, and Amherst, MA

Town	Population	Land Area (sq. mi.)	Population Density
Northampton	28,978	34.5	850
Hadley	4,793	23.3	206
Amherst	34,874	27.7	1260

Trip Generation for the Norwottuck Rail Trail

Based on the 2000 Census, and previously mentioned estimates, it can be said that the Norwottuck Rail-Trail generates **one daily trip for every 48 people** within 2 miles of the trail. This number is derived by dividing the population within the 36 square mile buffer, 28,900, by 600, the average number of users per day.

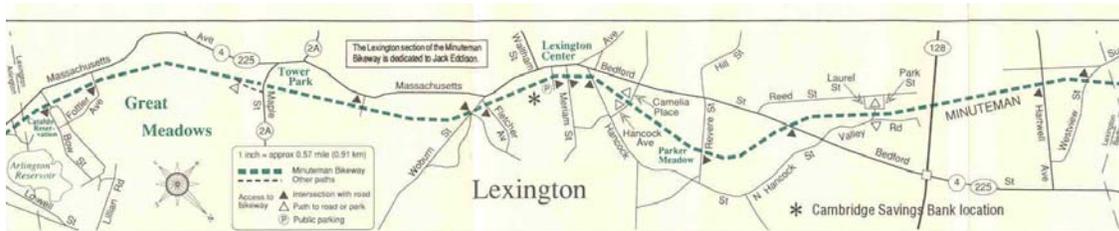
Minuteman Bikeway

The Minuteman Bikeway is an 11-mile long paved path running through Bedford, Lexington, Arlington and Cambridge, Massachusetts within the Boston metropolitan area. The path is 12 feet wide and relatively level since it was built on the bed of a former railroad. The path is used by bicyclists, pedestrians, skaters, persons in wheelchairs, people pushing baby carriages, etc. Commuters use the path to get to and from work locations along the path. Persons living near the trail use it for other utilitarian trips such as school, shopping, visiting friends, etc. On weekends and weekdays the path is popular for recreational biking and walking. The path is not plowed in the winter. When snow covered, it is used by cross country skiers. The Bedford to Arlington section of the path was built in 1993. In 1998, the popular path was extended from East Arlington Station to Alewife Station, Cambridge.

Salem-Concord Bikeway Demand Estimate

Bikeway Use

Use of the bikeway typically remains constant from Spring through Fall. Weekend counts during these three seasons have varied from 4,000 to 6,000 users per day in its first year of operation (McClennen, 1993). Typically, counts are simply a recording of the number of persons passing a specific location on the bikeway. This does not account for all of bikeway users since use varies by segment. In 1993, the Central Transportation Planning Staff conducted peak-hour user counts along the Minuteman Bikeway within the city of Lexington.² Between 4:00 and 6:30 PM on a Tuesday in late September, staff counted 367 users that passed along the path at Maple Street in Lexington. The breakdown of users is shown in Tables 11 and 12.



Portion of the Minuteman Bikeway in Lexington, MA

Table 11. PM Peak Period User Counts on Minuteman Bikeway, Lexington, MA Tuesday 9/28/93, 4:00-6:30 PM

User	Counts
Bikes	202
Walkers	59
Joggers	40
Skaters	66
Other	0
TOTAL	367

Source of Data: Central Transportation Planning Staff, Boston, 1993

Table 12. PM Peak-Hour User Counts on Minuteman Bikeway, Lexington, MA Tuesday 9/28/93, 5:30-6:30PM

User	Counts
Bikes	110
Walkers	31
Joggers	20
Skaters	22
Other	0
TOTAL	183

Source of Data: Central Transportation Planning Staff, Boston, 1993

² Unfortunately, more recent counts of Minuteman Bikeway use are not available.

Salem-Concord Bikeway Demand Estimate

There are no nationally accepted standards used to extrapolate daily and annual figures from peak hour counts on trails. Typically, the peak-hour on trails occur between 5:00 and 7:00 PM. The relationship between the total daily users and peak hour trips can vary between five times and eleven times. Table 13 shows the relationship of PM peak counts and 12 hour period (7:00 AM to 7:00 PM) counts at a few selected locations. The average factor between peak hour volumes and daily volumes is about seven.

Table 13. Relationship of PM Peak-Hour Counts and Daily Counts of Trail Users

Trail/Location	Month/ Year	Peak Hour	Peak Hour Count	Daily Count	Peak Hour Factor
Burlington (VT) Bikeway at Union Station	8/2000	4:30-5:30 PM	193	1622	8.4
Burlington (VT) Bikeway at Shore Road	8/2000	6:00-7:00 PM	177	885	5
Burlington(VT) Bikeway at Waterfront Park	7/2002	5:00-6:00 PM	137	1113	8.1
Burlington(VT) Bikeway at Shore Road	8/2002	5:00-6:00 PM	139	841	6.1
Norwottuck Rail Trail (MA) in Northampton	9/1999	6:00-7:00 PM	83	495	6.0
Norwottuck Rail Trail (MA) in Northampton	9/1999	5:00-6:00 PM	44	449	10.2
Norwottuck Rail Trail (MA) in Northampton	9/1997	6:00-7:00 PM	88	556	6.3

Using this method, the average **daily weekday users** on the particular segment of the Minuteman Bikeway in 1993 could be estimated at **1281**, which is seven times the peak hour volume of 183.

As previously mentioned, seasonal use of the trail varies. Based on a doctoral dissertation that looked at the use of the Minuteman Bikeway, use remains fairly consistent in Spring, Summer, and Fall, but drops off by 75 percent in the Winter (Troped, 1998). The research also found that weekend use is three times greater than weekday use. Using these factors, annual use of the bikeway in Lexington is estimated to be about 600,000 persons (see Table 14).

Salem-Concord Bikeway Demand Estimate

Table 14. Annual Estimate of Use: Minuteman Bikeway in Lexington, MA

Season	a. No. of Days	b. No of Weekdays	c. Estimated Avg. No. of Users (Weekdays)	d. No. of Weekend Days	e. Estimated Avg. No. of Users (Weekend Days)	f. Estimated No. of Users per Year (b*c) + (d*e)
Spring, Summer, Fall	274	195	1281	79	3843	553,392
Winter	91	65	320	26	961	45,786
						599,180

Using the total annual figure of 599,180, we can estimate the overall average daily use at about **1640 users per day** (599,180/365 days).

In his research for his doctoral dissertation, Phillip Troped found that the mean distance traveled to the bikeway was 0.54 miles with a standard deviation of ± 0.61 . Assuming a normal distribution, 95 percent of the bikeway users on this segment live within 1.76 miles of the trail (two standard deviations from the mean). This number can be rounded to two miles.

Using this information, as well as demographic information from Lexington, we can then determine the trip-generation rate of the bikeway per person living in the primary catchment area.

Demographic Characteristics of the Area

The land area of Lexington is 16.4 square miles. The population of Lexington in 1990³ was 28,974, giving Lexington a population density of 1,766 people per square mile. By comparison, the population of the Middlesex County was 1,398,468 in 1990 and the county had an average population density of 1,780 people per square mile. The Lexington portion of the Minuteman Bikeway is 5.2 miles long. The catchment area for the trail using a 2-mile buffer on either side of the trail is therefore 20.8 square miles. By applying the average density for Lexington on this buffer area, we can then estimate the population living within this corridor as about 37,000 people.

Trip Generation for the Minuteman Bikeway

Based on the analysis summarized above, the Minuteman Bikeway generates **one daily trip for every 22 people** in the bikeway catchment area. This number is based derived by dividing the population within the 20.8 square mile corridor, (37,000) by the average number of users per day (1640).

³ The population in 1990 was used because it is near the time when the count was taken (1993).

Summary of Trip Rates for the Three Trails

The following table summarizes the daily users and the trip generation rates for the Burlington Waterfront Bikeway, the Minuteman Bikeway, and the Norwottuck Bikeway.

Table 15. Summary of Use and Trip Rates for Three Trails

Trail/Location	Average Daily Users	Catchment Area (sq. miles)	Persons Living in Catchment Area	Trip Generation Rate
Burlington Waterfront Bikeway/ VT	1430	15	55,230	1 trip per 39 people
Minuteman Bikeway/ MA	1640	20.8	37,000	1 trip per 22 people
Norwottuck Rail Trail/ MA	600	36	28,900	1 trip per 48 people
Average Rate (Weighted)				1 trip per 33 people

4. PROJECTING USE OF THE SALEM-CONCORD BIKEWAY

In order to produce an estimate of the Salem-Concord Bikeway's potential demand, demographic and travel data were solicited and collected for the Salem-Concord Bikeway Corridor and for a number of existing multi-use trails in New England. The purpose of collecting the use and demographic data for existing trails was to help understand the relationship between the use of the trail and demographics of the nearby towns. Use data as well as supplementary survey data from three paved, off-road trails were collected and analyzed. The trails were chosen based on their functional similarities to the off-road segments of the Salem-Concord Bikeway.

The trails that were discussed in detail in the previous section are the Burlington Waterfront Bikeway in Burlington, Vermont, the Norwottuck Rail Trail in western Massachusetts, and the Minuteman Bikeway in eastern Massachusetts. For each of the three trails, the trail use was summarized and a trip rate was developed for the trails' adjacent towns. This rate refers to the number of daily trips generated by the respective trail in per capita terms. While the trip rate is based on persons living in the catchment area, it takes into account all types of trips including both utilitarian and recreation trips. All three facilities serve schools, work sites, community facilities, and homes. Furthermore all of the facilities attract some use from persons outside the primary catchment area including tourists. All of these trips are included in the rate; however, there is insufficient research to disaggregate the different types of trips from the total.

The weighted average daily rate for the three existing trails in New England was determined to be one trip per 33 persons residing in the catchment area. This area is defined as a four-mile wide corridor centered on the trail. The rate of one trip per 33 persons is an average daily rate. It is an average of all weekdays and weekend days year round as described in the previous section.

The Norwottuck Rail Trail in western Massachusetts was judged to be the most comparable to that of the Salem-Concord Bikeway. Therefore, a trip rate of 1 daily trip per 48 residents is being applied to the bikeway. This is also the most conservative estimate of use among the three corridors that have been presented. A summary of use projections is provided in Table 16. Detailed estimates of average daily use in 2007, 2017 and 2025 are displayed in Table 17.

In summary, the northern off-road path linking Concord and Hooksett is estimated to attract about 1,000 daily trips in 2007. The southern off-road path linking Manchester and Salem is estimated to attract about 2,000 daily trips in 2007. The two trails combined would have about 3,000 daily users in 2007. Trail use would rise to about 3,600 daily users in 2025.

Salem-Concord Bikeway Demand Estimate

Based on a study of similar trails, weekend use is estimated to be about 3 times greater than weekday use. Also, due to cold weather and snow conditions, Winter use drops off by about 75 percent compared to Spring through Fall use. In the Spring through Fall 2007, average weekday use is estimated to be about 2,500 trips per day, while weekend use is estimated to be 7,800 trips day. In a typical month from Spring through Fall, 122,600 trips are projected to take place on the path (2007).

Table 16. Projected Use of Salem -Concord Bikeway in 2007(Off-road segments)

Season	a. No. of Days	b. No of Weekdays	c. Estimated Avg. No. of Users (Weekdays)	d. No. of Weekend Days	e. Estimated Avg. No. of Users (Weekend Days)	f. Estimated No. of Users per Year (b*c) + (d*e)
Spring, Summer, Fall	274	195	2500	79	7800	1.1 million
Winter	91	65	625	26	1900	90,000
						1.19 million

5. PROJECTING BICYCLE USE AT I-93 PARK AND RIDE LOTS

This section of the report estimates bicycle use at park-and-ride lots adjacent to Interstate 93 and potentially accessible from the Salem-Concord Bikeway. Data were obtained from New Hampshire Department of Transportation (NHDOT) for the existing and future year traffic volumes on roads leading to the park and ride lots. In the absence of future data along some the roadways, forecasts were used based on existing and past volume counts.

Bicycle Volume Projections Based on Traffic Volumes

The locations of the relevant park-and-ride lots were identified, along with the major roadways providing access to these lots. A data collection effort was undertaken to obtain traffic volumes on roadways providing access to the park-and-ride lots, and to obtain origin and destination trip table data for the bikeway study area. The I-93 Widening Report was reviewed, but the traffic volume data only covered the area around park-and-ride Lot #4 in Windham and Lot #5 in Londonderry.

Future traffic model data were not available for the roadways providing access from the bikeway to the park-and-ride lots, either from NHDOT or from the regional planning commissions. Likewise, origin - destination trip table data were not available from NHDOT, and the trip table information from the regional planning commissions did not include appropriate external zones that would enable assessment of potential bike-and-ride demand.

Existing and future traffic volumes were obtained from the NHDOT traffic count database for the major roadways providing access to the park-and-ride lots. Generally, NHDOT traffic counts were available only for the roadway providing direct access to the park-and-ride lot. NHDOT historical annual average daily traffic (AADT) volumes were used to determine future traffic growth rates to 2007, 2017, and 2025. Peak hour counts on these routes were used to determine the appropriate K-factor to apply to the future traffic volume projections.

The existing bicycle mode split in the areas surrounding the park-and-ride lots were then applied to these peak hour traffic projections for the future horizon years of 2007, 2017, and 2025. This bicycle mode share was based on the 2000 U.S. Census Journey-to-Work data for the population within a 10-mile radius of each park-and-ride lot. These bicycle mode shares are generally quite low; all were 0.5% or lower. Table 18 shows the projected peak hour two-way traffic volumes on these roadways, and the potential peak hour bicycle volumes, based on the existing bicycle mode shares.

Salem-Concord Bikeway Demand Estimate

Table 18. Estimate of Potential Bicycle Volumes Based on Traffic Volumes

Park and Ride Lot		Year	AM Peak	PM Peak	Bike Mode Split	Bike Volume (AM)	Bike Volume (PM)
Location	Principal Access Road						
PR #4	Windham Route 111	2007	1,608	1,836	0.12%	2	2
		2017	1,452	1,658	0.12%	2	2
		2025	1,327	1,515	0.12%	2	2
PR #5	Londonderry Route 102	2007	2,140	3,764	0.18%	4	7
		2017	2,471	4,346	0.18%	4	8
		2025	2,736	4,811	0.18%	5	9
PR #17	Hooksett West River Road	2007	866	1,000	0.44%	25	29
		2017	1,056	1,237	0.44%	33	38
		2025	1,237	1,428	0.44%	39	46
PR # 18	Bow Route 3A	2007	528	659	0.00%	0	0
		2017	491	612	0.00%	0	0
		2025	460	575	0.00%	0	0
PR #20	Concord Route 9	2007	1,068	1,761	0.01%	0	0
		2017	1,184	1,953	0.01%	0	0
		2025	1,277	2,106	0.01%	0	0

The bicycle volume projections in Table 18 represent the potential bicycle volumes on these principal roadways, assuming that these roadways reflect the existing bicycle mode share in the area around the park-and-ride lots. This reflects the bicycle volumes that may pass by the park-and-ride lots, and could be attracted to the park-and-ride lot to take advantage of carpool and/or public transit opportunities.

Bicycle Demand Based on Park-and-Ride Lot Demand

Because the potential bicycle volumes on the principal access roads serving the park-and-ride lots does not provide a reliable estimate of actual bicycle demand at the park-and-ride lots, an additional demand estimate approach was employed. The bicycle demand for carpool and/or public transit service at the park-and-ride lots (or “bicycle-and-ride”) was estimated based on the vehicular park-and-ride demand at each lot.

In order to project the bicycle-and-ride demand at the park-and-ride lots, the bicycle mode share was correlated to the carpool mode share (or, where public transit service is available at the park-and-ride lot, to the carpool plus public transit mode share). To do this, the vehicular park-and-ride demand was determined, based on the parking supply and the occupancy. In general, the park-and-ride lots in the I-93 corridor are well-utilized, and would be projected to operate at capacity in the future horizon years of 2007, 2017, and 2025.

Salem-Concord Bikeway Demand Estimate

This park-and-ride demand at each lot represents a certain proportion of the total carpool (or carpool plus public transit) travel demand within a given park-and-ride lot's "catchment area." The catchment area for vehicular park-and-ride was assumed to be a 10-mile around each park-and-ride lot. These catchment areas were not assumed to overlap, since residents in a given area would choose to go to only one park-and-ride lot. Data reported earlier in the report were used to determine the catchment area population.

It was assumed that bicycle-and-ride demand at each park-and-ride lot would capture a share of the bicycle ridership that is comparable to the park-and-ride lot's capture of carpool (or carpool plus public transit) demand. However, the vehicular park-and-ride catchment area differs from the bicycle-and-ride catchment area. It was assumed that the bicycle catchment area is represented by the Salem to Concord Bikeway demand corridor (i.e., two miles on each side of the bikeway). As with the vehicular catchment area, the bikeway demand corridor was divided among the park-and-ride lots.

Therefore, the projected bicycle demand at the park-and-ride lot was determined by the following formula:

$$\frac{\text{Bike Demand}}{(\text{Bike Catchment Population} \times \text{Bike Mode Share})} = \frac{\text{Vehicular Parking Demand}}{(\text{Vehicle Catchment Population} \times (\text{Carpool} / \text{Transit Mode Share}))}$$

The resulting bicycle demand projected at each park-and-ride lot is shown in Table 19.

Salem-Concord Bikeway Demand Estimate

Table 19. Estimate of Bicycle Demand Based on Park and Ride Occupancy

Park-and-Ride Lot		2007	2017	2025
P4	Park & Ride Occupancy (Supply = 150)	150	150	150
	Carpool mode share	7.04%	7.04%	7.04%
	Carpool catchment population	86,372	96,034	104,536
	Bicycle mode share	2.8%	2.8%	2.8%
	Bicycle catchment population	23,925	26,602	28,957
	Bicycle Demand	16	16	16
P5	Park & Ride Occupancy (Supply = 471)	471	471	471
	Carpool + transit mode share	8.80%	8.80%	8.80%
	Carpool + transit catchment population	169,824	188,802	205,500
	Bicycle mode share	2.8%	2.8%	2.8%
	Bicycle catchment population	51,012	56,712	61,728
	Bicycle Demand	45	45	45
P17	Park & Ride Occupancy (Supply = 45)	45	45	45
	Carpool mode share	8.70%	8.70%	8.70%
	Carpool catchment population	103,578	115,438	125,897
	Bicycle mode share	2.8%	2.8%	2.8%
	Bicycle catchment population	21,516	23,980	26,152
	Bicycle Demand	3	3	3
P18	Park & Ride Occupancy (Supply = 60)	60	60	60
	Carpool mode share	10.35%	10.35%	10.35%
	Carpool catchment population	20,942	23,830	26,424
	Bicycle mode share	2.8%	2.8%	2.8%
	Bicycle catchment population	18,617	21,184	23,490
	Bicycle Demand	14	14	14
P20	Park & Ride Occupancy (Supply = 273)	273	273	273
	Carpool + transit mode share	11.60%	11.60%	11.60%
	Carpool + transit catchment population	47,468	54,013	59,893
	Bicycle mode share	2.8%	2.8%	2.8%
	Bicycle catchment population	33,760	38,414	42,596
	Bicycle Demand	46	46	46

Appendix A

Population Projections

Salem Concord Bikeway Demand Estimate

Population Projections Aggregated by Town

Town	TAZ	2000 Total	2007 Total	2017 Total	2025 Total
ALLENSTOWN	only 1	4,930	5,246	5,788	6,230
AUBURN		4,682	5,140	5,726	6,110
	71	56	61	68	73
	72	1868	2,051	2,285	2,438
	73	901	989	1,102	1,176
	74	802	881	981	1,047
	98	1055	1,158	1,290	1,377
BEDFORD		18,274	21,140	24,356	26,490
	89	1268	1,467	1,690	1,838
	90	300	347	400	435
	91	2998	3,468	3,996	4,346
	92	1954	2,261	2,604	2,833
	93	461	533	614	668
	94	132	153	176	191
	95	1023	1,183	1,363	1,483
	104	1380	1,596	1,839	2,000
	105	3147	3,641	4,194	4,562
	106	1589	1,838	2,118	2,303
	107	1191	1,378	1,587	1,727
	108	825	954	1,100	1,196
	109	609	705	812	883
	110	1397	1,616	1,862	2,025
BOW	only 1	7,280	8,222	9,934	11,300
CONCORD (census tracts)	(2001)	41,120	43,760	48,478	52,050
	032800	4407	4,690	5,196	5,578
	032700	8685	9,243	10,239	10,994
	032600	4154	4,421	4,897	5,258
	032900	7338	7,809	8,651	9,288
	032400	3420	3,640	4,032	4,329
	032500	3712	3,950	4,376	4,699
	032300	1981	2,108	2,335	2,508
	032200	2973	3,163	3,505	3,763
	032100	4017	4,275	4,736	5,084
DERRY		34,021	37,010	40,902	43,830
	121	2639	2,871	3,173	3,400
	122	824	896	991	1,062
	123	1206	1,312	1,450	1,554
	124	1424	1,549	1,712	1,835
	125	400	435	481	515
	126	674	733	810	868
	127	1687	1,835	2,028	2,173
	128	834	907	1,003	1,074
	129	783	852	941	1,009
	130	667	726	802	859
	131	1423	1,548	1,711	1,833
	132	666	724	801	858
	133	1101	1,198	1,324	1,418

Salem Concord Bikeway Demand Estimate

Population Projections Aggregated by Town

Town	TAZ	2000 Total	2007 Total	2017 Total	2025 Total
	134	1701	1,850	2,045	2,191
	135	974	1,060	1,171	1,255
	136	2501	2,721	3,007	3,222
	137	478	520	575	616
	138	3600	3,916	4,328	4,638
	139	1218	1,325	1,464	1,569
	140	474	516	570	611
	141	891	969	1,071	1,148
	142	832	905	1,000	1,072
	143	772	840	928	995
	144	1490	1,621	1,791	1,920
	145	405	441	487	522
	146	2245	2,442	2,699	2,892
	147	2112	2,298	2,539	2,721
GOFFSTOWN		16,929	18,498	20,720	22,180
	83	2893	3,161	3,541	3,790
	84	1405	1,535	1,720	1,841
	85	1190	1,300	1,456	1,559
	86	872	953	1,067	1,142
	87	963	1,052	1,179	1,262
	88	5079	5,550	6,216	6,654
	111	664	726	813	870
	112	1082	1,182	1,324	1,418
	113	1483	1,621	1,815	1,943
	114	1298	1,418	1,589	1,701
HOOKSETT		11,721	13,484	16,072	18,020
	10	1234	1,420	1,692	1,897
	18	2453	2,822	3,364	3,771
	75	1621	1,865	2,223	2,492
	76	748	861	1,026	1,150
	77	944	1,086	1,294	1,451
	78	885	1,018	1,213	1,361
	79	614	706	842	944
	80	686	789	941	1,055
	81	425	489	583	653
	82	1047	1,204	1,436	1,610
	96	917	1,055	1,257	1,410
	97	147	169	201	226
LONDONDERRY		23,236	25,944	29,090	31,260
	65	1205	1,345	1,509	1,621
	66	1023	1,142	1,281	1,376
	67	1432	1,599	1,793	1,927
	68	2425	2,708	3,036	3,262
	69	426	476	533	573
	70	1397	1,560	1,749	1,880
	99	2209	2,467	2,765	2,972
	100	2748	3,068	3,440	3,697

Salem Concord Bikeway Demand Estimate

Population Projections Aggregated by Town

Town	TAZ	2000 Total	2007 Total	2017 Total	2025 Total
	101	5083	5,675	6,364	6,838
	102	2352	2,626	2,944	3,164
	103	2936	3,278	3,676	3,950
MANCHESTER		<i>107,006</i>	<i>115,204</i>	<i>124,596</i>	<i>130,470</i>
	1	4410	4,748	5,135	5,377
	2	1897	2,042	2,209	2,313
	3	879	946	1,024	1,072
	4	1705	1,836	1,985	2,079
	5	2131	2,294	2,481	2,598
	6	2678	2,883	3,118	3,265
	7	2980	3,208	3,470	3,633
	8	1459	1,571	1,699	1,779
	9	3107	3,345	3,618	3,788
	11	6229	6,706	7,253	7,595
	12	3397	3,657	3,955	4,142
	13	2027	2,182	2,360	2,472
	14	1435	1,545	1,671	1,750
	15	2551	2,746	2,970	3,110
	16	231	249	269	282
	17	191	206	222	233
	19	270	291	314	329
	20	290	312	338	354
	21	491	529	572	599
	22	900	969	1,048	1,097
	23	875	942	1,019	1,067
	24	1076	1,158	1,253	1,312
	25	90	97	105	110
	26	422	454	491	515
	27	1518	1,634	1,768	1,851
	28	406	437	473	495
	29	1911	2,057	2,225	2,330
	30	2305	2,482	2,684	2,810
	31	1032	1,111	1,202	1,258
	32	776	835	904	946
	33	560	603	652	683
	34	972	1,046	1,132	1,185
	35	1279	1,377	1,489	1,560
	36	2143	2,307	2,495	2,613
	37	1018	1,096	1,185	1,241
	38	1063	1,144	1,238	1,296
	39	1196	1,288	1,393	1,458
	40	1834	1,975	2,135	2,236
	41	1466	1,578	1,707	1,788
	42	2285	2,460	2,661	2,786
	43	1898	2,043	2,210	2,314
	44	1800	1,938	2,096	2,195
	45	1104	1,189	1,286	1,346

Salem Concord Bikeway Demand Estimate

Population Projections Aggregated by Town

Town	TAZ	2000 Total	2007 Total	2017 Total	2025 Total
	46	263	283	306	321
	47	891	959	1,037	1,086
	48	1242	1,337	1,446	1,514
	49	2724	2,933	3,172	3,321
	50	1927	2,075	2,244	2,350
	51	1562	1,682	1,819	1,905
	52	2592	2,791	3,018	3,160
	53	719	774	837	877
	54	99	107	115	121
	55	2733	2,942	3,182	3,332
	56	622	670	724	758
	57	2423	2,609	2,821	2,954
	58	2715	2,923	3,161	3,310
	59	3693	3,976	4,300	4,503
	60	3568	3,841	4,155	4,350
	61	0	0	0	0
	62	8	9	9	10
	63	2373	2,555	2,763	2,893
	64	0	0	0	0
	115	287	309	334	350
	116	1991	2,144	2,318	2,428
	117	2377	2,559	2,768	2,898
	118	1406	1,514	1,637	1,714
	119	1168	1,258	1,360	1,424
	120	1336	1,438	1,556	1,629
PEMBROKE	(only1)	6,990	7,474	8,394	9,150
SALEM		28,112	30,088	32,666	34,330
	338	1,988	2,128	2,310	2,428
	339	1,142	1,222	1,327	1,395
	340	2,398	2,567	2,786	2,928
	341	3,553	3,803	4,129	4,339
	342	4,613	4,937	5,360	5,633
	343	731	782	849	893
	344	1,398	1,496	1,624	1,707
	345	2,432	2,603	2,826	2,970
	346	4,029	4,312	4,682	4,920
	347	1,566	1,676	1,820	1,912
	348	4,249	4,548	4,937	5,189
WINDHAM		10,709	12,912	13,762	14,750
	333	4430	5,341	5693	6102
	334	1152	1,389	1480	1587
	335	1870	2,255	2403	2576
	336	1281	1,545	1,646	1,764
	337	1837	2,215	2,361	2,530

Appendix B

Employment Projections

Salem Concord Bikeway Demand Estimate

Employment Projections Aggregated by Town

Town/City	TAZ	2000 Total	2007 Total	2017 Total	2025 Total
ALLENSTOWN		548	751	1,041	1,273
AUBURN		983	1,321	1,883	2,401
	71		314	604	959
	72		442	541	543
	73		71	101	129
	74		128	220	350
	98		366	417	420
BEDFORD		12,769	16,511	23,200	29,835
	89		890	1,266	1,640
	90		476	601	717
	91		269	346	380
	92		683	791	884
	93		636	892	1,138
	94		1,913	2,357	2,692
	95		4,030	6,899	10,429
	104		596	709	852
	105		217	247	272
	106		231	261	285
	107		141	165	187
	108		1,952	2,523	3,003
	109		1,069	1,355	1,606
	110		3,409	4,790	5,750
BOW		3,379	4,133	5,209	6,071
CONCORD		21,980	25,447	30,339	34,253
DERRY		8,690	9,915	12,010	13,954
	121		79	88	96
	122		42	55	66
	123		27	42	49
	124		2,082	2,538	3,020
	125		1,048	1,139	1,195
	126		496	591	650
	127		254	266	276
	128		3	4	7
	129		90	109	126
	130		769	836	890
	131		1,508	1,605	1,690
	132		371	395	414
	133		267	313	340
	134		198	215	226
	135		336	363	384
	136		1,106	1,164	1,220
	137		223	339	401
	138		108	126	139

Salem Concord Bikeway Demand Estimate

Employment Projections Aggregated by Town

Town/City	TAZ	2000 Total	2007 Total	2017 Total	2025 Total
	139		31	37	42
	140		235	806	1,298
	141		272	459	606
	142		69	158	209
	143		13	15	26
	144		128	158	373
	145		27	31	34
	146		47	66	80
	147		71	88	97
GOFFSTOWN		4,133	4,838	6,051	7,252
	83		446	543	666
	84		55	59	63
	85		584	683	819
	86		54	73	89
	87		188	673	1,105
	88		2,533	2,903	3,267
	111		19	25	31
	112		755	840	907
	113		140	171	204
	114		63	82	101
HOOKSETT		6,843	8,760	12,032	15,250
	10		374	1,316	2,715
	18		1,065	1,294	1,370
	75		537	670	702
	76		346	405	440
	77		1,626	1,944	2,140
	78		754	1,585	2,700
	79		107	149	191
	80		274	368	420
	81		2,200	2,655	2,800
	82		149	198	247
	96		327	389	415
	97		1,001	1,060	1,110
LONDONDERRY		11,597	15,544	22,506	29,569
	64		3,184	4,839	5,204
	65		3,638	6,386	8,046
	66		1,366	1,939	2,548
	67		2,613	2,898	3,050
	68		1,347	1,940	2,220
	69		732	993	2,283
	70		634	983	2,189
	99		322	382	430
	100		424	685	1,948

Salem Concord Bikeway Demand Estimate

Employment Projections Aggregated by Town

Town/City	TAZ	2000 Total	2007 Total	2017 Total	2025 Total
	101		729	829	909
	102		346	402	497
	103		209	229	245
MANCHESTER		67,037	72,841	83,544	93,931
	1		663	771	875
	2		726	753	773
	3		793	833	881
	4		404	424	442
	5		207	222	232
	6		301	323	342
	7		549	1,952	4,095
	8		283	310	335
	9		774	1,092	1,182
	11		706	761	805
	12		355	380	398
	13		246	262	277
	14		1,241	1,325	1,385
	15		656	686	707
	16		2,069	2,422	2,653
	17		4,092	4,977	5,786
	19		790	910	950
	20		505	530	549
	21		45	48	51
	22		4	4	4
	23		62	66	71
	24		628	656	677
	25		571	623	666
	26		697	743	779
	27		985	1,030	1,067
	28		552	572	589
	29		194	203	212
	30		122	130	138
	31		381	404	424
	32		2,147	2,267	2,399
	33		3,738	3,882	4,036
	34		3,286	3,432	3,561
	35		72	79	85
	36		33	36	39
	37		60	64	67
	38		247	263	277
	39		324	346	362
	40		542	586	608
	41		1,016	1,106	1,160
	42		3,069	3,247	3,377
	43		1,141	1,202	1,252
	44		152	162	170

Salem Concord Bikeway Demand Estimate

Employment Projections Aggregated by Town

Town/City	TAZ	2000 Total	2007 Total	2017 Total	2025 Total
	45		305	324	336
	46		2,276	3,260	4,000
	47		990	1,040	1,078
	48		591	646	689
	49		1,044	1,107	1,157
	50		237	251	263
	51		102	109	116
	52		237	251	263
	53		4,912	5,672	6,460
	54		0	260	400
	55		35	39	50
	56		2,220	2,928	4,100
	57		964	1,015	1,075
	58		569	596	616
	59		2,363	2,536	2,685
	60		561	586	605
	61		4,189	4,810	5,250
	62		5,920	6,670	7,150
	63		159	179	197
	64		4,585	5,268	5,840
	115		68	72	75
	116		333	353	370
	117		246	265	277
	118		931	985	1,028
	119		167	179	187
	120		3,368	4,057	4,926
PEMBROKE		4,380	4,934	5,705	6,323
SALEM		21,167	26,469	34,042	40,102
	338	377	472	606	714
	339	90	113	145	171
	340	84	105	135	159
	341	556	695	894	1053
	342	2633	3293	4234	4988
	343	2804	3506	4510	5312
	344	5310	6640	8540	10060
	345	5638	7050	9067	10682
	346	608	760	978	1152
	347	261	326	420	495
	348	2806	3509	4513	5316
WINDHAM		2160	2,851	3,838	4,628
	333	804	1061	1429	1723
	334	726	958	1290	1556
	335	240	317	426	514
	336	183	242	325	392
	337	207	273	368	443

Appendix C

Population and Employment Densities

Salem Concord Bikeway Demand Estimate

Population and Employment Densities

TOWN	TAZ	Census Tract	Area (Sq Mi)	2000 Population	Density (Persons Per Sq. Mi.)	Census Tract	Area(Sq. Miles)	2000 Employment	Density (Employees Per Sq. Mi.)
Allenstown	S228		20.62	4843	235	003100	20.62	2647	128
Auburn	SN71		3.32	56	17	004000	28.69	2644	92
Auburn	SN72		11.31	1868	165				
Auburn	SN73		4.80	901	188				
Auburn	SN74		3.11	802	258				
Auburn	SN98		6.15	1055	172				
Bedford	SN104		2.94	1380	469	002901	10.28	3011	293
Bedford	SN105		8.16	3147	386	002902	9.21	2686	292
Bedford	SN106		2.67	1589	595	002903	13.62	3369	247
Bedford	SN107		2.84	1191	419				
Bedford	SN108		1.17	825	705				
Bedford	SN109		0.92	609	662				
Bedford	SN110		0.59	1397	2368				
Bedford	SN89		1.28	1268	991				
Bedford	SN90		0.73	300	411				
Bedford	SN91		4.89	2998	613				
Bedford	SN92		3.75	1954	521				
Bedford	SN93		1.10	461	419				
Bedford	SN94		0.45	132	293				
Bedford	SN95		1.59	1023	643				
Bow	S227		28.49	7138	251	031000	28.49	3654	128
Concord		032100	1.65	4017	2435	032100	1.65	1957	1186
Concord		032200	1.12	2973	2654	032200	1.12	1666	1488
Concord		032300	0.32	1981	6191	032300	0.32	1027	3209
Concord		032400	1.46	3420	2342	032400	1.46	1878	1286
Concord		032500	13.68	3712	271	032500	13.68	1470	107
Concord		032600	6.22	4154	668	032600	6.22	1314	211
Concord		032700	15.30	8685	568	032700	15.30	4864	318
Concord		032800	19.75	4407	223	032800	19.75	2363	120
Concord		032900	8.10	7338	906	032900	8.10	3506	433
Derry	SN121		2.52	2639	1047	003301	8.59	2320	270
Derry	SN122		1.38	824	597	003302	4.67	2940	630
Derry	SN123		1.33	1206	907	003400	2.21	3040	1376
Derry	SN124		0.81	1424	1758	003500	2.19	3097	1414
Derry	SN125		0.24	400	1667	003601	7.17	3845	536
Derry	SN126		0.16	674	4213	003602	11.83	3009	254
Derry	SN127		1.19	1687	1418				
Derry	SN128		1.33	834	627				
Derry	SN129		1.94	783	404				
Derry	SN130		0.64	667	1042				
Derry	SN131		0.41	1423	3471				
Derry	SN132		0.20	666	3330				
Derry	SN133		0.40	1101	2753				
Derry	SN134		0.70	1701	2430				
Derry	SN135		0.17	974	5729				
Derry	SN136		0.76	2501	3291				
Derry	SN137		0.96	478	498				
Derry	SN138		1.31	3600	2748				
Derry	SN139		1.08	1218	1128				
Derry	SN140		1.50	474	316				
Derry	SN141		1.10	891	810				
Derry	SN142		1.78	832	467				
Derry	SN143		1.48	772	522				
Derry	SN144		3.19	1490	467				
Derry	SN145		1.70	405	238				
Derry	SN146		3.67	2245	612				
Derry	SN147		4.71	2112	448				
Goffstown	SN111		3.04	664	218	002700	30.31	4990	165
Goffstown	SN112		1.07	1082	1011	002800	7.25	3922	541
Goffstown	SN113		5.88	1483	252				
Goffstown	SN114		0.57	1298	2277				
Goffstown	SN83		6.95	2893	416				
Goffstown	SN84		7.84	1405	179				
Goffstown	SN85		2.89	1190	412				
Goffstown	SN86		3.08	872	283				
Goffstown	SN87		4.59	963	210				
Goffstown	SN88		1.55	5079	3277				
Hooksett	SN10		4.09	1234	302	003001	13.16	2223	169
Hooksett	SN18		1.66	2453	1478	003002	24.11	4062	168
Hooksett	SN75		4.61	1621	352				
Hooksett	SN76		1.65	748	453				

Salem Concord Bikeway Demand Estimate

Population and Employment Densities

TOWN	TAZ	Census Tract	Area (Sq Mi)	2000 Population	Density (Persons Per Sq. Mi.)	Census Tract	Area(Sq. Miles)	2000 Employment	Density (Employees Per Sq. Mi.)
Hooksett	SN77		1.83	944	516				
Hooksett	SN78		10.66	885	83				
Hooksett	SN79		1.15	614	534				
Hooksett	SN80		1.23	686	558				
Hooksett	SN81		2.01	425	211				
Hooksett	SN82		6.85	1047	153				
Hooksett	SN96		0.88	917	1042				
Hooksett	SN97		0.67	147	219				
Londonderry	SN100		5.15	2748	534	003700	20.42	4245	208
Londonderry	SN101		9.02	5083	564	003800	14.15	4117	291
Londonderry	SN102		2.79	2352	843	003900	7.44	4154	558
Londonderry	SN103		2.46	2936	1193				
Londonderry	SN65		4.72	1205	255				
Londonderry	SN66		3.49	1023	293				
Londonderry	SN67		1.63	1432	879				
Londonderry	SN68		2.06	2425	1177				
Londonderry	SN69		1.52	426	280				
Londonderry	SN70		4.67	1397	299				
Londonderry	SN99		3.01	2209	734				
Man/London	SN64		1.51	0	0	000101	0.99	1469	1484
Manchester	SN1		1.77	4410	2492	000102	1.81	2519	1392
Manchester	SN11		0.57	6229	10928	000201	4.20	3731	888
Manchester	SN115		0.24	287	1196	000202	1.17	1054	901
Manchester	SN116		0.68	1991	2928	000300	0.20	1447	7235
Manchester	SN117		0.93	2377	2556	000400	0.43	331	770
Manchester	SN118		1.02	1406	1378	000500	0.30	812	2707
Manchester	SN119		1.71	1168	683	000600	0.19	1136	5979
Manchester	SN12		0.82	3397	4143	000700	0.50	1770	3540
Manchester	SN120		0.95	1336	1406	000800	0.20	1275	6375
Manchester	SN13		0.42	2027	4826	000901	1.14	1947	1708
Manchester	SN14		0.40	1435	3588	000902	1.78	2677	1504
Manchester	SN15		0.21	2551	12148	001000	5.61	2925	521
Manchester	SN16		0.15	231	1540	001100	1.96	2944	1502
Manchester	SN17		0.27	191	707	001200	0.32	1054	3294
Manchester	SN19		0.02	270	13500	001300	0.20	1600	8000
Manchester	SN2		0.44	1897	4311	001400	0.18	784	4356
Manchester	SN20		0.06	290	4833	001500	0.15	1247	8313
Manchester	SN21		0.03	491	16367	001600	0.26	2035	7827
Manchester	SN22		0.16	900	5625	001700	0.26	1239	4765
Manchester	SN23		0.07	875	12500	001800	0.58	3031	5226
Manchester	SN24		0.09	1076	11956	001900	0.65	1313	2020
Manchester	SN25		0.05	90	1800	002000	0.20	1112	5560
Manchester	SN26		0.04	422	10550	002100	0.62	2560	4129
Manchester	SN27		0.07	1518	21686	002200	0.78	1675	2147
Manchester	SN28		0.06	406	6767	002300	0.81	1913	2362
Manchester	SN29		0.14	1911	13650	002400	1.71	3306	1933
Manchester	SN3		0.27	879	3256	002500	1.75	2737	1564
Manchester	SN30		0.14	2305	16464	002600	5.95	3165	532
Manchester	SN31		0.07	1032	14743				
Manchester	SN32		0.08	776	9700				
Manchester	SN33		0.09	560	6222				
Manchester	SN34		0.07	972	13886				
Manchester	SN35		0.06	1279	21317				
Manchester	SN36		0.10	2143	21430				
Manchester	SN37		0.10	1018	10180				
Manchester	SN38		0.22	1063	4832				
Manchester	SN39		0.42	1196	2848				
Manchester	SN4		0.57	1705	2991				
Manchester	SN40		1.04	1834	1763				
Manchester	SN41		0.34	1466	4312				
Manchester	SN42		0.27	2285	8463				
Manchester	SN43		0.16	1898	11863				
Manchester	SN44		0.09	1800	20000				
Manchester	SN45		0.12	1104	9200				
Manchester	SN46		0.28	263	939				
Manchester	SN47		0.15	891	5940				
Manchester	SN48		0.15	1242	8280				
Manchester	SN49		0.23	2724	11843				
Manchester	SN5		0.27	2131	7893				
Manchester	SN50		0.19	1927	10142				

Salem Concord Bikeway Demand Estimate

Population and Employment Densities

TOWN	TAZ	Census Tract	Area (Sq Mi)	2000 Population	Density (Persons Per Sq. Mi.)	Census Tract	Area(Sq. Miles)	2000 Employment	Density (Employees Per Sq. Mi.)
Manchester	SN51		0.21	1562	7438				
Manchester	SN52		0.91	2592	2848				
Manchester	SN53		0.75	719	959				
Manchester	SN54		1.80	99	55				
Manchester	SN55		2.04	2733	1340				
Manchester	SN56		1.33	622	468				
Manchester	SN57		0.83	2423	2919				
Manchester	SN58		0.47	2715	5777				
Manchester	SN59		0.66	3693	5595				
Manchester	SN6		0.72	2678	3719				
Manchester	SN60		1.23	3568	2901				
Manchester	SN61		0.36	0	0				
Manchester	SN62		0.33	8	24				
Manchester	SN63		0.76	2373	3122				
Manchester	SN7		2.80	2980	1064				
Manchester	SN8		1.20	1459	1216				
Manchester	SN9		0.77	3107	4035				
Pembroke	S204		23.01	6897	300	003200	22.90	3866	168
Salem	RPC338		3.07	1988	648			377	123
Salem	RPC339		1.77	1142	645			90	51
Salem	RPC340		2.50	2398	959			84	34
Salem	RPC341		3.22	3553	1103			556	173
Salem	RPC342		1.97	4613	2342			2633	1337
Salem	RPC343		1.22	731	599			2804	2298
Salem	RPC344		2.59	1398	540			5310	2050
Salem	RPC345		2.22	2432	1095			5638	2540
Salem	RPC346		2.65	4029	1520			608	229
Salem	RPC347		2.45	1566	639			261	107
Salem	RPC348		2.19	4249	1940			2806	1281
Windham	RPC333		7.60	4430	583			804	106
Windham	RPC334		7.29	1152	158			726	100
Windham	RPC335		5.67	1870	330			240	42
Windham	RPC336		2.38	1281	538			183	77
Windham	RPC337		4.88	1837	376			207	42

Appendix D

Journey to Work Data

Salem Concord Bikeway Demand Estimate

Journey to Work Data by Census Tract

Town	Census Tract	Mean Travel Time (min)	Total Workers	Drove	Public Transit	Biked	Walked	Other (Includes work at Home)
Allentown	003100	28	2647	2537	0	0	20	90
Auburn	004000	27	2644	2504	11	0	7	122
Bedford	002901	28	3011	2694	18	0	9	290
	002902	21	2686	2521	8	0	28	129
	002903	31	3369	3069	0	0	12	288
Bow	031000	25	3654	3431	0	0	0	223
Concord	032100	18	1957	1813	24	0	51	69
	032200	20	1666	1417	39	0	190	20
	032300	18	1027	798	26	3	110	90
	032400	16	1878	1638	18	0	175	47
	032500	20	1470	1245	8	0	123	94
	032600	20	1314	1217	18	0	21	58
	032700	26	4864	4583	49	0	48	184
	032800	20	2363	2245	10	0	47	61
Derry	032900	19	3506	3316	53	0	47	90
	003301	34	2320	2225	27	0	0	68
	003302	33	2940	2784	29	0	27	100
	003400	24	3040	2843	13	0	70	114
	003500	29	3097	2905	19	0	93	80
Derry	003601	31	3845	3622	34	0	46	143
	003602	35	3009	2892	15	0	16	86
	002700	27	4990	4629	0	8	37	316
Goffstown	002800	23	3922	3411	7	19	390	95
Hooksett	003001	23	2223	1890	59	0	178	96
	003002	27	4062	3816	44	0	48	154
Londonderry	003700	30	4245	3942	101	0	22	180
	003800	31	4117	3981	39	0	9	88
	003900	28	4154	3868	20	13	46	207
Manchester	000101	23	1469	1298	18	0	53	100
	000102	22	2519	2442	18	0	9	50
	000201	24	3731	3665	30	0	0	36
	000202	20	1054	1013	16	0	0	14
	000300	25	1447	1349	6	6	48	28
	000400	38	331	243	14	0	62	12
	000500	24	812	619	68	31	80	14
	000600	25	1136	961	23	10	117	25
	000700	19	1770	1639	26	9	39	57
	000800	21	1275	1175	10	0	58	32
	000901	21	1947	1844	13	0	7	83
	000902	25	2677	2642	0	0	0	35
	001000	22	2925	2812	15	11	10	77
	001100	18	2944	2718	9	0	69	148
	001200	18	1054	1014	0	0	0	40
	001300	17	1600	1364	73	0	65	98
	001400	24	784	606	69	0	72	37
	001500	19	1247	1166	21	0	52	8
	001600	16	2035	1710	66	17	197	38
	001700	25	1239	1129	18	8	56	28
	001800	21	3031	2741	57	17	146	70
	001900	18	1313	1096	7	0	170	29
	002000	21	1112	981	37	5	49	40
	002100	19	2560	2340	52	0	98	70
	002200	25	1675	1634	8	0	12	21
	002300	22	1913	1815	15	0	32	51
	002400	16	3306	3209	31	11	16	39
	002500	19	2737	2641	26	0	23	47
	002600	25	3165	3025	0	8	49	75
	Pembroke	003200	24	3866	3633	14	0	63
Salem	100100	32	3233	3145	0	0	6	82
	100200	26	3107	2909	0	7	59	125
	100301	24	2454	2309	0	11	31	103
	100302	27	2272	2182	10	0	24	56
Windham	100400	23	3784	3663	13	9	26	73
	106101	31	2975	2850	7	0	38	80
Windham	106102	33	2604	2459	9	0	9	117