CHAPTER V

TRANSPORTATION

A. INTRODUCTION

The inter-relationship between land use and transportation is an integral element in the spatial layout and growth of a community. The dominant use of the automobile has contributed to the transformation of the character of Hudson from rural to suburban over the past thirty years. The rise in motor vehicle use has enabled residents to commute longer distances, businesses to improve services for their customer base, and communities to broaden their tax bases through economic growth. The rise in motor vehicle use has also created traffic congestion problems, especially along major highway corridors. The situation is unlikely to change in the near future. The key to preserving and enhancing Hudson's transportation network is to ensure that roadway capacity and regional connections are enhanced and maintained and that incremental improvements to the alternative transportation network involving transit, sidewalks and bicycle routes, are implemented.

The purpose of the Transportation Chapter of the Master Plan is to develop strategies for an efficient and safe transportation system that will preserve the community's character, accommodate growth, and increase the availability of alternative transportation choices. This chapter includes a discussion of: 1) the existing transportation network, including the roadway classification system, existing traffic conditions, highway capacity, accidents, bridge conditions and travel patterns; 2) future traffic projections; 3) transportation solutions, including regulations, access management, community character guidelines, traffic calming and scenic road designation; 4) alternative transportation, including transit, bicycle and pedestrian facilities; and 5) recommendations.

B. EXISTING TRANSPORTATION NETWORK

1. Roadway Classification

Based on the New Hampshire Department of Transportation (NH DOT) road mileage inventory, there are 143.9 miles of roads in the Town of Hudson. The State of New Hampshire classifies roadways in two ways. The first is by a state funding category (the State Aid classification system) and the second is by federal funding category (the Functional classification system). The State Aid classification system was developed by the State of New Hampshire, as defined by RSA 229–231, to determine responsibility for construction, reconstruction and maintenance as well as eligibility for use of state aid funds. Descriptions of the State Aid classification system are included in Appendix V-1. The State Aid classification road mileage in Hudson is summarized in Table V-1 and illustrated on Map V-1.

Table V-1. State Aid Classification Road Mileage

State Class	Road Mileage	Percent of Total
Class I Primary State Highway	5.056	3.5 %
Class II Secondary State Highway	18.055	12.5 %
Class III Recreation Roads	0.000	0.0 %
Class IV Compact Section	35.449	24.7 %
Class V Rural Roads Local	82.054	57.0 %
Class VI Un-maintained	3.311	2.3 %
Total	**143.926**	**100.0 %**

Source: NH DOT, 2000.

NH 102 is an Arterial Roadway

The functional classification system was also developed by the State of New Hampshire as required by the Federal Highway Administration (FHWA). The Functional classes were set according to the criteria defined by the FHWA and the American Association of State Highway and Transportation Officials (AASHTO). This system classifies roads and highways into different categories according to their functions and was developed to define eligibility for funds under federal programs. Descriptions of the functional classification system characteristics are included in Appendix V-1. Arterial and Collector roadways in Hudson are listed in Table V-2 and illustrated on Map V-2.

Table V-2. Statewide Roadway Functional Classification*

Functional Classification	Roadways
Urban Other Principal Arterial	NH 111 NH 102 from Library Street to Litchfield Line Sagamore Bridge
Urban Minor Arterial	NH 102 from Litchfield Line to Londonderry NH 3A from NH 102 to Litchfield Line NH 3A from Mass. Line to Library Street Chase Street Dracut Road County Road from NH 3A to Belknap Road Belknap Road Central Street from Chase Street to NH 111
Urban Major Collector	Old Derry Road from NH 102 to Greeley Street Greeley Street Highland Street Kimball Hill Road Library Street Central Street from NH 111 to Chase Street Melendy Road from Central Street to Belknap Road Pelham Road from NH 3A to Burns Hill Road Burns Hill Road from Pelham Road to Wason Road
Local	All others

Source: NH DOT, 2000.

* Other classifications are used for the NH DOT, but do not apply to the Town of Hudson.

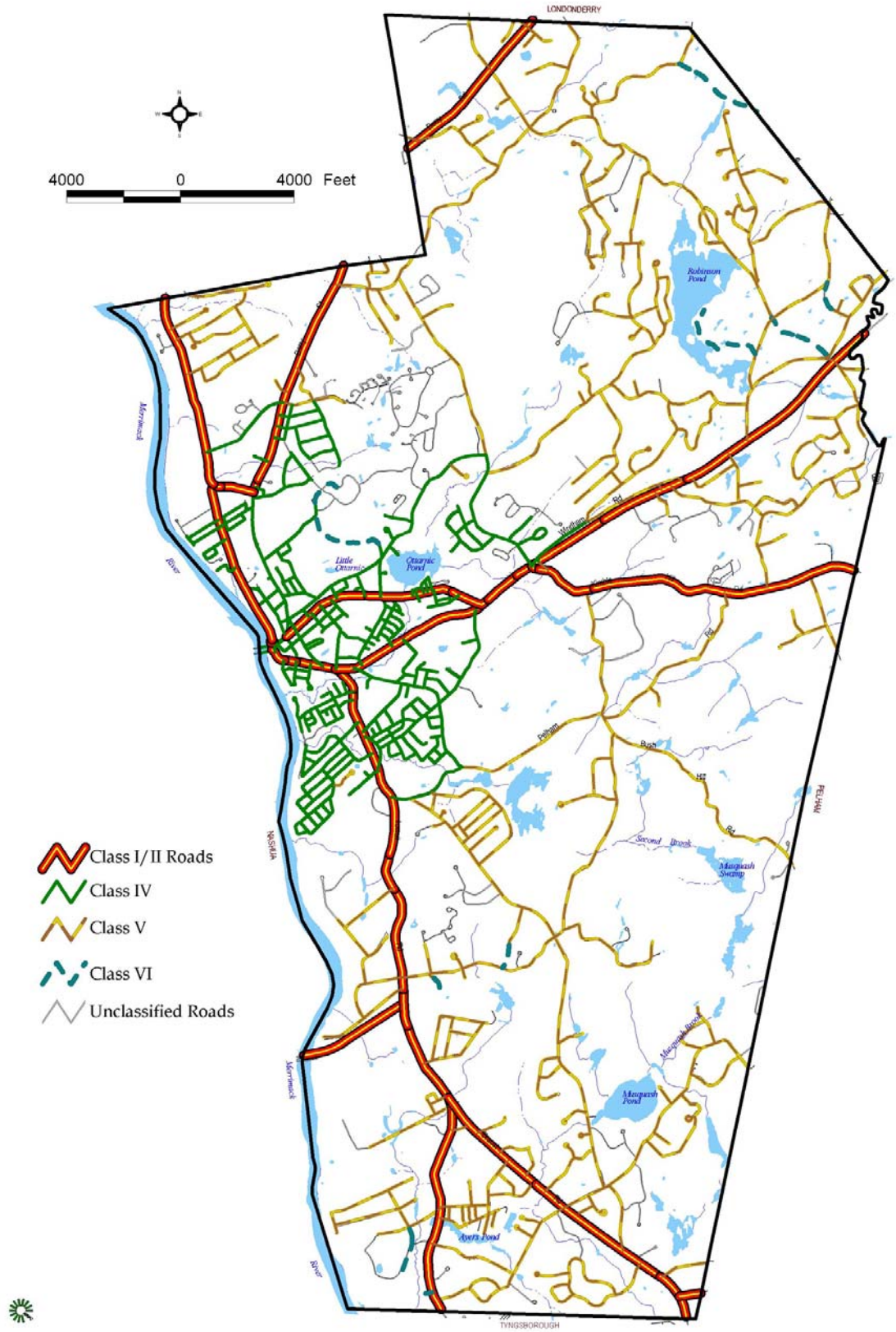
In addition to the statewide roadway classification, the Town of Hudson has adopted its own functional classification scheme within the Town's zoning ordinance for certain roads. Table V-3 summarizes the Town's official functional classification.

Table V-3. Town Designated Roadway Functional Classification

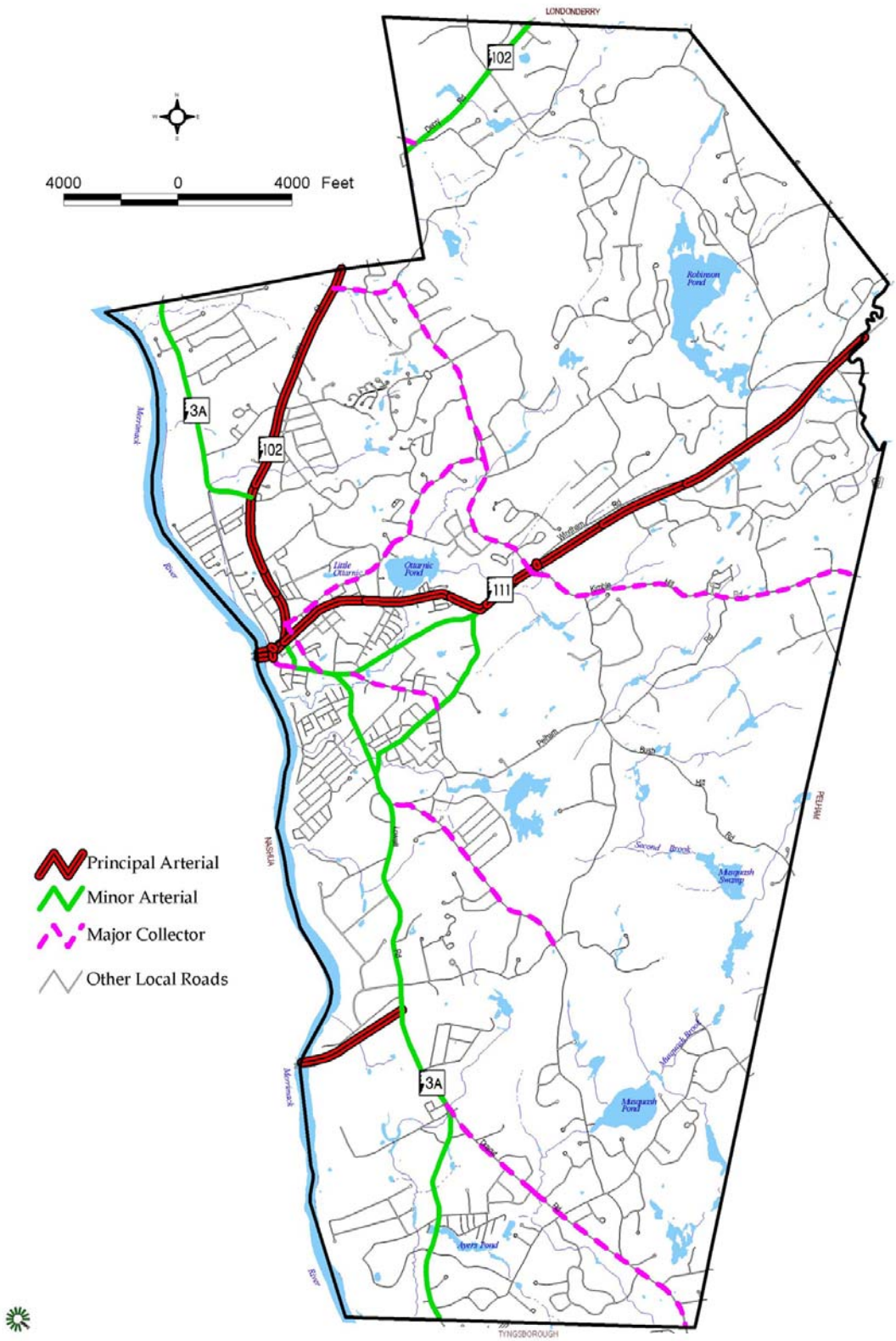
Functional Classification	Roadways
Arterial	1) NH 3A (Elm Street, Lowell Road, Webster Street and River Road). 2) NH 102 (Derry Street) 3) NH 111 (Central Street) 4) Dracut Road
Collector	1) Barretts Hill Road 2) Belknap Road 3) Burns Hill Road 4) Bush Hill Road 5) Greeley Street 6) Highland Street 7) Kimball Hill Road 8) Lawrence Road 9) Musquash Road 10) Old Derry Road 11) Pelham Road 12) Pine Road 13) Robinson Road 14) Wason Road 15) West Road 16) Windham Road

Source: Hudson Zoning Ordinance, 2002.

Map V-1. State Aid Classification of Roadways in Hudson



Map V-2. Statewide Functional Classification of Roadways in Hudson



2. Existing Traffic Conditions

Historic traffic volume data for the Town of Hudson has been compiled from both NH DOT and the Nashua Regional Planning Commission (NRPC). NH DOT collects traffic counts in accordance with federal guidelines under the Federal Highway Performance Monitoring System (HPMS). The HPMS guidelines describe federal procedures for sampling highway and road volumes. These procedures provide the Federal Highway Administration (FHWA) with highway volumes for design standards and meet the Environmental Protection Agency's (EPA) requirements for estimating vehicular highway travel. In addition to NH DOT's annual traffic counting program, NRPC maintains an ongoing traffic count program to validate the region's traffic model. NRPC also provides traffic counts for member communities upon request. Historic traffic trends for Hudson are shown in Appendix V-2. Map V-3 illustrates the Average Annual Daily Traffic (AADT) for roads of higher functional classification in Hudson. Table V-4 shows the AADT for key Hudson roads, based on NH DOT's HPMS archives.

The Taylor's Falls/Veterans Bridge and the Sagamore Bridge (also called the Circumferential Highway) both carry the heaviest traffic volumes in a 24-hour period. In 2001, the Taylor's Falls Bridge averaged 35,600 vehicles per day (vpd) and the Sagamore Bridge averaged 35,400 vpd. NH 3A, at a location north of the Sagamore Bridge and south of Wason Road, had the third highest AADT at 32,000 vpd in 2001. The AADT on NH 3A varies from a low of 8,900 vpd at the Massachusetts State Line to 32,000 vpd just north of the Sagamore Bridge. The AADT on NH 3A is generally at a level of just above 20,000 vpd. The AADT on NH 102 ranges between 15,000 to 17,000 vpd while traffic on NH 111 ranges in the 14,000 to 15,000 vpd range.

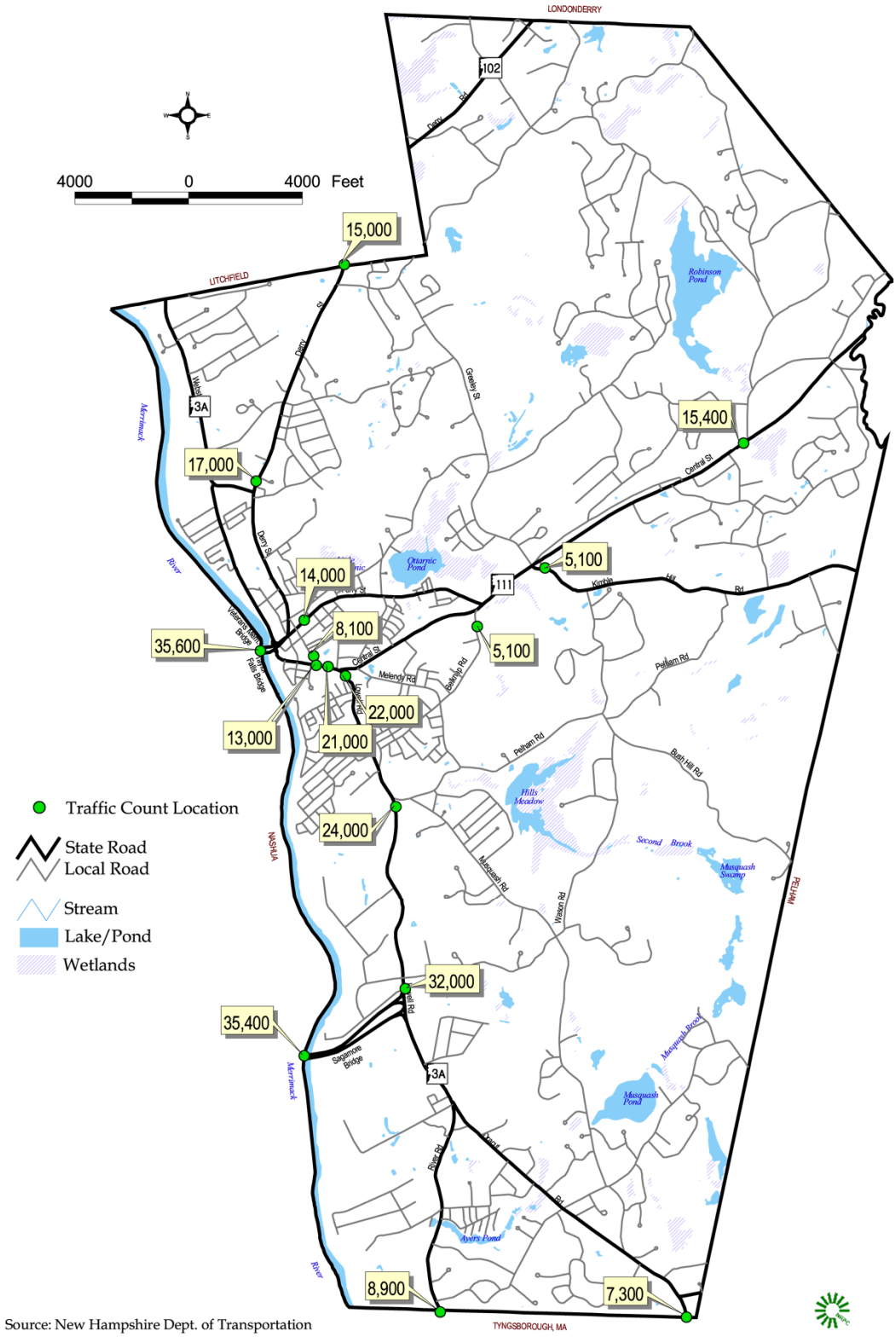
Table V-4. Average Annual Daily Traffic (AADT), 2001

Road Location	AADT (Vehicles per day)
NH 111 at Taylor's Falls/Veterans Bridge	35,600
Sagamore Bridge (Circumferential Highway) across the Merrimack River	35,400
NH 102 at Litchfield Town Line	15,000
NH 102 north of Elm Avenue (NH 3A)	17,000
NH 3A east of Library Street	21,000
NH 3A (Lowell Road) south of Central Street	22,000
NH 3A south of Burns Hill Road (north of Wason Road)	24,000
NH 3A (Lowell Road) north of the Sagamore Bridge	32,000
NH 3A south of Sagamore Bridge	22,000
NH 3A at Massachusetts State Line	8,900
Dracut Road at the Massachusetts State Line	7,300
NH 111 east of Library Street	14,000
NH 111 west of Park Avenue	15,400
Library Street	8,100
Kimball Hill Road south of NH 111	5,100
Central Street west of Library Street	13,000
Belknap Road south of Central Street	5,100

Source: NH DOT, 2001.

Historic traffic count trends show that traffic on many local and collector roads increased substantially due to residential growth. The traffic on Highland Street (north of George Street) grew from 2,112 vpd in 1984 to 4,068 vpd in 1999 (see Appendix V-2). Other local roads with collector functions for residential areas such as Kimball Hill Road, Wason Road and Greeley Street also showed marked increases in traffic. Kimball Hill Road, at a location just south of NH 111, grew from 4,931 vpd in 1990 to 6,001 vpd in 2001. Wason Road, at a location just east of NH 3A, shows an increase from 1,928 vpd in 1983 to 8,547 vpd in 2000. Greeley Street, at a location just south of Highland Street, increased from 2,524 vpd to 5,944 vpd in 2000.

Map V-3. Average Daily Traffic on Hudson Roads



Source: New Hampshire Dept. of Transportation

a. Hudson-Litchfield Traffic Study, 2002

At the request of the Towns of Hudson and Litchfield, a traffic study was completed to determine future impacts of the Circumferential Highway on traffic operations at various essential intersections within the local road network. The *Hudson-Litchfield Traffic Study, 2002* was funded through a grant from the NH DOT. The engineering consultant firm of Vollmer Associates was retained under contract to provide analysis in the evaluation of existing and future traffic conditions at those intersections. The main purpose of the study was to evaluate traffic conditions over a twenty-year horizon and to consider improvements needed as a result of the impacts of the Circumferential Highway and the Airport Access Road in Manchester. The study identified specific needed improvements at the study area intersections. Table V-5 summarizes the recommended improvements included in the Hudson Litchfield Traffic Study. Conceptual designs of these improvements from the study are provided in the *Hudson-Litchfield Traffic Study Final Report*, dated March 31, 2003.

Table V-5. Recommended Intersection Improvements in Hudson

Intersection Location	Recommended Improvements
NH 102/Robinson Road	Install traffic signals, add left turn lanes from NH 102 eastbound and westbound to side streets, add truck climbing lane to NH 102. Widen the West Road approach and add a right turn only lane.
NH 111/Chase Street	Add an additional left turn lane on the Chase Street northbound approach. Add sidewalk along the east side of Chase Street.
Central Street/Library Street	Install traffic signals, add right turn only lane to southbound approach, and add right turn only lane to Central Street westbound approach.
NH 3A (Lowell Road)/Central Street	Add an eastbound through lane on Central Street. Widen NH 3A and add a sidewalk to the west side of NH 3A.
NH 3A/County Road (south)	Install a traffic signal and add a northbound right turn lane on NH 3A. Add a traffic island on the northbound approach to channelize traffic. Add a left turn storage lane on the NH 3A southbound approach.
NH 3A/Wason Road	Add an exclusive left turn lane on the Wason Road westbound approach.
Belknap Road/County Road	Three alternative scenarios for improvements at this intersection; 1) Install a traffic signal at Belknap/County Road and NH 3A/County Road, *or* 2) Install a roundabout at Belknap/County Road and a signal at NH 3A/County Road, *or* 3) Extend Belknap Road to the Birch Street/NH 3A intersection to create a four-way, stop sign at intersection of Belknap and County Road. The NH 3A/Birch Street intersection should also be expanded to a four-way intersection with Belknap Road making up the eastbound approach. This third solution would eliminate the need for a traffic signal at the NH 3A/County Road (south) intersection.
NH 111/Greeley Street/Kimball Hill Road	Add an additional left turn storage lane on the NH 111 eastbound approach. Widen Greeley Street to accomodate the traffic from two left turn lanes from the NH 111 eastbound approach. Add a left turn lane to the Greeley Street southbound approach. Widen NH 111 through the intersection and add sidewalks to the north and south sides of NH 111. Add a pedestrian island and crosswalk across the eastbound approach of NH 111. Add a left turn lane on the Kimball Hill Road northbound approach.

Source: Vollmer Associates, *Hudson-Litchfield Traffic Study, 2002.*

b. New Hampshire State Transportation Improvement Program (STIP) in Hudson

i. NH 3A and NH 102 Widening

The New Hampshire State Transportation Improvement Program (STIP) includes a number of widening and improvement projects for the NH 3A and NH 102 corridor in Hudson. These projects are presently under various stages of construction and are summarized in Table V-6.

Table V-6. NH 3A and NH 102 Corridor Improvements

Location	Improvements
NH 102	Reconstruct NH 102 from Highland Street to McDonalds, including extending sidewalks on both sides of the road
NH 3A	Reconstruct 2,000 feet of NH 3A from Rena Street to Dracut Road
NH 3A	Construct sidewalks on NH 3A from Birch Street to Central Street
NH 3A	Reconstruct and widen 4,100 feet of NH 3A from Wason Road to Executive Drive

The STIP also currently includes projects underway for improvements at the NH 102/Robinson Road intersection (this project has been fast-tracked utilizing private developer funds) and the NH 3A/Wason Road intersection. Private developer funds have also been utilized for the Wason Road/NH 3A intersection improvements.

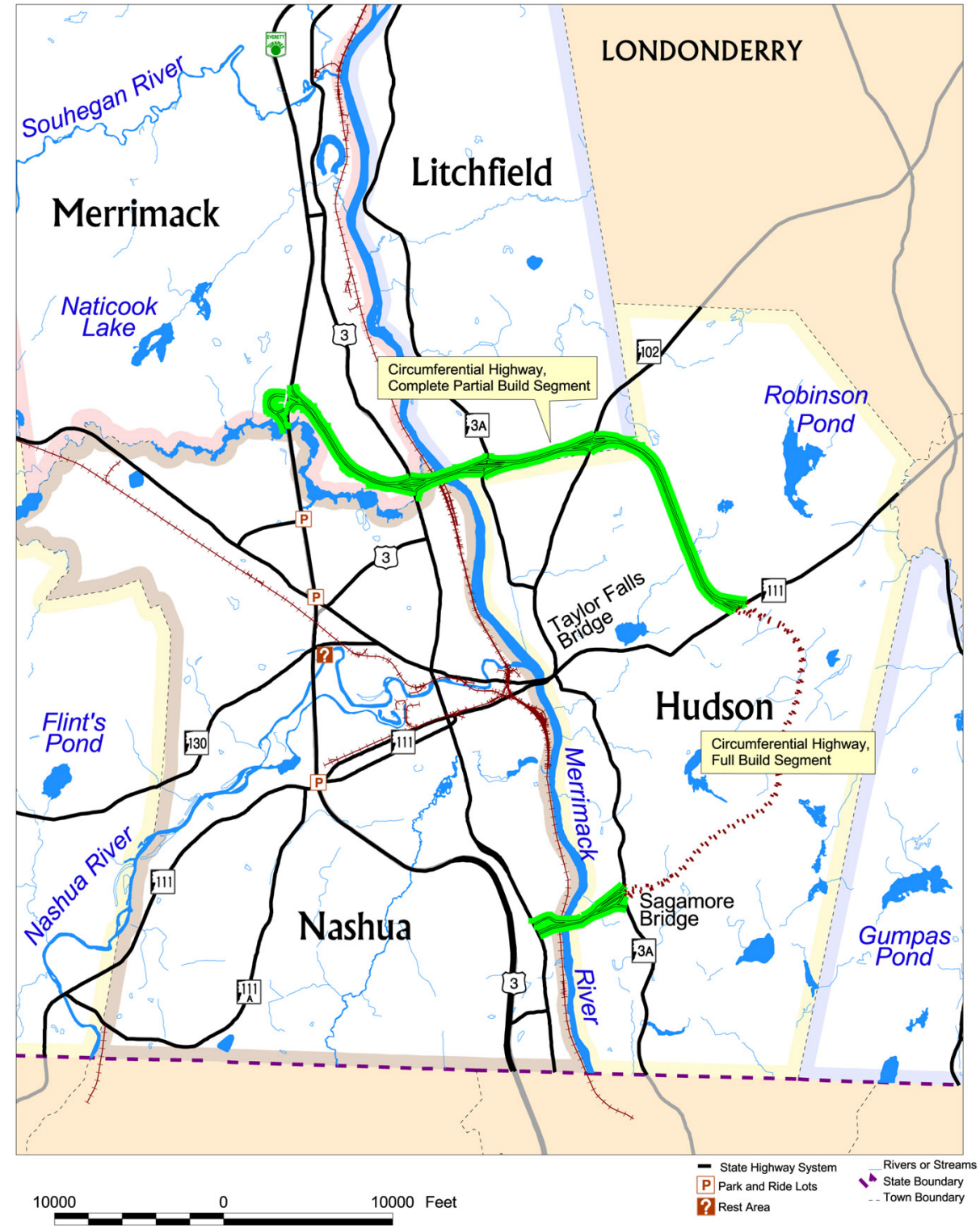
ii. Circumferential Highway

The Circumferential Highway was originally proposed to be a loop road extending around the south, east, and north sides of Hudson. The purpose of the project was to provide transportation improvements to assist east-west traffic movements across the Merrimack River. New crossings over the Merrimack River would reduce congestion on existing bridges and streets in and near the center of Hudson and in downtown Nashua. The project was proposed to have interchanges at NH 3A, NH 111 and NH 102 in Hudson. The project was to be funded solely through toll revenues from the New Hampshire turnpike system.

During the early 1990's NH DOT produced a draft Environmental Impact Statement (EIS) for the proposed project. Prior to completion of the EIS process the Environmental Protection Agency (EPA) filed a letter of intent to veto the highway. EPA cited concerns over the segmentation of wildlife habitat between NH 3A and NH 111 in Hudson that could result from the construction of the southern segment. NH DOT, after consultation with the EPA, revised the project and is now conducting a supplemental EIS for the Northern Segment Partial-Build. The Northern Segment involves the construction of a limited access, four-lane highway beginning from NH 111 in Hudson circling northerly then westerly just north of the Hudson town line in Litchfield, across the Merrimack River to a new Exit 9 on the F.E. Everett Turnpike in Merrimack. Map V-4 illustrates the Northern Segment Partial-Build of the Circumferential Highway. The Supplemental Environmental Impact Statement is expected to be completed in 2003.

If the project completes the EIS process and the required permitting processes, the Northern Segment Partial Build project will be constructed in three phases. NH DOT is committed to completing the entire Northern Segment from NH 111 in Hudson to the F.E. Everett Turnpike in Merrimack in the State's Ten Year Transportation Plan.

Map V-4. Circumferential Highway in Hudson



3. Accidents

Accidents for the Town's roads are compiled by the NH DOT based on local police reports. Table V-7 is based on NH DOT's accident database for the latest three years of available data (1999 - 2001).

As shown in Table V-7 the NH 111/NH 102/Derry-Chase Street intersection experienced the most accidents in the three-year period with 43 accidents. Twenty-nine of these accidents involved property damage only and 14 involved personal injuries. The NH 111/Library Street intersection and the NH 3A/Sagamore Bridge Road intersection both experienced the second highest number of accidents in the three-year period with 24 each. Other high accident intersections in Hudson include NH 102/Elm Ave (22 accidents), NH 111/Greeley/Kimball Hill Road (22 accidents), NH 3A/Birch Street (23 accidents), NH 3A/Wason Road (20 accidents), and Central Street/Library Street (22 accidents). Table V-7 also shows intersections on an accident rate basis using accidents per million entering vehicles in order to rate the accident exposure for locations. The intersections of Central Street/Library Street, Central Street/Chase Street, and NH 111/NH 102/Chase Street have the highest accident rates. These intersections have accident rates over 1.0 accident per million entering vehicles.

Table V-7. Three Year Accident Summary (1999-2001)

Intersection	Average Daily Traffic (vpd)	Million Vehicles Entering per Year	Total Property Damage Only	Total Personal Injury	Three Year Total	Accidents Per Million Entering Vehicles Per Year
Central Street/Library Street	14,000	5.11	13	9	22	1.44
Central Street/Chase Street	12,000	4.38	8	6	14	1.07
NH 111/NH 102, Derry-Chase	38,000	13.87	29	14	43	1.03
NH 102/West Road/Robinson Road	16,000	5.84	7	8	15	0.86
NH 111/Library Street	25,900	9.45	16	8	24	0.85
NH 3A/Birch Street	30,000	10.95	18	5	23	0.70
NH 111/Greeley/Kimball Hill Road	33,000	12.05	13	9	22	0.61
Library Street/School Street	10,800	3.94	5	2	7	0.59
NH 102/Elm Avenue	36,400	13.29	15	7	22	0.55
NH 3A/Wason Road	34,000	12.41	17	3	20	0.54
NH 3A/Central Street	31,500	11.50	14	3	17	0.49
NH 3A/County Road. S. intersection	31,400	11.46	13	4	17	0.49
NH 3A/Executive Drive	32,000	11.68	14	3	17	0.49
NH 3A/Sagamore Bridge Road	48,600	17.74	16	8	24	0.45
NH 102/Page Road	20,000	7.30	4	5	9	0.41
NH 3A/Flagstone Drive	32,000	11.68	10	3	13	0.37
NH 102/Library/ Highland Street	31,100	11.35	8	4	12	0.35
NH 3A/Pelham Road	29,000	10.59	8	2	10	0.31
Chase Street/School Street	12,000	4.38	4	0	4	0.30
NH 3A/Dracut Road	32,900	12.01	3	0	3	0.08

Source: NH DOT

The Town should consider further detailed studies for the highest accident rate intersections in order to develop improvements and strategies to reduce accidents. The Town of Hudson Highway Safety Committee should consider requesting that the NH DOT perform safety studies for the highest accident rate intersections. The studies should include collision diagrams and an analysis of the physical road features and traffic control, road conditions at the time of the accidents (latest three years), the severity of the accidents, and a summary tabulation of accidents. Any further detailed accident studies should include input from the public and include the following six steps:

1. Identify the locations that are candidates for improvements.
2. Quantify the main crash trend(s) at a particular location.
3. Determine the source of the problem(s).
4. Evaluate types of improvements to address the crash problem(s).
5. Obtain an expert opinion about safety improvement(s).
6. Obtain funding to implement a safety improvement.

4. Bridge Conditions

NH DOT inspects locally-owned bridges as well as state-owned bridges. NH DOT defines a bridge as a structure with a span of at least 10 feet. Inspection and maintenance of culverts and other structures that do not meet this 10-foot span definition on local roads are the responsibility of the town (NH RSA 234). NH DOT inspects bridges on Class IV and V roads (local roads) every two years and the records of these inspections must be kept by the town. The state inspections are a prerequisite for a town's participation in the State Bridge Aid program.

The municipality bears the responsibility for the installation of signs for posting load restrictions on local bridges, although the NH DOT recommends these load restrictions after inspection. The Town should develop routine inspection and maintenance for culverts and other structures on local roads that are not inspected or maintained by the state.

The State of New Hampshire lists ten bridges in the Town of Hudson that are regularly inspected and rated by the NH DOT. The “Structurally Deficient” rating for a bridge denotes that there are deficiencies in the bridge structure and a load restriction is recommended, or repairs for those bridges that need significant maintenance. The “Functionally Obsolete” rating refers to the bridge’s capacity for traffic operations in relation to the function of the approach road. NH DOT does not list any bridges in Hudson as “Structurally Deficient.” The NH DOT lists two bridges (Taylor's Falls/Veterans Bridge over the Merrimack River, both owned by the State) as “Functionally Obsolete.” The "Functionally Obsolete" status for the Taylor's Falls/Veterans Bridge refers to the fact that these bridges are not wide enough to provide the capacity needed to avoid traffic congestion based on the traffic demand at this location.

In addition to inspecting and rating bridges for weight restrictions, NH DOT publishes a list of bridges statewide that are included on its “red list.” NH DOT defines “red list” bridges as those bridges “…requiring interim inspections due to known deficiencies, poor conditions, weight restrictions, or type of construction. These structures are inspected twice yearly.” No bridges in Hudson are included on the “red list.” The NH DOT lists one bridge in Hudson in its "Bridge Aid Program Status Report" that is programmed for repairs and plans to rehab the County Road Bridge over Second Brook in 2006. The total cost of the project is estimated at $160,000. The State will provide 80% of funding for the cost and the Town will be responsible for 20% of the cost.

5. Travel Patterns

Information on commuting is available from the 2000 US Census and is shown in Tables V-8 and V-9, as compared to the 1990 Census. 87.7% of Hudson's workers commuted by single occupant vehicle in 2000, significantly higher than the national average of 75%. This also represents an increase of 5.1% over 1990. The mean travel time to work in 2000 was 27.6 minutes, which is slightly higher than the national average of 25.5 minutes and an increase of 3 minutes over 1990. The trends in commuting patterns show that Hudson commuters are traveling longer distances to work each year with increased dependence on the automobile. These trends contribute to the overall congestion on the local and regional road networks.

The Town should encourage alternative modes to single occupancy auto use to help decrease traffic congestion and provide greater choices for Hudson commuters. The Town should work with the NRPC and the NH DOT to plan for and promote alternative modes of transportation. Programs should include efforts to increase commuter participation in existing region-wide carpooling and vanpooling programs, commuter bus lines and commuter rail. In addition, the Town should work with the NRPC and the Nashua Transit System in extending the existing bus routes from Nashua to Hudson to provide for an alternative mode for commuting within the Nashua region. The Town should also support the NH DOT's region-wide effort to extend the commuter rail line from Boston and Lowell to Nashua. The commuter rail site chosen by the NH DOT on Daniel Webster Highway in South Nashua is just south of the Sagamore Bridge offering a short driving distance for most Hudson commuters. In addition to working and coordinating the alternative transportation effort with government agencies, the Town should also explore the option of working directly with large employers in the Town to coordinate the alternative modes initiative. Large employers have the single greatest impact on traffic in the Town and reduction in work trips to those locations will result in the greatest possible reduction in traffic.

Table V-8. Means of Transportation to Work, 1990 and 2000 (Workers 16 years and over)

Means of Transportation	1990 Census		2000 Census	
	Number	Percentage	Number	Percentage
Drove alone	9,025	82.6%	11,107	87.7%
Carpooled	1,344	12.3%	967	7.6%
Public transportation (incl. taxi)	42	0.4%	44	0.3%
Bicycle or walked	162	1.5%	109	0.9%
Motorcycle or other means	81	0.7%	52	0.4%
Worked at home	278	2.5%	387	3.1%
Total	**10,932**	**100%**	**12,666**	**100%**

Source: 2000 Census, Transportation Planning Package.

Table V-9. Travel Time to Work (Away From Home), 1990 and 2000

Travel Time	1990 Census		2000 Census	
	Number	Percentage	Number	Percentage
Less than 5 minutes	287	2.7%	260	2.1%
5 to 9 minutes	1,084	10.2%	1,004	8.2%
10 to 14 minutes	1,629	15.3%	1,402	11.4%
15 to 19 minutes	1,700	16.0%	1,754	14.3%
20 to 29 minutes	2,115	19.9%	2,718	22.1%
30 to 44 minutes	2,136	20.0%	2,746	22.4%
45 or more minutes	1,703	16.0%	2,395	19.5%
Mean Travel Time to Work (min.)	24.6	-	27.6	-

Source: 2000 Census, Transportation Planning Package.

C. FUTURE TRAFFIC PROJECTIONS

Future traffic forecasts can be estimated utilizing the NRPC regional traffic model. The NRPC model uses 20-year regional land use forecasts to estimate future trip generation and zones of trip attraction and production within the region. The road network in the model is revised to reflect changes in the system due to the completion of major road projects, such as the Circumferential Highway and the Broad Street Parkway, for future traffic estimation. The future revised road network, along with changes in land use assumptions, yields the future trips and trip distribution within the region. Model calibration is achieved by comparing ground counts taken in the field with a base year model run that reflects existing network and land use conditions. The model is then revised to reflect future network and land use conditions based on the planned road projects and the land use growth assumptions. One issue that must be emphasized is that the traffic model adjusts its forecast of traffic for the anticipated levels of congestion. As a roadway becomes highly congested, with traffic in excess of roadway volume, the model calculates the degree to which delay is resulting from the traffic congestion and switches traffic to alternate routes. These alternate routes are often longer mileage routes but, due to lower levels of congestion, they are actually the fastest path the model can find between an origin point and a destination.

Table V-10 shows the estimated forecasts for daily traffic volumes, in vehicles per day (24-hour period), for essential roads within the Town of Hudson, as compared with the existing average annual daily traffic. The Table V-10 forecasts are for a future road network that assumes the completion of the planned Northern Portion of the Circumferential Highway (from the F.E. Everett Turnpike in Merrimack to NH 111 in Hudson), the Broad Street Parkway in Nashua, the Airport Access Road in Manchester, the widening of I-93 in Londonderry and Windham, and the completion of Albuquerque Avenue in Litchfield.

Based on the forecasts, the highest increases in traffic volume on Hudson's roads are expected on NH 3A south of the Sagamore Bridge (+14,500), the Sagamore Bridge (+13,800), Kimball Hill Road south of NH 111 (+12,700), NH 111 west of Park Avenue (+12,500), NH 3A at the Massachusetts State Line (+8,000), and NH 3A north of the Sagamore Bridge (+5,600). These increases are due in part to increased residential development in Pelham and Hudson, increases in development in the I-93 corridor (due to the I-93 widening), and the lack of the southern portion of the Circumferential Highway between the Northern Portion terminus on NH 111 (north of Kimball Hill Road) and NH 3A and the Sagamore Bridge. The Town should consider further study of the NH 111 corridor due to growth and development, the lack of an outlet for the terminus of the Northern Portion of the Circumferential Highway and increased traffic from Londonderry due to the I-93 widening project. An additional study should also be considered for the southern portion of Hudson, including the NH 3A corridor due to increases in traffic on Dracut Road and NH 3A from Pelham and the use of the NH 3A corridor and the local road network as a connection between the Sagamore Bridge and the Circumferential Highway terminus on NH 111.

Table V-10. 20-Year Forecasted Weekday Traffic Volumes in Hudson

Road Location	AADT (vpd)	20-Year Forecast (vpd)	Change (vpd)
NH 111 at Taylor's Falls/Veterans Bridge	35,600	36,700	+ 1,100
Sagamore Bridge (Circumferential Hwy)	35,400	49,280	+ 13,880
NH 102 at Litchfield Town Line	15,000	19,100	+ 4,100
NH 102 north of Elm Ave (NH 3A)	17,000	10,300	- 6,700
NH 3A east of Library Street	21,000	24,800	+ 3,800
NH 3A (Lowell Road) south of Central Street	22,000	22,400	+ 400
NH 3A south of Burns Hill Road (N of Wason)	24,000	21,600	- 2,400
NH 3A (Lowell Road) N. of Sagamore Bridge	32,000	37,600	+ 5,600
NH 3A south of Sagamore Bridge	22,000	36,500	+ 14,500
NH 3A at Massachusetts State Line	8,900	16,900	+ 8,000
Dracut Road at the Massachusetts State Line	7,300	10,900	+ 3,600
NH 111 east of Library Street	14,000	15,900	+ 1,900
NH 111 west of Park Avenue	15,400	27,900	+ 12,500
Library Street	8,100	10,000	+ 1,900
Kimball Hill Road south of NH 111	5,100	17,800	+ 12,700
Central Street west of Library Street	13,000	13,600	+ 600
Belknap Road south of Central Street	5,100	7,900	+ 2,800

Source: NRPC Traffic Model.
Note: AADT = Average Annual Daily Traffic; VPD = vehicles per day.

D. TRANSPORTATION SOLUTIONS

1. Existing Regulations

a. Impact Fees

The Town of Hudson Zoning Ordinance currently assesses impact fees on developments in order to raise funds for the mitigation of traffic and transportation impacts attributable to the development. The Town impact fee ordinance states that the fees will be used to implement specific improvement projects outlined in the Town's Master Plan and Capital Improvements Program (CIP). The fees are assessed based on a schedule developed by the Planning Board which is reviewed annually for necessary revision and update. At present, the planned improvements for the Route 102/West Road intersection represents the only roadway project on the Town's CIP. The Town should consider adding improvement projects for the NH 111/Chase Street intersection, Belknap Road/County Road and County Road (south)/NH 3A intersection, and the NH 111/Kimball Hill Road/Greeley Road intersection to its CIP. These intersections have been recommended for improvements by both the Town's Planning Board and Board of Selectmen.

b. Road and Sidewalk Layout

At present, the Town's subdivision regulations require that the width of the right of way for a new residential street be at least 50 feet wide with a pavement width of 28 feet (Section 289-28). The subdivision regulations require that streets be laid out to intersect as nearly as possible at right angles and not less than 60 degrees. Street grades should not exceed 4% for major streets and 7% for local streets. In addition, the subdivision regulations require that sidewalks be constructed in new subdivisions where deemed essential by the Planning Board to provide access to schools, playgrounds, shopping centers and other community facilities. The sidewalks must be at least four feet wide and provide for pedestrian comfort and safety. New roads that are to be classified by the Town code as major streets, collector streets, and commercial streets are

required to have a pavement width of 36 feet. The definition of the Town code street classification scheme is included in the appendix.

A number of criteria should be considered in updating the design standards for local streets:[1]

- *Design and maintain street space for the comfort and safety of residents*. Local residential streets should be designed with consideration to the needs of children, pedestrians, and bicyclists. The main function of the local street is to provide access to adjacent residential properties. Long distance travel and high speeds are not priorities for local streets, therefore, the Town should reconsider its subdivision requirement for a 28 foot width for residential streets. A residential street with pavement width of 20 feet is sufficient to allow for emergency vehicle access with *no* on-street parking. A pavement width of 24 to 26 feet is.sufficient for a residential street to allow for emergency vehicle access *with* on-street parking.
- *Provide a well connected, interesting pedestrian network*. Convenient and safe pedestrian access to schools, shopping, recreation, employment and other destinations should be provided. This may include the development of an interconnected pedestrian pathway system. The Town should reconsider its 4 foot width requirement for sidewalks. The Americans' with Disabilities Act (ADA) guidelines call for a minimum sidewalk pavement width of at least five feet.[2] Sidewalks on high volume roads should be required to be at least eight feet wide with a three foot landscaped buffer between the curb and paved surface. This buffer provides a margin of safety between the pedestrian flow and high speed and high volume traffic.
- *Provide convenient access for people who live on the street, but discourage through traffic; allow traffic movement, but do not facilitate it*. Traffic control measures should be considered to eliminate extensive through traffic on local streets. The Town should consider traffic calming measures on streets that serve as cut throughs in neighborhoods. The traffic calming measures should be implemented with input from the Town Highway Safety Committee and the public.
- *Differentiate streets by function.* Streets should be clearly distinguished within the network in terms of the functional differences between local residential streets and major collectors or arterials in the overall street design.
- *Relate street design to the natural and historical setting*. Street design should relate to and express the terrain, natural character, and historic traditions of the locale. Irregularities of a site such as large rocks or trees and slopes should be incorporated rather than removed. Street details including curb design, sidewalk paving or signs must relate to the regional vernacular rather than being anonymous from a handbook.
- *Reduce impervious surfaces by minimizing the amount of land devoted to streets.* There are several factors that should shape a plan including a design concept, on-street parking needs, traffic volumes and land constraints (steep slopes, wetlands, etc.). Narrower residential streets reduce the amount of impervious surfaces and allow for better groundwater recharge.

[1] Southworth and Ben-Joseph, *Streets and Shaping of Towns and Cities*, page 143.
[2] United States Department of Justice, *Americans' with Disabilities Act Standards for Accessible Design, Excerpt from 28 CFR Part 36*, July 1, 1994 at: http://www.usdoj.gov/crt/ada/adastd94.pdf.

2. Access Management

Access Management "*…involves providing (or managing) access to land development while simultaneously preserving the flow of traffic on the surrounding road system in terms of safety, capacity and speed.*"[3] The speed and volume of traffic on a roadway is greatly reduced due to vehicles entering and exiting side streets and driveways. In general, access management techniques involve the regulation of the number, spacing and width of access points, the design of those access points, and the provision of alternative transportation methods in order to reduce vehicle trips. The primary goal of access management is to preserve roadway capacity by reducing turning movement conflicts with through traffic.[4]

NH 3A and NH 102 represent the main north-south roadways in Hudson. NH 111 serves as the main corridor for east west travel. In order to preserve the existing road capacity, which has a theoretical limit, and to enhance safety for vehicles entering and exiting driveways, access management techniques should be applied to Hudson's major corridors including NH 3A, NH 102, NH 111 and Dracut Road. The Town should coordinate access management policies with NH DOT's access management initiatives. The following general access management techniques can be implemented through the subdivision, site plan and/or driveway regulations, and/or the zoning ordinance:

- Reduce the number of curb cuts along arterials and encourage the use of common driveways.
- Encourage the development of service roads parallel to arterials that allow for access to adjacent commercial developments.
- The minimum distance allowed between curb cuts along roads and arterials should be at least the minimum distances recommended in Table V-11. With the exception of a 100-foot minimum separation between driveways and intersections, there are no minimum driveway separation requirements in the subdivision or site plan regulations.

Table V-11. Minimum Access Separation Distances

Posted Speed (mph)	Spillback Rate*			
	5%	10%	15%	20%
30	335	265(a)	210(b)	175(c)
35	355	265(a)	210(b)	175(c)
40	400	340	305	285
45	450	380	340	315
50	520	425	380	345
55	590	480	420	380

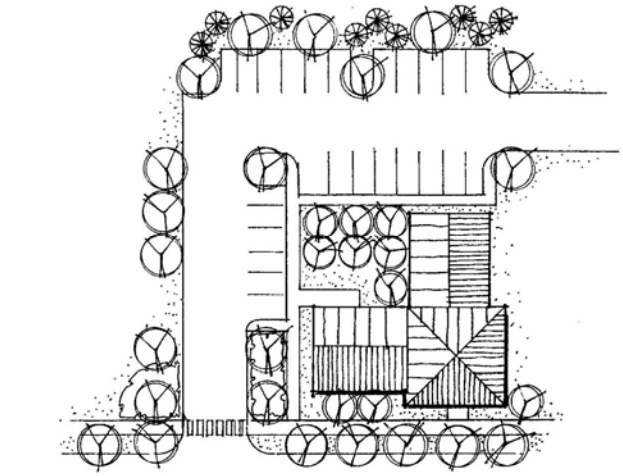
Source: Gluck, J.S., Haas, G., Levinson, H.S., and Jamal Mahmood, *Driveway Spacing and Traffic Operations*, TRB Circular E-C019, December 2000.

*Spillback occurs when a right-lane through vehicle is influenced by right-turn-in to or beyond a driveway upstream of the analysis driveway. The spillback rate represents the percentage of right-lane through vehicles experiencing this occurrence.
(a) Based on 20 driveways per mile; (b) Based on 25 driveways per mile; (c) Based on 30 driveways per mile.
*Based on an average of 30-60 right turns per driveway.

[3] AASHTO, *Policy on the Geometric Design of Highways and Streets*, 2001.
[4] Nashua Regional Planning Commission, *Access Management Guidelines*, April 2002.

- Require developers to fund road improvements such as turn lanes, medians, consolidation or alignment of access points and/or pedestrian facilities that reduce the impedance of through traffic.
- Place parking behind or beside buildings (Figure V-1) to allow for adequate driveway throat length and to screen parking when possible to make the building the focal point of the destination. Use green spaces to articulate the differences between driveways, parking and pedestrian areas.

Figure V-1. Parking to Rear and Side of Building



- Encourage easements between parcels for the interconnection of non-residential sites that allow employees and customers to move from site to site without repeatedly entering and exiting the roadway.
- Encourage easements or future right of way access between residential subdivisions in order to encourage an interconnected street system.
- Allow for pedestrian access between developments. Crossing points for pedestrians should be across driveways rather than through parking areas. Encourage separate sidewalks and walking paths in parking lots for non-residential uses.
- Enter into a Memorandum of Understanding (MOU) with NH DOT to coordinate review of access points. Until recently, NH DOT would issue permits with limited input from the local decision makers. To improve the coordination of local and state planning objectives along the state's road system, NH DOT has developed a MOU which is a formal agreement between NH DOT and the community to coordinate on the review and issuance of driveway permits to access state roads.

3. Community Character Guidelines

The adoption of "community character guidelines" for non-residential development can result in development that is compatible with the community's character, enhances traffic safety and preserves highway capacity. The NRPC publication, *Non-Residential Development Community Character Guidelines*,[5] includes guidelines relating to building orientation, building design, access management, parking lot landscaping, off site parking, site lighting guidelines, loading and service facilities guidelines, and public spaces and landscaping guidelines. The Town should assess existing site plan, subdivision and zoning requirements based on recommendations included in this document.

4. Traffic Calming

Excess traffic and speeding on local roads through residential neighborhoods have been a by product of growth experienced by the Town and the region as a whole. Traffic calming is an integrated approach to traffic planning that seeks to maximize mobility while reducing the undesirable effects of that mobility.[6] There are a number of techniques that are described to achieve the goals of traffic calming:

- Reduce the speed at which automobiles travel by altering roadway design. These techniques include speed bumps and speed tables, rumble strips or changes in the roadway surface, center medians, diagonal diverters, dead-end streets or cul-de-sacs, neck downs, chicanes, chokers and protected parking, narrower streets and roundabouts (see photos[7], below).
- Change the psychological feel of the street through design or redesign. The use of traffic control devices, signs, pavement markings and landscaping should enhance the image of the residential street as a place that is safe for pedestrians.
- Discourage the use of private motor vehicles. Encourage the use of alternative transportation.
- Create strong viable local neighborhoods. Create compact neighborhoods with a range of facilities on hand so that people can drive shorter distances to where they want to go and make more trips by foot, bicycle or public transportation.

A primary way to slow down traffic is to narrow the real or perceived horizontal width of the pavement. Streets can be narrowed in various ways. A so-called "curb extension" is generally the best and perhaps most widely used option. It slows down traffic, shortens the crossing distance for pedestrians and a sidewalk can be added along the road if necessary.[8]

Center Median **Speed Table** **Chicane** **Choker**

[5] Nashua Regional Planning Commission, *Non-Residential Development Community Character Guidelines*, 2000.
[6] Cynthia L. Hoyle, *Traffic Calming*, PAS Report 456, pg. 9.
[7] Photo Source: Fehr & Peers, Associates, Transportation Consultants at www.trafficcalming.org.
[8] Conservation Law Foundation, *Take Back Your Streets*, May 1995, pg. 32.

5. Scenic Road Designation

As New Hampshire's residential, commercial and industrial development has grown, so has the need to improve the road system, thereby reducing the number of country roads that constitute an important asset to the State. To prevent the elimination of scenic roads, communities are enabled by NH RSA 231:157 to designate roads other than state highways as Scenic Roads. This law protects such roads from repair or maintenance which would involve the cutting or removal of medium and large-sized trees, within the right of way, except with the written consent of an official body. The law is an important tool in protecting the scenic qualities of roads. The large trees and stone walls that line many rural roads are irreplaceable and contribute heavily to the New England character of the region's towns. There are no designated scenic roads in Hudson. Consideration should be given to designating appropriate routes.

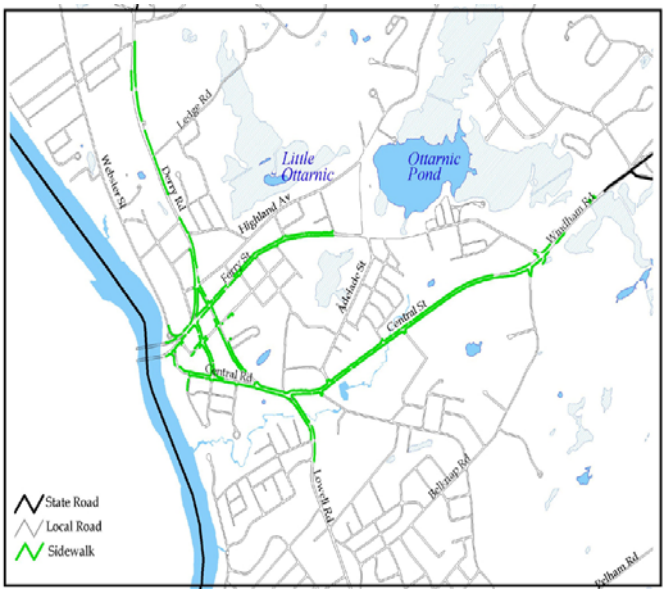
E. NON-MOTORIZED TRANSPORTATION

Although most trips in Hudson are taken by automobile, opportunities are available to enhance the provision of bicycle, pedestrian and public transit facilities. Each trip taken by bicycle, foot or transit removes one private vehicle from the roadway, thereby enhancing the capacity of the road network and providing options for those who cannot or do not wish to drive.

1. Bicycle and Pedestrian Facilities

The Town maintains seven miles of sidewalks and has a Town Center sidewalk program as illustrated on Map V-5. This includes maintaining sidewalks on Library Common and the following streets: Library, Chase, Central, Lowell Road from Central to Riverside Drive, Derry to the intersection of Elm and NH 102, and Ferry.

Map V-5. Town Center Sidewalks



Source: Town of Hudson Department of Public Works

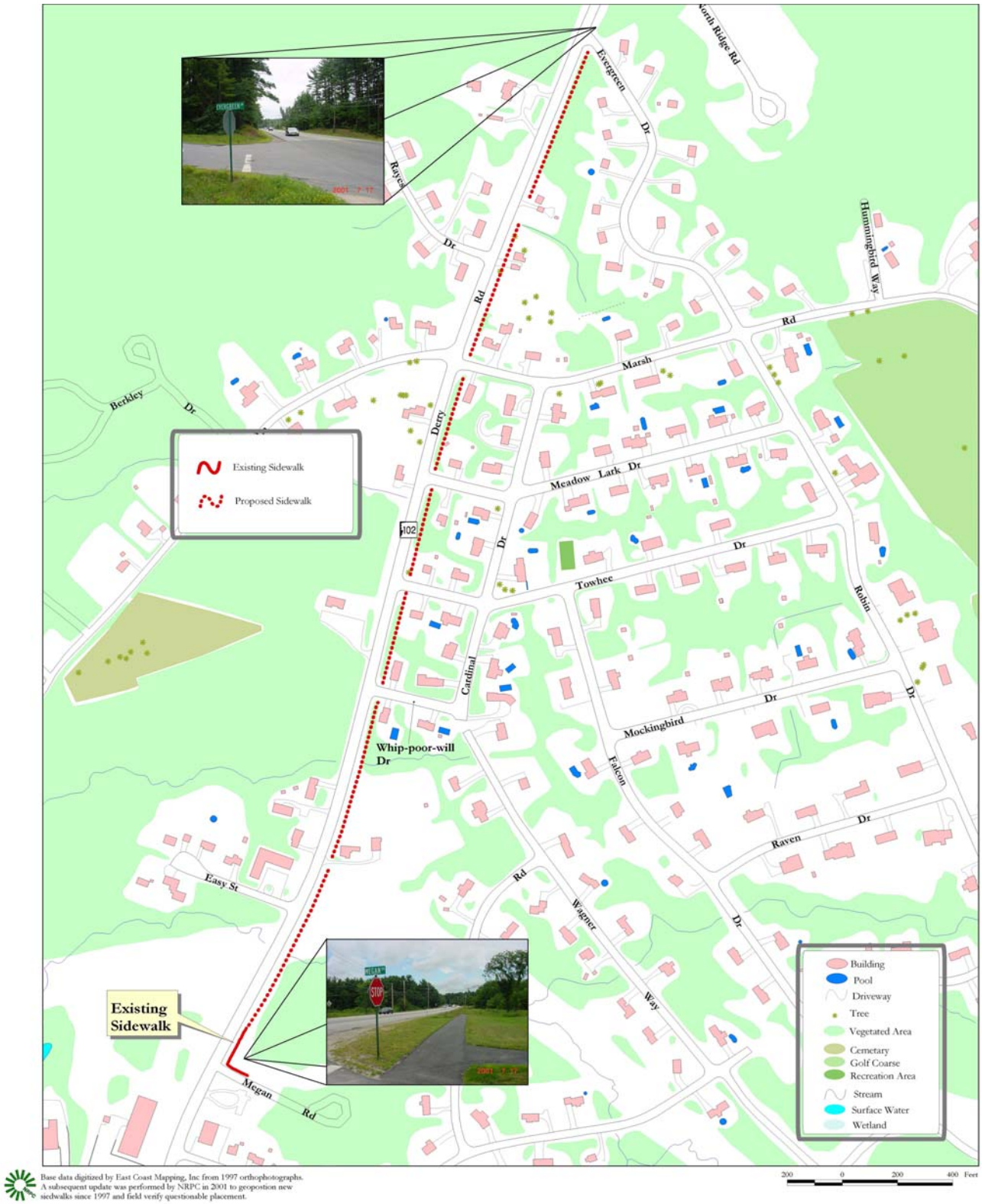
The Town also maintains the sidewalk on Ferry Street all the way across the Merrimack River. The Town should: 1) continue to consider widening and re-striping roadways for bicycle access whenever roadways are repaved or reconstructed; and 2) connect missing links in the Town Center sidewalk network. Crosswalks should be marked at all intersections on established routes to school where there is substantial conflict between drivers, bicyclists and pedestrian movements, where students are encouraged to cross between intersections, or where they would not otherwise recognize the proper place to cross.[9]

As of June 2003, one new sidewalk and bicycle route is planned for Hudson. This project is located on NH 102 between Evergreen Drive and Megan Drive. A 5-foot wide sidewalk and a 4-foot wide bicycle lane will be constructed in this location, as illustrated on Map V-6.

Additional bicycle and pedestrian routes are recommended in the Nashua Regional Planning Commission's, *Nashua Regional Bicycle and Pedestrian Plan* (NRBPP), 1995 and endorsed by member communities, including Hudson. The plan was created in order to provide guidance in the development and implementation of a comprehensive bicycle and pedestrian system within the region. The primary goal of the plan is to increase the incidence of bicycling and walking by establishing a continuous, coordinated non-motorized transportation network. NRPC is currently updating the NRBPP to incorporate 2000 Census data and the latest information from the National Personal Transportation Survey.

[9] U.S. Department of Transportation Federal Highway Administration, *Manual on Uniform Traffic Control Devices, Millennium Edition*, 2001.

Map V-6. NH 102 Sidewalk Enhancement Project



2. Developing a Bicycle and Pedestrian Network Plan

NRPC has developed a methodology for identifying proposed bicycle and pedestrian facilities that can be implemented in Hudson. The methodology involves identifying where bicyclists and pedestrians begin their trips, the destinations they want to go to and recommendations for suitable routes that will get them there. The methodology also involves establishing minimum standards for all streets and highways where bicyclists and pedestrians are permitted. This will ensure that even the streets not on designated routes would have minimum accommodations for bicyclists and pedestrians.

The methodology has been designed to be used in a Geographic Information System (GIS) environment and to be as quantitative as possible. The methodology assumes that demand for bicycle and pedestrian facilities is influenced by the location, type and intensity of land use throughout the region, as well as by the distribution of population. Factors such as directness, barriers, aesthetics and cost of improvements are also considered. The following six steps were used to develop a proposed bicycle and pedestrian network for Hudson:

1. Identify and Quantify Trip Productions (Origins of Travel)
2. Identify and Quantify Trip Attractions (Destinations)
3. Identify Desired Bicycle Travel Corridors
4. Apply Suitability Index to Select Alternative Routes
5. Evaluate Route Alternatives using Performance Criteria
6. Select Specific Routes

Bicycle and pedestrian trip productions (origins of travel) were determined using Census block population and trip generation rates. Major trip attractions (destinations) in Hudson were also identified. These attractions include the major employment centers, shopping areas, schools and recreation/park areas identified in Table V-12 and illustrated on Map V-7.

Table V-12. Inventory of Destinations in Hudson

Identification Number	Name of Attraction	Attraction Type
1	Alvirne High School	School
2	Hudson Memorial School	School
3	Dr. Smith Elementary School	School
4	Hills Garrison Elementary School	School
5	Library Street Elementary School	School
6	Nottingham West Elementary School	School
7	Presentation of Mary Academy	School
8	Bethel Christian School	School
9	Town Center District	Commercial
10	NH 102 South	Commercial
11	Lowell Road North	Commercial
12	Central Street East	Commercial
13	Lowell Road – Wal Mart	Commercial
14	NH 102 North	Commercial
15	Town Beach – Robinson Pond	Park/Recreation
16	Skate Board Park	Park/Recreation
17	Lion's Hall	Park/Recreation
18	Jette Field	Park/Recreation
19	Musquash Conservation Area	Park/Recreation
20	Benson's Wild Animal Park	Park/Recreation

Source: NRPC, 2000.

The suitability of the routes between productions and attractions was determined using the volume of traffic, road width and posted speed limit. The "suitability" number assigned to each segment of road is an indication of how appropriate that segment is for bicycling. Not surprisingly, portions of the State roads are only suitable for experienced bicycle riders in sections due to the high traffic volumes and speed limits. Attractions near the Town Center are appropriate for adolescents and inexperienced adults.

3. Development of a Preliminary Network

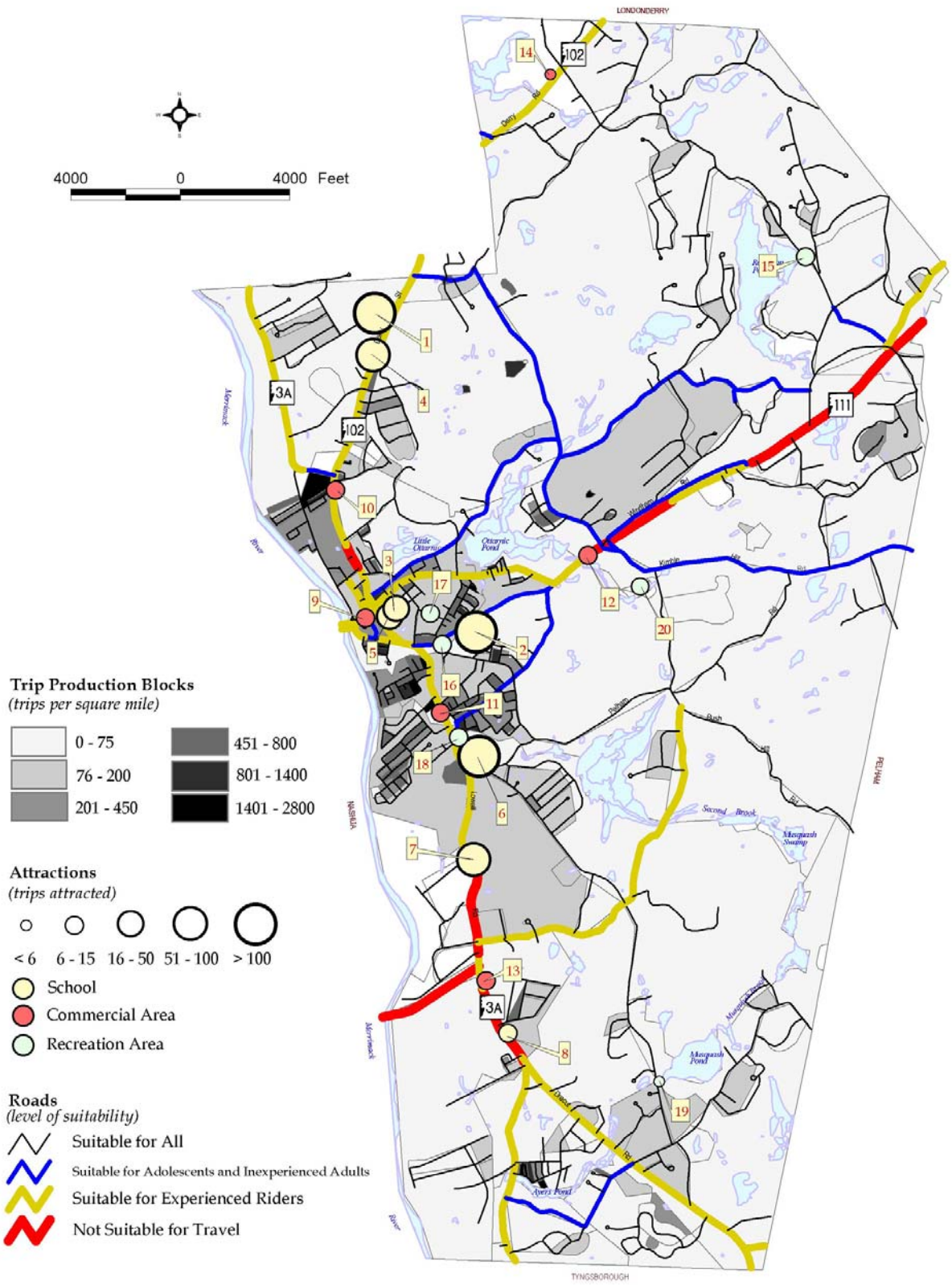
Map V-7 illustrates trip origins, the destinations listed in Table V-12, and suitability of roads connecting the points. Map V-8 illustrates a preliminary bicycle network based on the features identified on Map V-7. The proposed network attempts to connect all points by providing north-south and east-west travel between the origins and destinations. The segments illustrated by a solid red line on Map V-7 (NH Route 3A and NH Route 111 east of the Kimball Hill Road intersection) are not recommended for bicycling; however, there are no existing alternatives. The segments illustrated by a dashed red line on Map V-7 are gaps in the proposed network and should be field checked for the viability of building connections.

The proposed network illustrated on Map V-7 was then further refined in the field by applying specific performance criteria as follows:

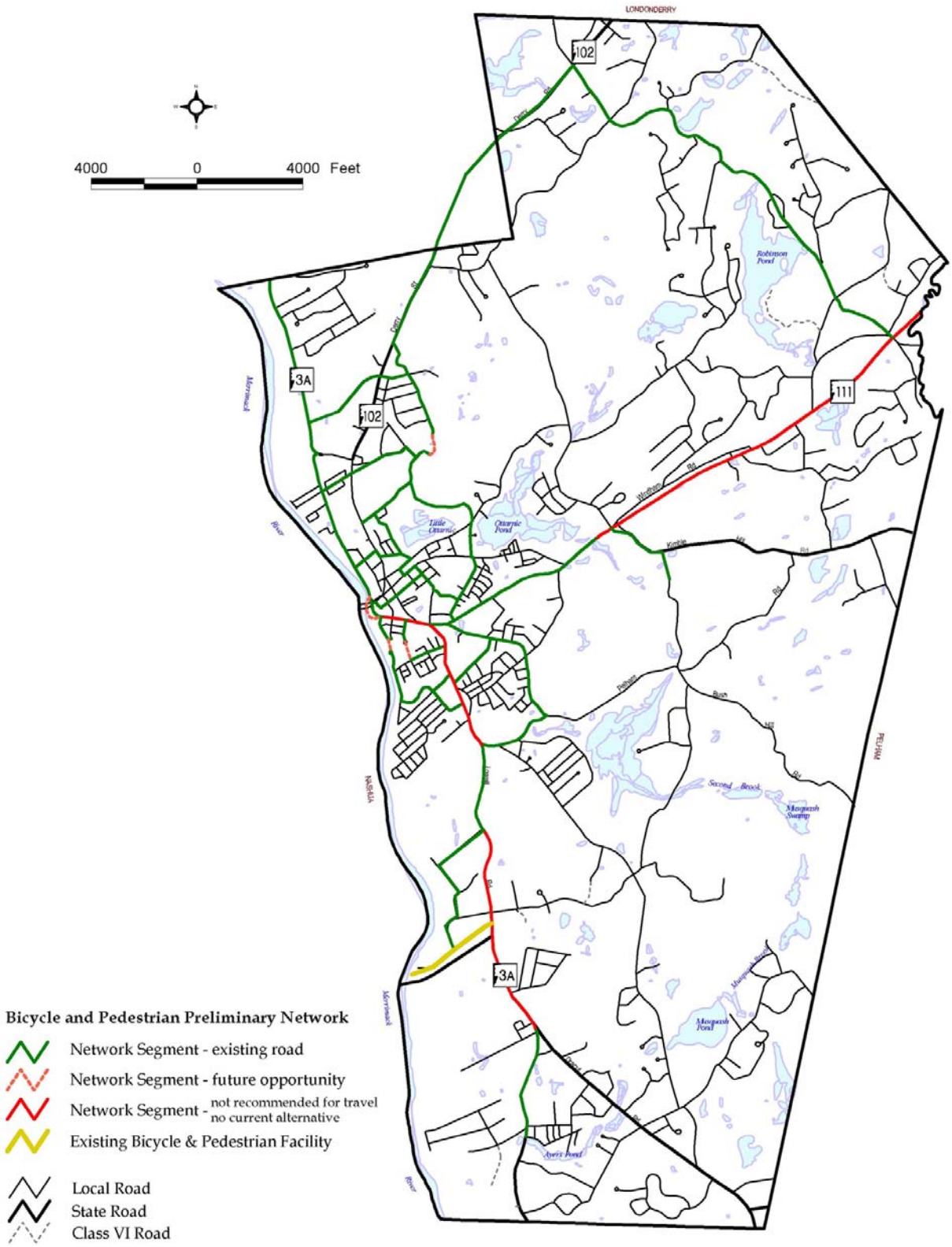
- **Accessibility:** This is measured by the distance a bicycle or pedestrian facility is from a specified trip origin or destination, the ease by which this distance can be traveled by bicycle or foot, and the extent to which all likely origins and destinations are served.
- **Directness:** Studies have shown that most bicyclists or pedestrians will not use even the best bicycle or pedestrian facility if it greatly increases the travel distance or trip time over a less desirable but more direct alternative.
- **Continuity:** The proposed network should have as few missing segments as possible. If gaps do exist, they should not include environments that are threatening to riders or walkers.
- **Usage:** This is the degree to which a specific route meets the needs of the anticipated users as opposed to an alternative route.
- **Aesthetics:** The network should be physically atractive.
- **Safety:** The route should present few confllicts between bicyclists, pedestrians and vehicles.
- **Cost:** When comparing route alternatives, the cost of implementation as well as maintenance should be considered.
- **Ease of Implementation:** Some proposed routes may be easier to implement than others. For example, a potential bicycle route may already have adequate shoulders and therefore only require proper pavement markings. This route could be implemented quickly and at little cost. Other potential routes may need more extensive and costly shoulder construction and could therefore take a long time to implement.
- **Pavement Condition:** The pavement will be observed for roughness, potholes and longitudinal and latitudinal cracking.

Specific recommendations are provided based on these criteria and the field work. These recommendations include such solutions as installation of crosswalks, signage and lane striping, etc. Town officials were consulted in May 2003 to further refine the recommendations.

Map V-7. Trip Production, Attractions and Suitability for Bicycle and Pedestrian Travel



Map V-8. Proposed Bicycle and Pedestrian Network



4. Recommendations for Bicycle and Pedestrian Network

a. Regional Routes

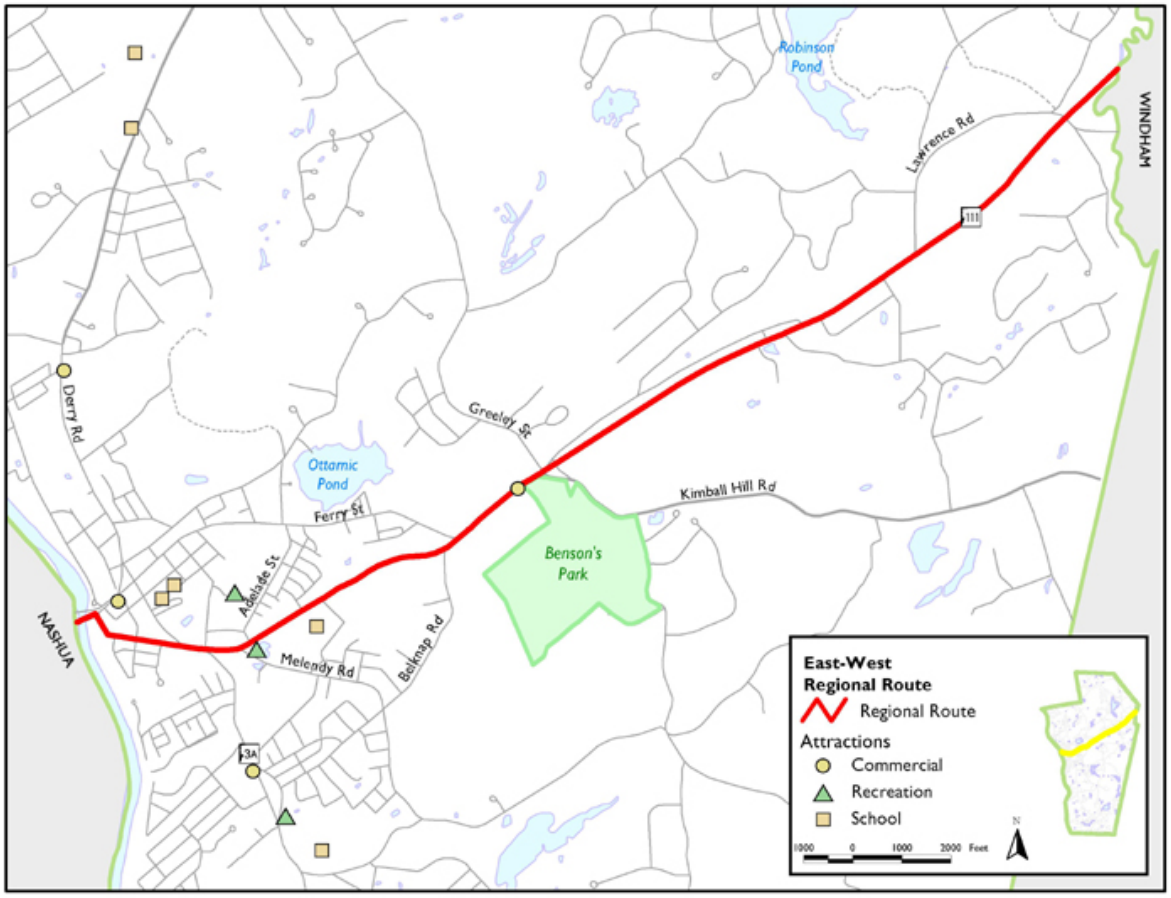
Regional routes are generally bicycle routes since they connect communities and/or town centers and involve greater distances than the average pedestrian would travel. Segments of the route may overlap with the major local destination bicycle and pedestrian routes. There are two regional routes within the Town of Hudson that connect the communities of Nashua to the west, Litchfield and Londonderry to the north, Pelham to the east and the state of Massachusetts to the south.

The recommended west to east route is NH Route 111 as illustrated on Map V-9. Specific recommendations are shown in Table V-13. After crossing the Taylor's Falls/Veterans Bridges, the route continues to Central Street to avoid the heavily congested intersection in the Town Center. Riders would proceed along Central Street to the intersection of NH 3A. Riders would travel through the intersection to continue in an easterly direction. Central Street becomes NH 111 at the Ferry Road intersection. NH 111 continues to the Windham town line. Although the suitability index scored this section of NH 111 as not recommended for travel, the entire route has a well maintained flat surface, good sight distance and shoulders ranging from 4-10 feet in width on both sides. It is recommended that a bicycle lane be striped to Greeley Street. The shoulder beyond Greeley Street to the Windham town line is 10 or more feet in width and does not require striping. As an alternative, riders going west could use Windham Road. This would allow them to ride parallel to NH 111 to the intersection of Greeley Street, NH 111 and Kimball Hill Road.

Table V-13. Regional West to East Route

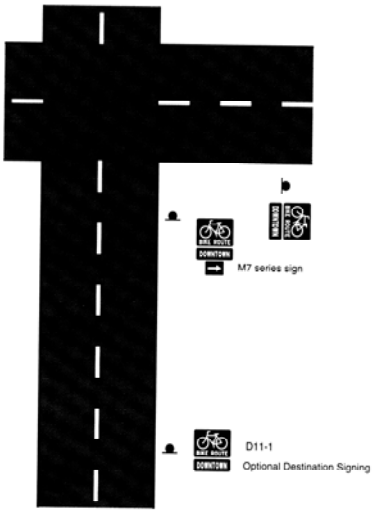
Road Segments from Points West	Recommendations
Taylor's Falls/Veterans Bridge on NH 111 along Central Street to NH 3A intersection	Sign for points east and south at NH 111 and Central Street intersection
NH 3A /Central Street intersection	Sign for points east and south (NH 3A).
Central Street/School Street intersection	Signage to proceed down School Street to Veterans Bridge (Travelers heading west to Nashua only)
From the NH 3A /Central Street intersection to Adelaide Street	Sign for Town Center, points north and east (NH 102 and NH 102).
Along Central Street through the Ferry Street/NH 111 intersection to Greeley Street	Continue sidewalks to Benson's property. Sign for points east (Pelham/Windham)
Along NH 111 through the Lawrence Road intersection to the Windham town line	Bicycle Crossing Warning painted on NH 111. Sign for Robinson Pond at Lawrence Road/Windham town line

Map V-9. Regional West to East Route



Source: NRPC GIS, 2002

The recommended north to south route is NH 102 and adjacent neighborhood streets as illustrated on Maps V-10 through 12. Specific recommendations are shown in Tables V-14 through 16. If used, Bicycle Route guide signs should be provided at decision points along designated bicycle routes, including signs to inform bicyclists of direction change and destination. Bicyclists approaching from the Albuquerque Avenue multi-use path in Litchfield will join NH 102 at the Cutler Road intersection. Riders will travel south along NH 102 to Marsh Road. Although the road has high volumes of traffic during peak commuting hours, the shoulders are wide and the sight distance is good. It is recommended that a bike crossing warning be painted on NH 102 and a bike route crossing sign be installed. The route continues through the neighborhoods surrounding Whip-Poor Will Golf Course. The route has adequate width and light traffic all the way to the Town Center area.



South of Central Street, traffic volume increases on Melendy Road and there is less than 1 foot of shoulder. It is recommended that a 1,400 foot long sidewalk be added along Melendy Road from Thorning Road to Central Avenue to connect the Hudson Memorial School to the skatepark and destinations in the Town Center area. Melendy Road and Roosevelt Avenue are good candidates for shoulder widening or re-striping. NH 3A has heavy traffic and multiple curb cuts which makes travel difficult and is recommended for experienced riders only. All alternate routes paralleling NH 3A have poor pavement conditions, sight distance and are limited in width.

Table V-14. North to South Regional Route - Northern Segment

Road Segments North of Town Center	Recommendations
From Litchfield town line (via Cutler Road) travelling on NH 102 to Marsh Road	Sign for Town Center and points south. Work with Litchfield to continue the bike lane to Cutler Road
From Marsh Road to Cardinal Drive	Sign to turn right on Cardinal Drive
From Cardinal Drive to Wagner Way	Connect the 20-foot segment with 5-foot asphalt path
From Wagner Way to Joel Path	Sign to continue forward
From Joel Path to Melissa Trail (private)	Sign to turn on Melissa Trail
From Melissa Trail to Ledge Road	Sign to continue forward
From Ledge Road to Lindsay Street	Sign to turn left on Lindsay Street
From Lindsay Street to Vernon Street	Sign to continue forward
From Vernon Street to Haverhill Street	Sign to turn left on Haverhill Street
From Haverhill Street to Highland Street	Sign to turn right on Highland Street

Map V-10. North to South Regional Route - Northern Segment

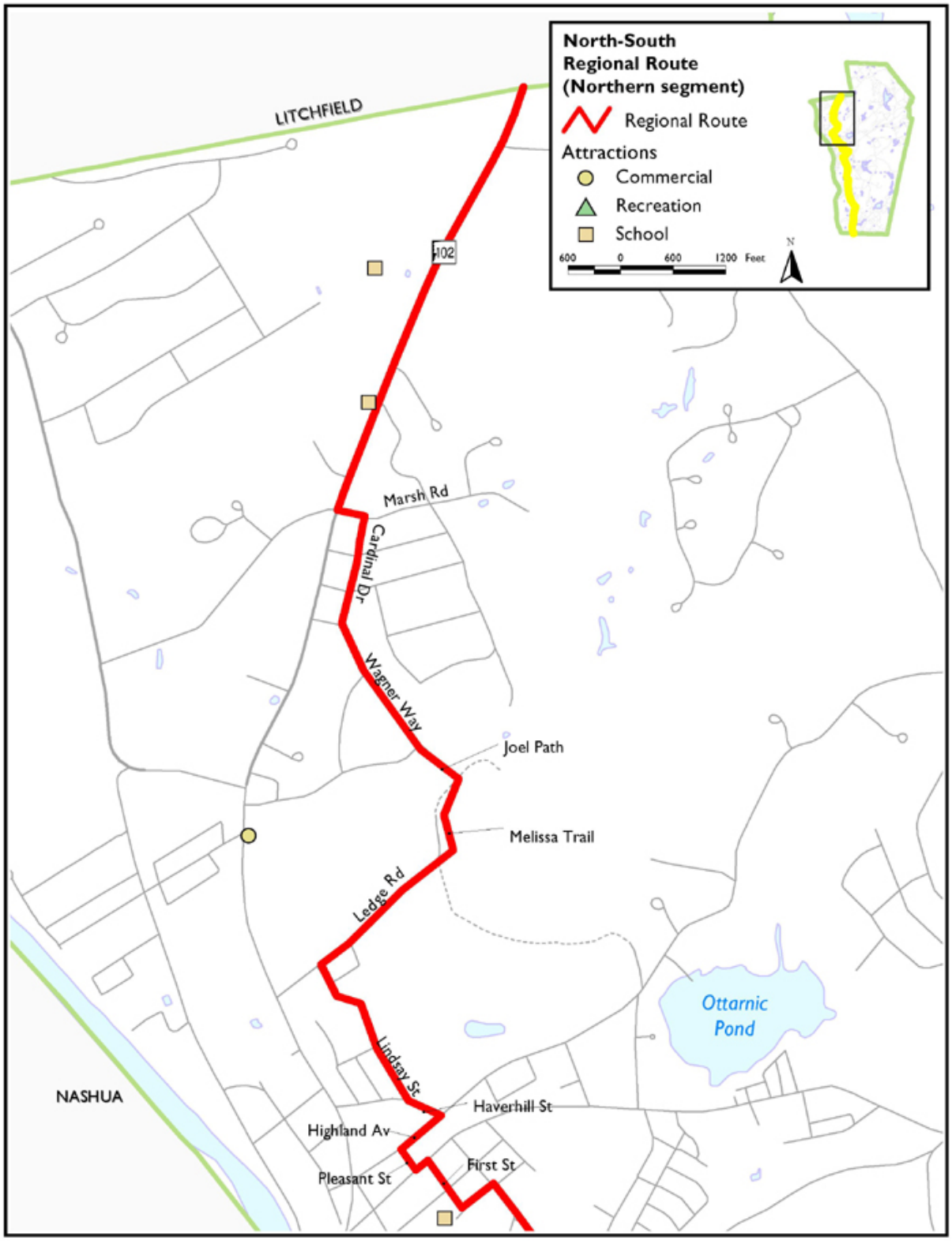
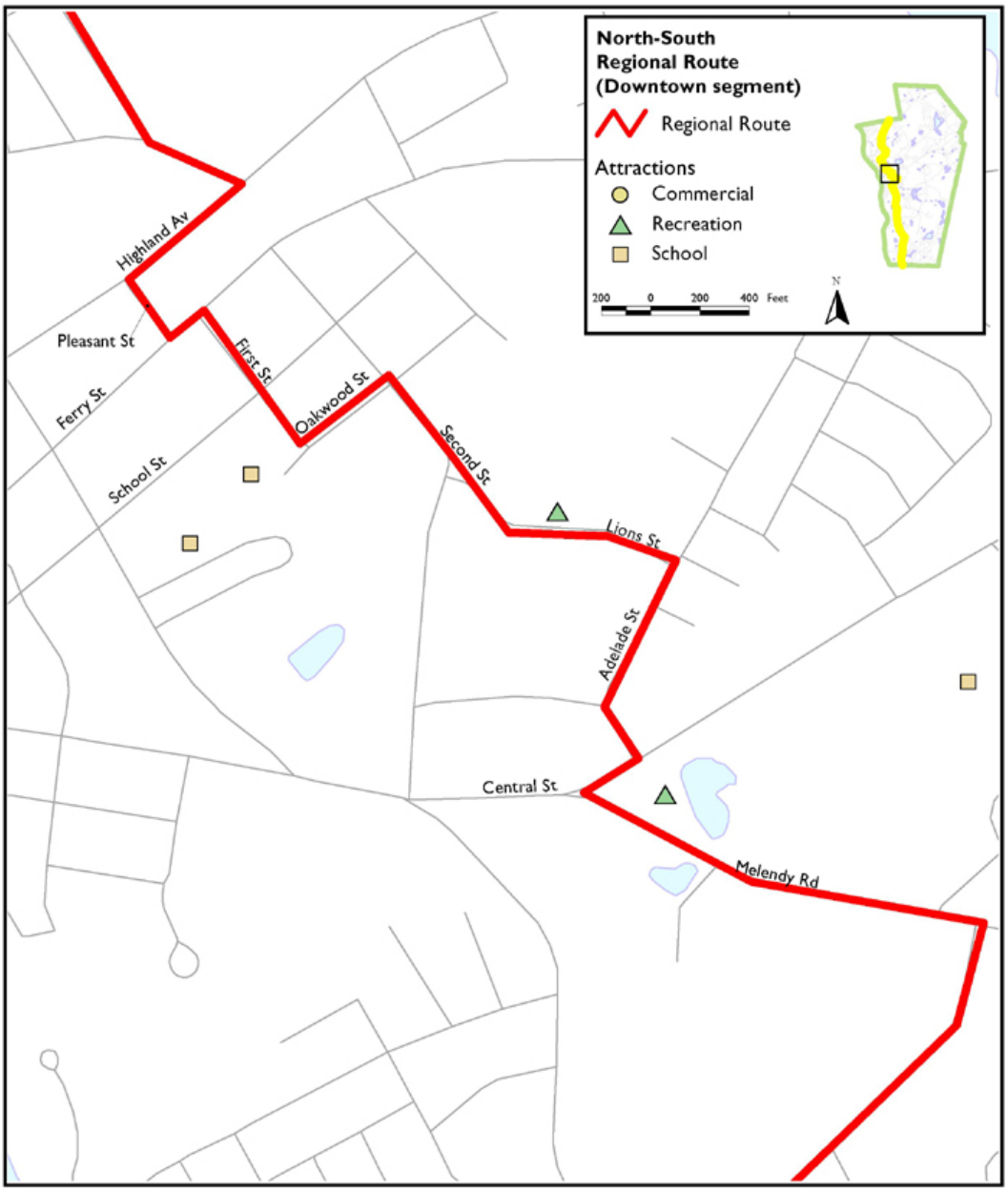


Table V-15. North to South Regional Route – Town Center Segment

Road Segments in Town Center	Recommendations
From Highland Street to Pleasant Street	Sign to turn left on Pleasant Street
From 1st Street to Oakwood Street	Sign to turn left on Oakwood Street
From Oakwood Street to 2nd Street	Sign to turn right on 2nd Street
From 2nd Street to Lions Street	Sign to turn left on Lions Street
From Lions Street to Adelaide Street	Sign to turn right on Adelaide Street
From Adelaide Street to Central Street	Sign to turn right on Central Street
From Central Street to Melendy Road	Bicycle Crossing painted on Central Street. Sign to turn left on Melendy Road.

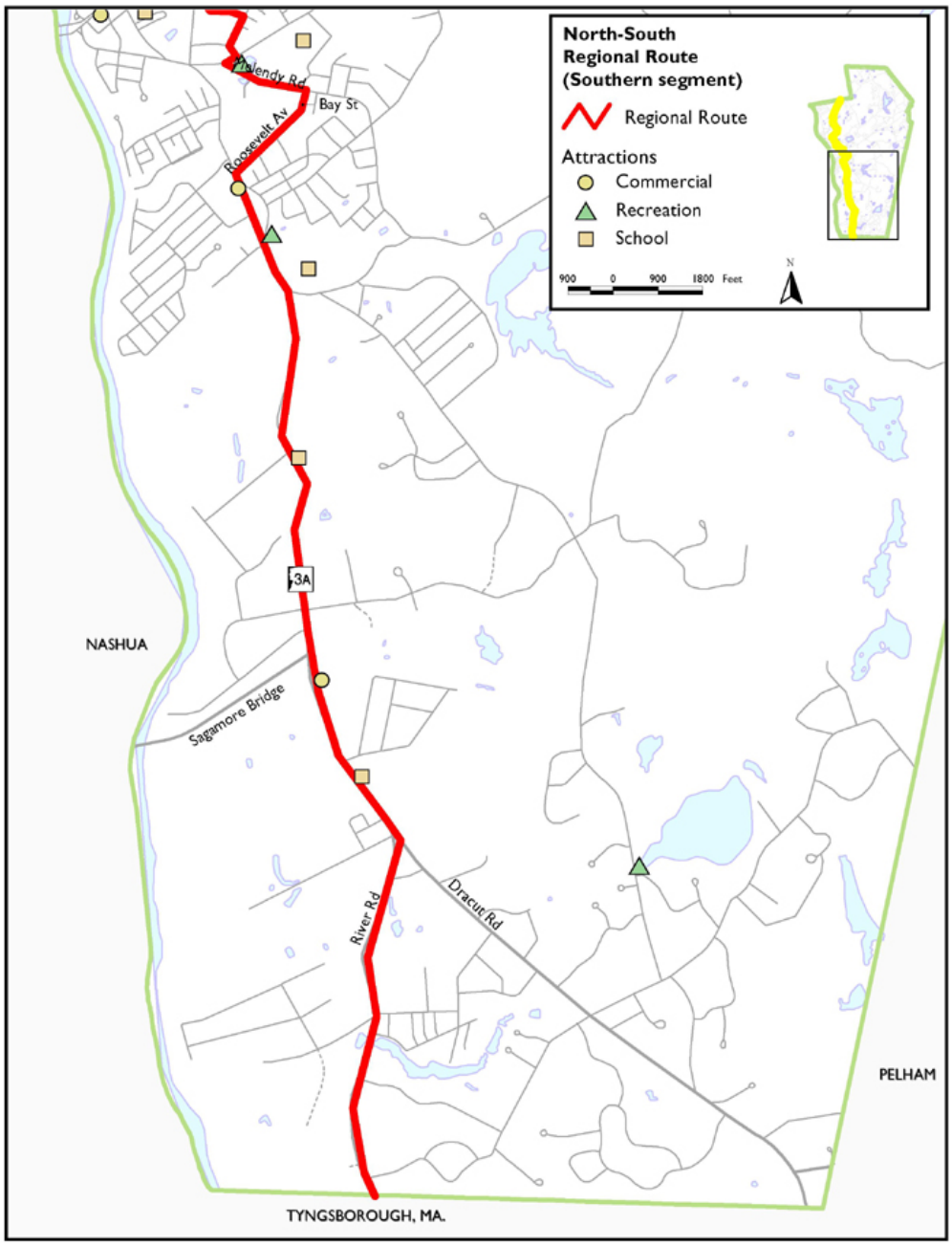
Map V-11. North to South Regional Route – Town Center Segment



TableV-16. North to South Regional Route - Southern Segement

Road Segments South of Town Center	Recommendations
From Melendy Road to Roosevelt Avenue	Sign to turn right on Roosevelt Avenue Extend shoulder/strip a bike lane when the road is improved
From Roosevelt Avenue to NH 3A	Bicycle Crossing Warning painted on NH 3A Sign to turn left on NH 3A Extend shoulder/strip for a bike lane when the road is improved
Along NH 3A to Massachusetts Line	Continue signs down NH 3A as needed

Map V-12. North to South Regional Route - Southern Segment



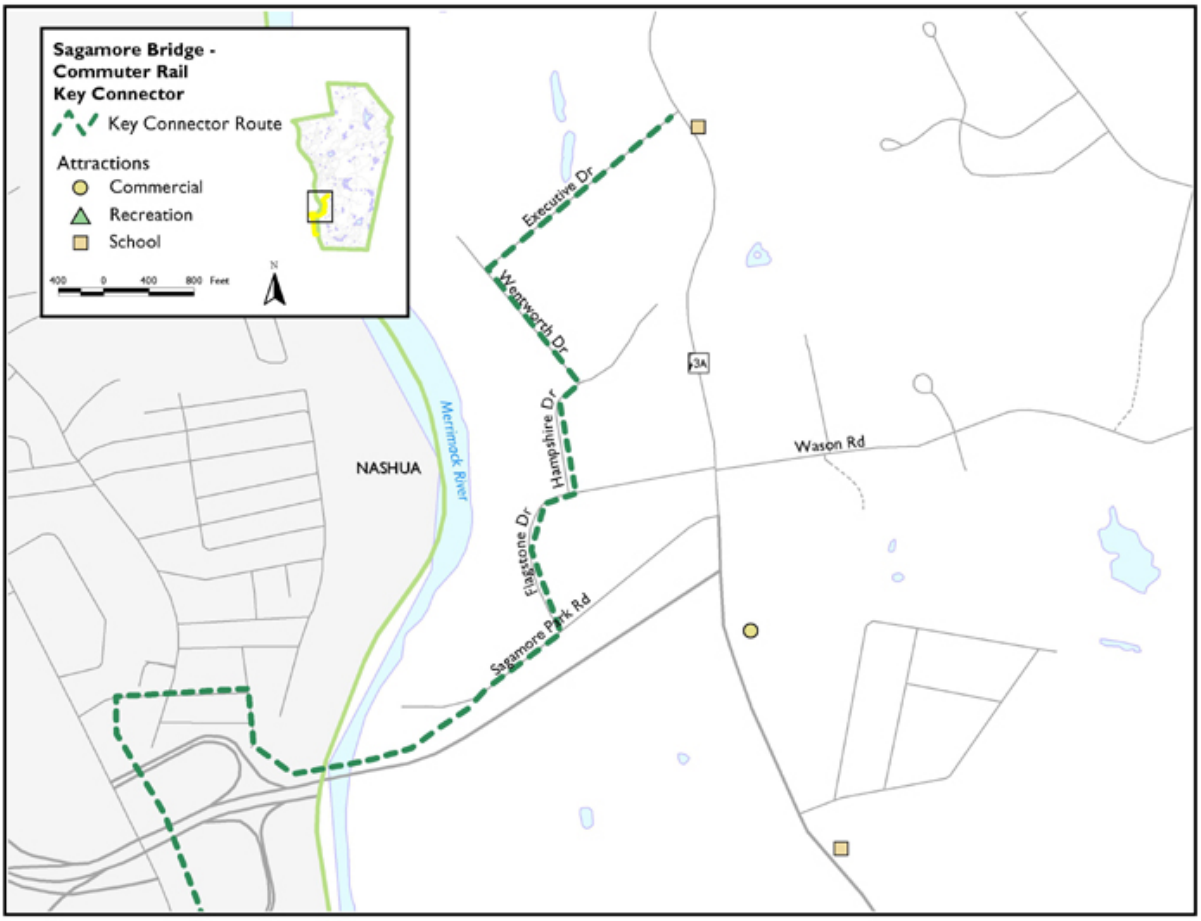
b. Key Connector Routes

Key connector routes are bicycle or pedestrian facilities that connect to regional routes within the municipality or to other regional routes/destinations in surrounding communities. The Sagamore Bridge-Commuter Rail Connector is an existing separated bicycle and pedestrian path across the Merrimack River on the Sagamore Bridge, as illustrated on Map V-13. Specific recommendations are shown in Table V-17.

Table V-17. Sagamore Bridge - Commuter Rail Key Connector

Road Segments to go West	Recommendations
Along NH 3A to Executive Drive intersection	Sign to Nashua and points west at intersection
Along Executive Drive to Wentworth Drive	Sign to turn left on Wentworth Drive
Along Wentworth Drive to Hampshire Drive	Sign to turn right on Hampshire Drive
Along Hampshire Drive to Flagstone Drive	Sign to turn right on Flagstone Drive
Along Flagstone Drive to Sagamore Park Drive	Sign to turn right on Sagamore Park Drive to Bike Trail over the Sagamore Bridge to Nashua

Map V-13. Sagamore Bridge - Commuter Rail Key Connector



c. Local Routes

Source: Dan Burden, Walkable Communities

Local routes are bicycle and pedestrian facilities that people would generally use to ride or walk to work, school, social visits, town facilities, shopping and/or recreation attractions. They include most local residential roads. Segments of these routes may overlap with the regional and/or key connector bicycle and pedestrian routes. Conducting a comprehensive sidewalk survey is recommended along with an education program to educate the community that it is a state law to yield to pedestrians in crosswalks and to share the road with bicycles. The cable channel and town website are good mediums for promoting this educational program.

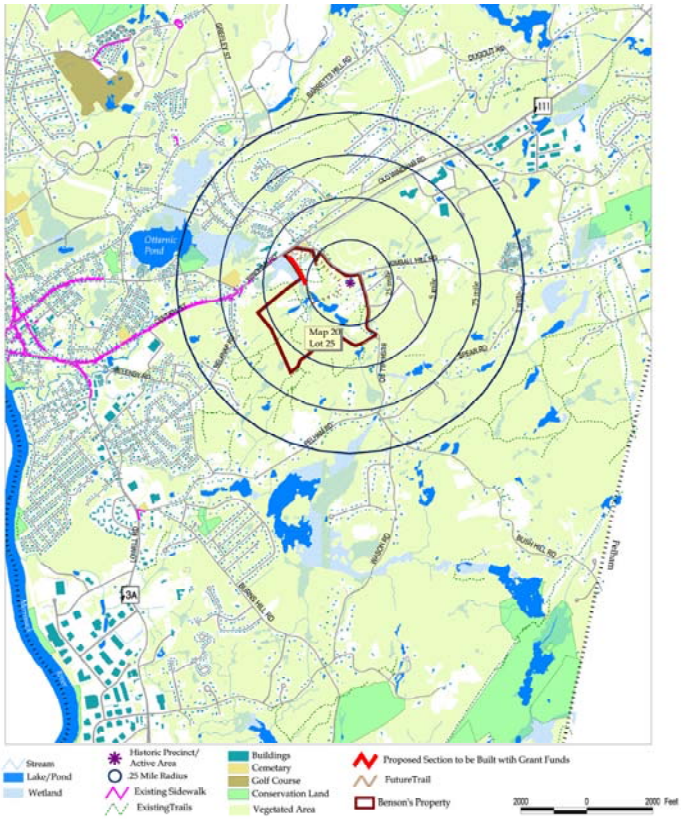
d. Class VI Roads

The Town presently contains 3.3 miles of Class VI roads (un-maintained). Opportunities for obtaining rights of way to develop a town-wide bicycle and pedestrian system are dwindling due to ongoing residential, commercial and industrial development. The Class VI un-maintained roads in the Town represent an opportunity to add to the recreational trail system in the Town and can provide both bicycle and pedestrian access at limited cost.

e. Benson's Site

The soon to be acquired Benson's site represents a significant opportunity for the Town to provide open space and recreational activities. It is important to provide access to the Benson's site by means other than just by personal vehicle. This will allow and encourage those who cannot drive to participate in recreational and educational activities as well as reduce traffic congestion and the need for excessive parking areas during larger events. The 168-acre property abuts two large tracts of land on the north and east destined for residential development. Sidewalks and a crosswalk to the main entrance of the site on Kimball Hill Road should be considered during any development of the northern site (Shepherd's Hill). In addition, Map V-14 illustrates walking and riding distance within a mile of the Park. Each circle represents a quarter of a mile. It is recommended that multi-use paths be considered for future development within this radius. See Chapter VIII, Community Facilities for additional detail on the Benson's site.

Map V-14. One Mile Radius of Benson's Site



f. Riverwalk

Another future opportunity is a proposed bicycle and/or pedestrian route along the Merrimack River. The Merrimack River Shoreline Assessment Phases I & II[10] investigated the possibility of developing a trail, a location for a boat ramp, and additional recreational opportunities along the river. The best location for a riverside boat ramp and/or park lies in north Hudson. The opportunity exists to secure recreation easements on two parcels (Map 23, Lot 5 and Map 23, Lot 4-1). The riverside trail could continue south through the "Riverwalk" elderly housing development where a trail is indicated on the site plan, and on through the existing easements in the Garrison Farms Subdivision. Due to the proximity of houses to the river bank, the trail would need to be diverted to Webster Street and go under the Taylor's Falls/Veterans Bridge (with some work on the existing 1.25 acre Town-owned property). The existing sewer easement on Map 47, Lots 136 and 138 may then suffice to connect a 0.05 acre piece of Town-owned land near the bridge to Merrill Park. First Brook will be difficult to cross due to the proximity of houses and the width of the floodplain. The trail could wind through the neighborhoods and join the existing sidewalks on Central Street. Once on the Central Street sidewalk system, pedestrians could access the Town Center area, Lions Hall, the skateboard park or the Benson's site.

PSNH easement on the Friary property

Bicyclists or pedestrians who wish to follow the river further south would turn down Riverside Street to Riverview Avenue. The Town owns 0.44 of an acre (Map 45, Lot 26-16) at the convergence of Second Brook and the Merrimack River. The route would continue down Radcliffe Drive, up Winnhaven Drive and along Birch Street to Lowell Road. The Birchcroft subdivision is directly on the river making it unfeasible to continue the route along the water. It is recommended that the Town consider acquiring a recreational easement along the northern property line of the former Friary property and investigate alternatives to connect the Birchcroft subdivision to the existing trail along the PSNH powerlines on the PressTek property. A 30-foot sewer easement does run through the Friary property and parts of it could possibly be used as a trail. There is a 15-foot ROW to Executive Drive within the Industrial/Technology Park between PressTek and Southeast Container Corporation. At the present time the Town is pursuing additional easements along the rivers edge to the south. The steepness of the banks increase at Atrium Medical, which currently has a recorded easement. The cost of construction may be prohibitive to continue along the waters edge any further. There is a separated bicycle/pedestrian path at the southern end of the industrial park that crosses the

[10] Nashua Regional Planning Commission, *Town of Hudson, Merrimack Riverwalk Shoreline Survey*, February, 2000 and *Merrimack River Shoreline Assessment Phase II*, December, 2000.

Merrimack River on the Sagamore Bridge into the City of Nashua. See NRPC's *Merrimack River Shoreline Assessment, Phase II*, December 2000, for more details and maps.

5. Funding for Bicycle and Pedestrian Facilities

Funding for bicycle and pedestrian facilities could be obtained through a Town pedestrian and/or bicycle facilities fund, the collection of impact fees, or through an application to the NH DOT Transportation Enhancements Program. The Federal Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991 provided funds for transportation enhancement activities. 10% of the State of New Hampshire's apportionment of the Surface Transportation Program (STP) from the federal highway trust fund must be set aside for transportation enhancement activities. The 1998 Transportation Equity Act for the 21st Century (TEA-21) continued the enhancement program (Appendix V-4). The federal share for the program is a maximum 80% of the total cost and the applicant is responsible for supplying the local 20% match. Some of the projects eligible for the competitive enhancement funds include: bicycle and pedestrian facilities, acquisition of scenic easements, historic preservation, and scenic and transportation museum programs.

F. PUBLIC TRANSIT

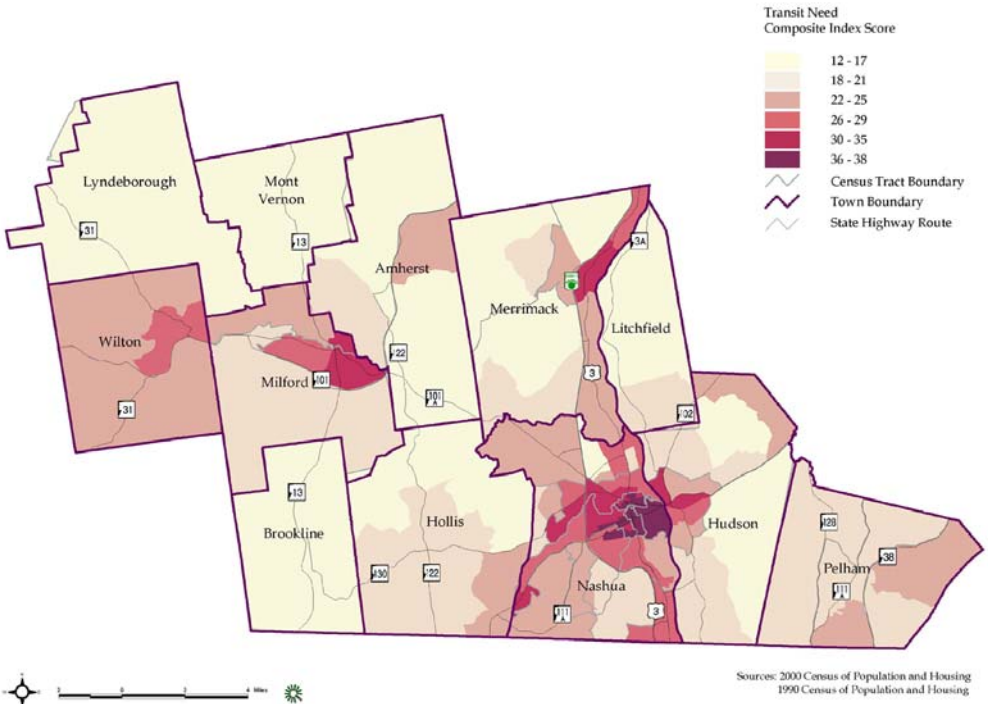
Areas with high densities, high populations of youth, elderly, and disabled persons as well as low median incomes, high poverty rates and lack of automobile availability typically have a significant need for public transit services. Hudson is comprised of three census tracts: tract 121, tract 122 and tract 123. Portions of tract 122, which includes the higher density traditional center of Hudson, ranks high in many of these categories and therefore exhibits a significant need for transit service. Introducing fixed route transit service in this area would facilitate mobility and increase access to employment opportunities, commercial and retail establishments, and future commuter rail service.

1. Transit Needs Index Score

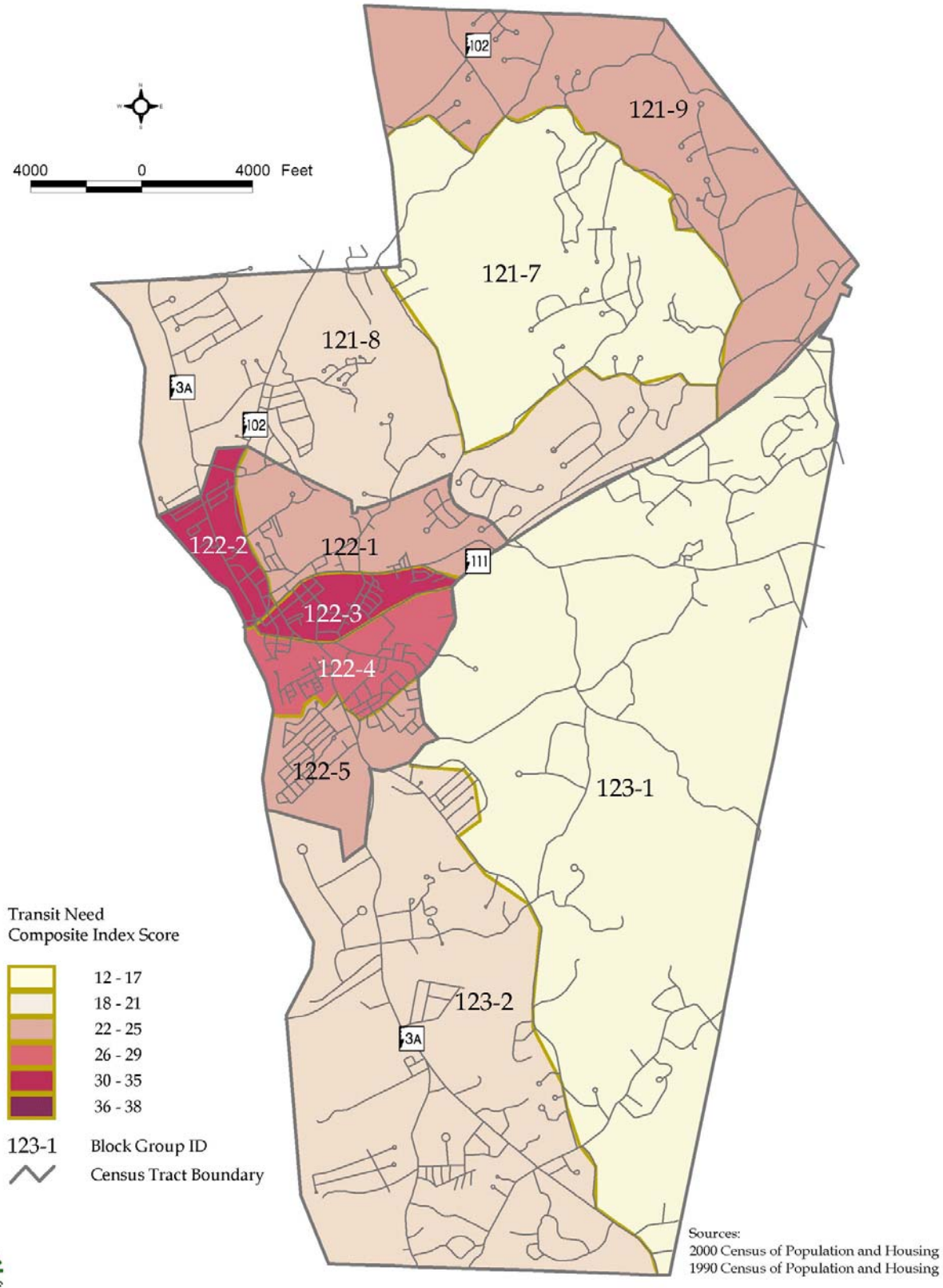
The Nashua Regional Planning Commission (NRPC) used the following methodology to develop a transit needs index and identify the areas of greatest transit need throughout the region. Each census block group (the smallest geographic area designated by the US Census Bureau) within the region was ranked by an index score to determine the geographic areas in greatest need of transit services. The index score was developed by assigning a rank to each block group based on seven transit needs factors as follows: 1) population density; 2) youth population; 3) elderly population; 4) disabled status; 5) median household income; 6) poverty status; and 7) automobile availability.

All of the block groups were assigned a number between 1 and 6 for each of the seven transit need categories. A ranking of 1 indicates a low transit need and 6 indicates a high transit need. For instance, higher densities can better support public transit, so a block group with a population density of 100 people per square mile would receive a 1, while a density of 10,000 people per square mile would receive a 6. The rankings of 1-6 were then totaled for each block group for a possible index score between 7 and 42. Map V-15 illustrates the composite index scores for all block groups within the region. Map V-16 illustrates the composite index scores for all block groups within Hudson. Index scores are shown in Table V-18. The highest index score indicates the greatest potential transit need while the lowest score indicates the lowest potential transit need.

Map V-15. Region Wide Transit Need Index Score



Map V-16. Hudson Transit Need Index Score



Maps V-15 and V-16 indicate that Hudson's Town Center has one of the highest transit needs in the region, especially along NH 102, NH 111, and NH 3A. Residents in the Town Center and surrounding areas have a high transit need based on a high concentration of elderly and disabled persons with median incomes between $39,500 and $52,000, as well as increased poverty rates and a large percentage of households with zero or one vehicle available. The Town Center's proximity to Nashua makes this an ideal location to create a transit connection and increase access between residences, retail establishments, and employment sites.

Table V-18. Index Scores by Block Group ID

Block Group ID	Pop. Density	Density Index	Median HH Income	Income Index	% In Poverty	Poverty Index	% Elderly	Elderly Index	% Youth	Youth Index	% Disabled	Disabled Index	% with 1-2 Cars	Cars Index	Total Index
121-7	484.31	2	$86,517	1	0.0	1	3.5	1	35.1	6	9.2	2	17.9	2	15
121-8	1071.34	3	$78,520	2	1.7	2	7.0	3	31.5	5	10.4	2	19.0	2	19
121-9	457.26	2	$61,677	4	5.0	5	4.8	1	35.4	6	10.7	2	23.4	3	23
122-1	1386.35	3	$55,930	4	4.9	5	11.8	5	25.8	2	12.6	3	29.1	3	25
122-2	3653.94	5	$39,500	5	6.2	5	10.0	4	28.3	3	13.3	3	51.4	5	30
122-3	2872.59	4	$43,321	5	2.9	3	14.3	6	25.3	2	21.4	6	33.9	4	30
122-4	2659.25	4	$47,500	5	2.8	3	8.1	3	27.1	2	18.1	5	46.8	5	27
122-5	2697.10	4	$60,650	4	2.6	3	9.1	3	26.7	2	14.3	4	29.6	3	23
123-1	379.33	2	$71,064	2	0.6	1	5.3	1	31.9	5	10.0	2	22.7	3	16
123-2	707.97	3	$74,464	2	1.8	2	9.6	4	30.3	4	10.1	2	17.0	2	19

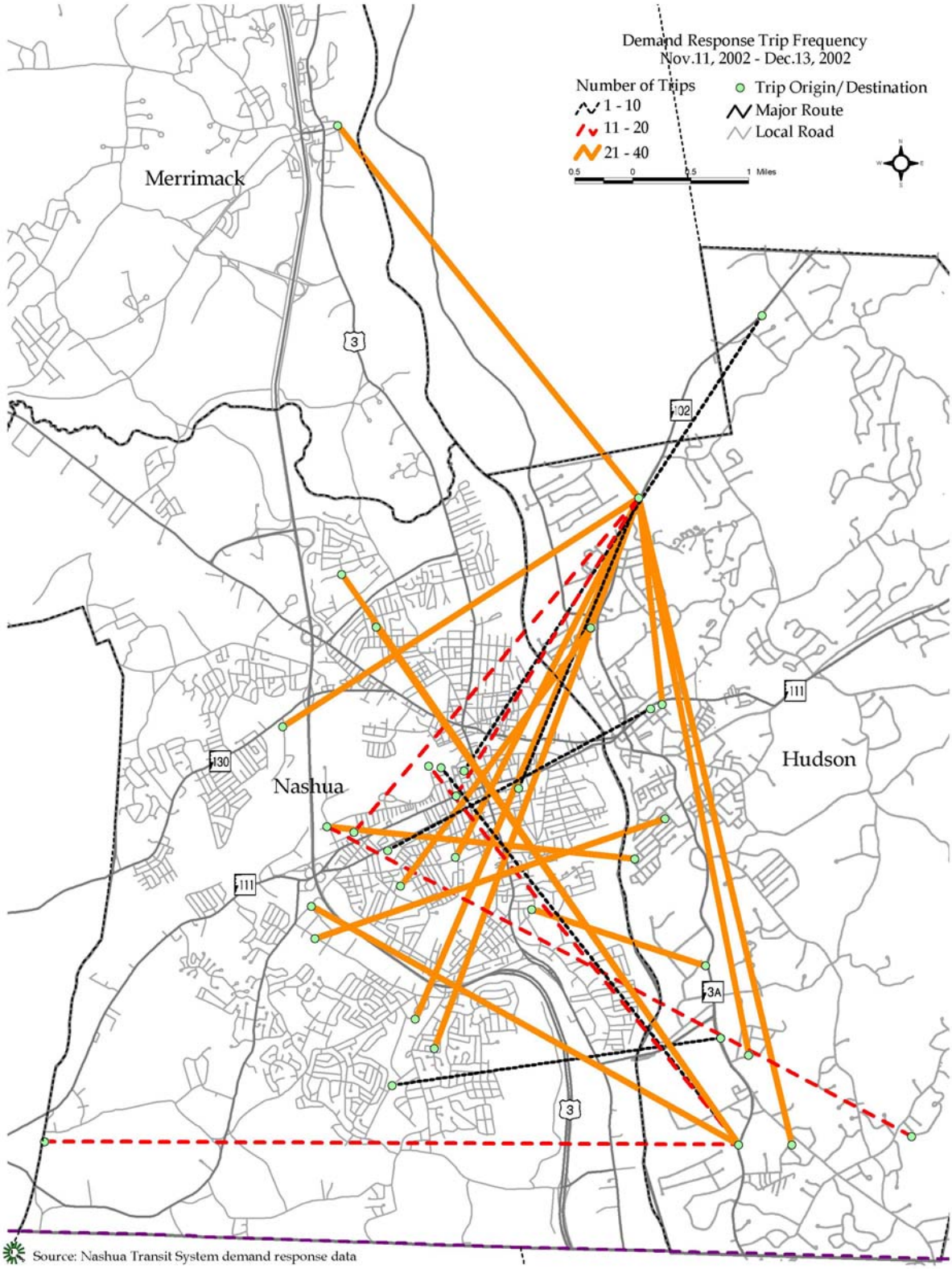
Source: NRPC, 2003.

2. Demand Response Service

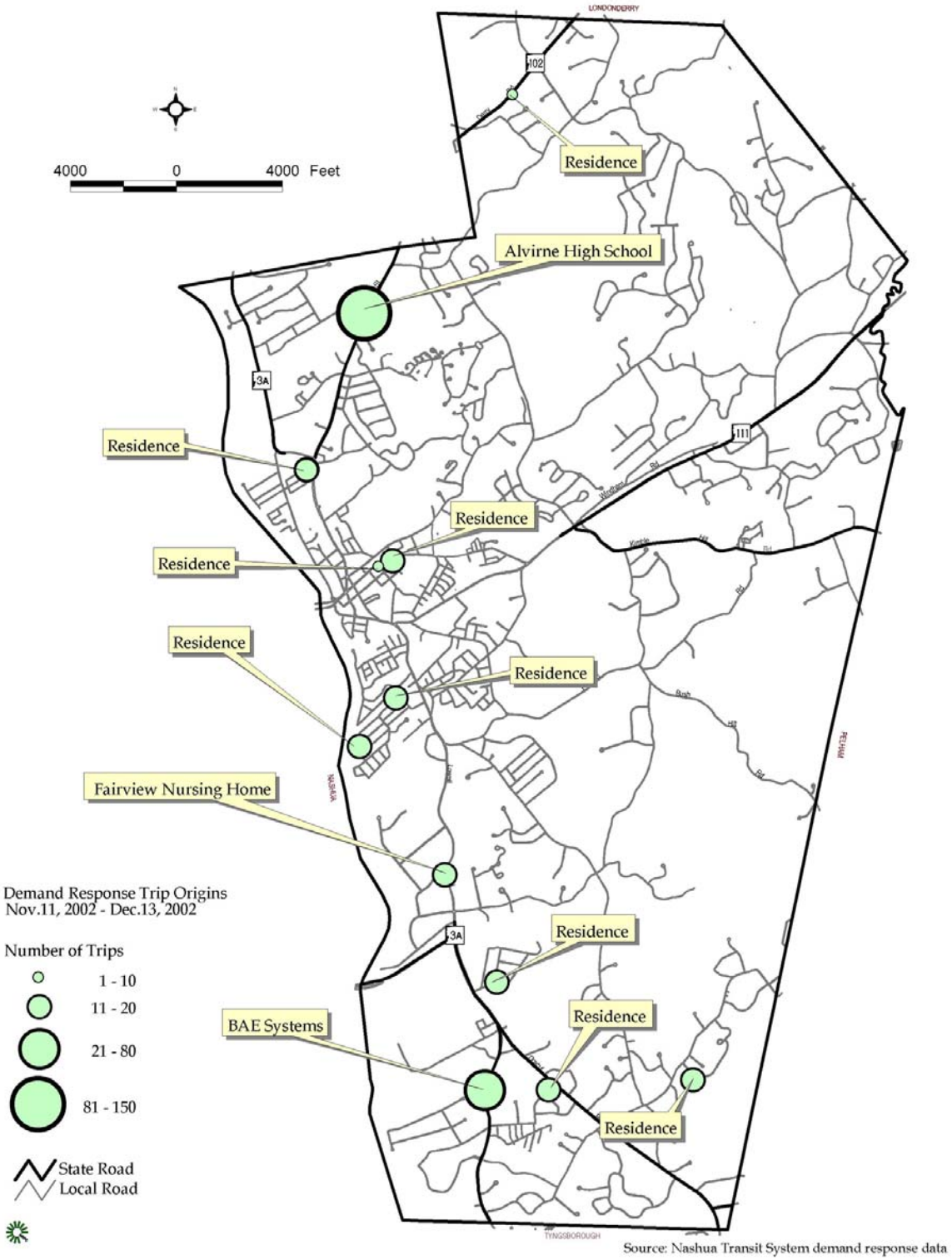
Demand response service currently operates in Hudson, Monday through Friday, between the hours of approximately 8:00 – 10:30AM and 1:00 – 3:30PM. All demand response trips during a four week period between November 11th – 22nd 2002 and December 2nd – December 13th 2002 have been counted and mapped to determine the total number of rides provided in Hudson as well as the most common origin and destination points within the Town.

Map V-17 uses different lines to depict the frequency of trips between each origin and destination point. Map V-18 illustrates the number of trips originating at demand response locations throughout Hudson. Map V-19 illustrates the number of trips terminating at demand response locations throughout Hudson. Alvirne High School and BAE Systems have the greatest number of trips originating and terminating at their locations. Over the four week period, 144 trips originated and 144 trips terminated at Alvirne High School, located at 200 Derry Road, for a total of 288 demand response trips. These trips are providing rides for adults who participate in the Adult Day Services program offered at the high school. BAE Systems, at 65 River Road, had the second largest number of trips with 76 trips originating and 65 trips terminating for a total of 141 demand response trips. A number of disabled adults work an early morning shift at BAE Systems. This shift starts too early to be accommodated by Citylift, so many riders only use demand response for their return trip home. This explains the greater number of demand response trips originating compared to terminating at BAE Systems.

Map V-17. Demand Response Trip Frequency, 2002

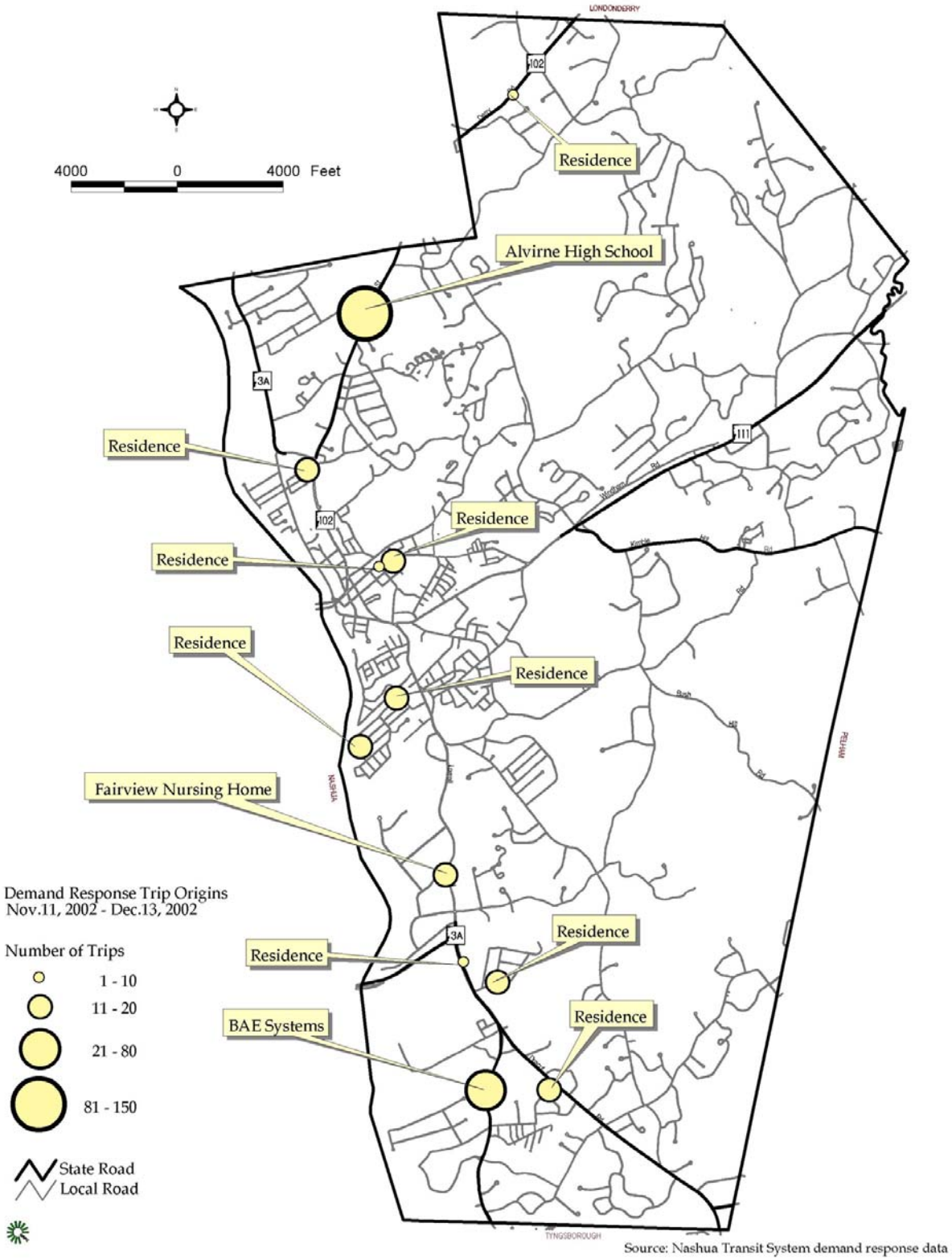


Map V-18. Demand Response Trip Origins



Source: Nashua Transit System demand response data

Map V-19. Demand Response Trip Destinations



Source: Nashua Transit System demand response data

Due to the lack of fixed route service in Hudson, demand response service is the only public transit service currently available to passengers. Although Hudson contributes to the cost of demand response service, the primary beneficiaries are Nashua residents traveling to the Adult Day Services program at Alvirne High School and Plus Company clients from Nashua traveling to BAE Systems. It would be more appropriate for the benefiting social service agencies to fund this service. This could be accomplished by direct contracts for services between the social service agencies and Nashua Transit System.

Qualifying disabled adults and children as well as senior citizens can use demand response service; however, the 2000 Census data indicates that a significant transit need also exists amongst the greater population. Census tract 122 has a median household income of $49,753, with 294 individuals in a state of poverty, 1,228 disabled persons and 189 households with no available vehicle. These findings suggest many Hudson residents would benefit from public transit service to access employment and commercial establishments. The most beneficial investment that Hudson could make in transit would be contributions to develop regularly scheduled transit service in the Town. The following describes a plan for transit service development in the community.

3. Suggestions for Future Service Improvements

Southern New Hampshire is one of the most populated and fastest growing areas of the state. Continued growth will increase the need for public transit services to facilitate access to employment and retail locations throughout the region. Demand response is currently the only public transit service available in the Town of Hudson, and serves elders and individuals with disabilities who cannot utilize fixed route service. Fixed route service would provide rides to the general public at established times. Below is a three phase scenario to integrate fixed route service into Hudson starting with the most cost effective option and ending with the highest service option. All proposed services will operate Monday through Friday and include the assumption of continued limited demand response service in Hudson. The proposed routes are illustrated on Map V-20.

a. Phase 1

- A single bus commuter service with limited designated stops; however, passengers may signal the bus to stop at safe locations along the route.
- Six round trips per day, three during peak morning hours and three during peak afternoon hours.
- The proposed loop would leave the transit center in downtown Nashua, cross over the Taylor's Falls/Veterans Bridge into Hudson center, travel south on Lowell Road past Wal-Mart and Sam's Club, circle around BAE systems, and head north again on Lowell Road, then west over the Sagamore bridge, and return to the transit center.
- Due to bridge traffic this run will travel eastbound on Bridge Street over the Taylor's Falls Bridge, south down Lowell Road and westbound over the Sagamore bridge during the morning runs, and in the reverse direction during afternoon runs.

b. Phase 2

- A single bus commuter service during the morning and afternoon peak hours with midday deviated fixed route service.
- Six round trips per day, three during peak morning hours and three during peak afternoon hours.

- The commuter service would travel the same route as discussed in Phase 1; however, the midday deviated fixed route service will travel solely within the Hudson town limits and will deviate within ¾ mile of either side of the fixed route.

c. Phase 3

- This level of service would require one bus designated for Hudson service only and an additional shared bus to extend the existing Nashua service to connect with Hudson's Town Center.
- A shelter would be located in Hudson's Town Center to serve as a transfer point between the two buses.
- The Hudson bus would run north and south between the Town Center and southern points on Lowell Road, while the extended Nashua service would cross the Taylor's Falls Bridge into Hudson's Town Center, head north on NH 102 and circle the Hudson Mall, stop at the transfer point and return to the Nashua transit station along the same route.
- Both routes would provide fixed route service during the NTS weekday hours of operation.
- Demand response service would operate within ¾ mile of either route.

The interconnection between Nashua and Hudson is constrained by traffic, especially at the Taylor's Falls/Veterans Bridge and Sagamore Bridge, making it difficult to maintain a regular schedule. Regularly scheduled service would be more feasible with the anticipated traffic relief associated with the construction of the Circumferential Highway bridge over the Merrimack River. Please note that the proposed transit services are intended to serve as a guide and specific service options will need to be jointly developed between the Town and Nashua Transit System.

4. Cost of Proposed Future Service Improvements

An estimate of the annual cost of the proposed future service improvements is shown in Table V-19. The *Total Project Cost* identifies the total cost of providing the service on a yearly basis, the *Percentage of Local Match* lists the percentage of the total expense that must be provided as a local match, and the *Total Local Cost* lists the total annual cost to Hudson to provide the service. The local match percentage is based on Section 5307 funds, which provide a 50% federal match and 50% local match. Congestion Mitigation and Air Quality (CMAQ) funds may provide additional funding opportunities. CMAQ monies are competitive grant funds and there are no guarantees that this project would receive these funds. CMAQ funds provide an 80% federal match and 20% local match for operating the first three years of a pilot transit project, after which time local communities would need to provide other funding sources for continued service.

Table V-19. Financial Analysis for Service Extensions to Hudson

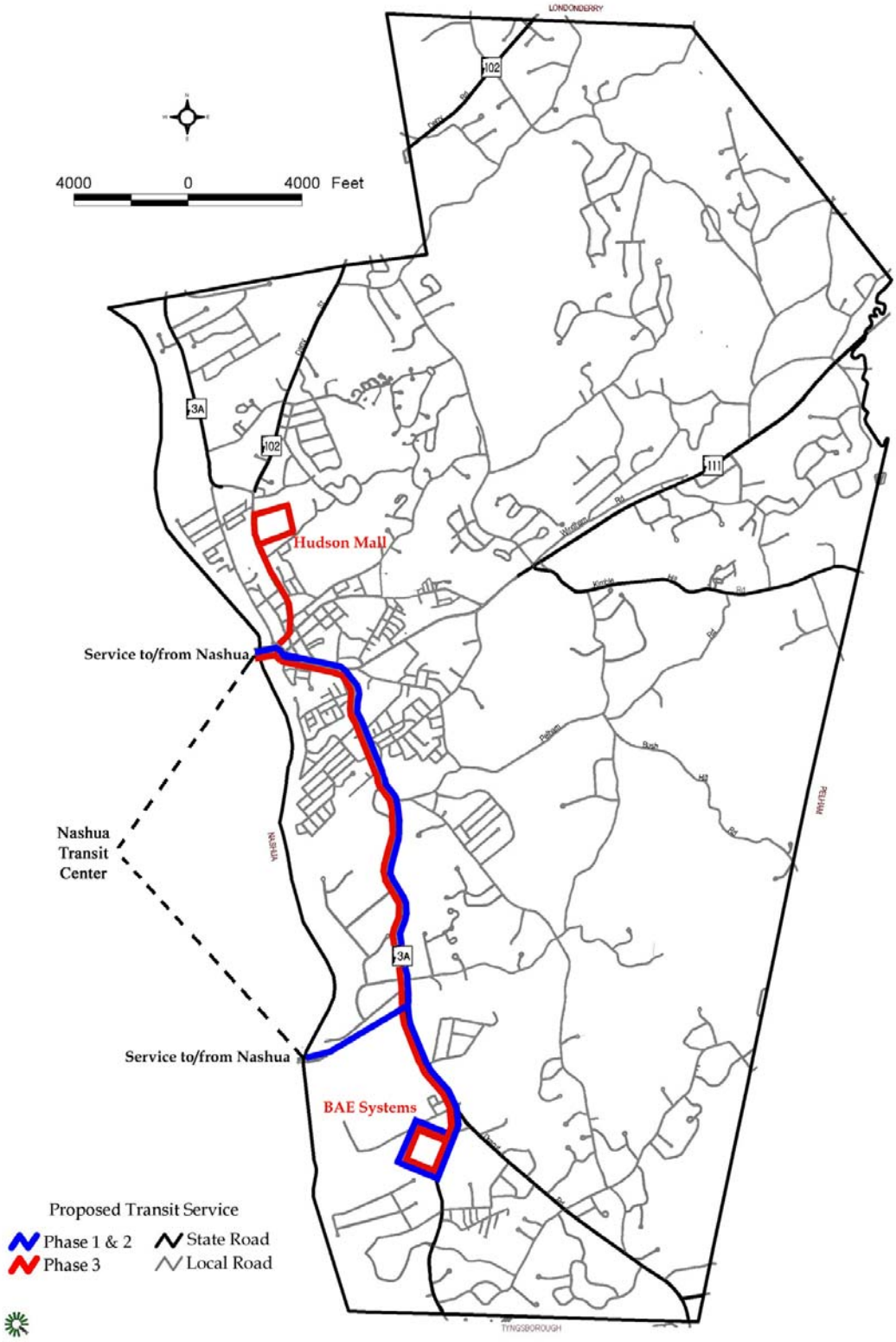
Type of Service	Phase 1	Phase 2	Phase 3
Fixed Route Loop	$75,000	$75,000	-
Midday Deviated Fixed Route*	-	$68,000	-
Fixed Route Hudson Mall	-	-	$62,500
Fixed Route Hudson only	-	-	$125,000
Demand Response**	-	-	$35,000
Total Project Cost	**$75,000**	**$143,000**	**$222,500**
Percentage of Local Match	50%	50%	50%
Total Local Cost	**$37,500**	**$71,500**	**$111,250**

Note: These numbers are estimates and based on Fiscal Year 2003 costs.

* Phase 2 Midday service will provide deviated fixed route service within ¾ mile of either side of the fixed route. This service will be limited to Hudson town limits and will operate during the midday, between the commuter service runs.

** Phase 3 Demand Response service cost assumes 6 hours of service, Monday through Friday, for the first year. Demand will determine future service hours and costs.

Map V-20. Proposed Future Transit Service



G. RECOMMENDATIONS

- The Town should budget for traffic improvements in its Capital Improvement Program and undertake a systematic transportation system improvement program. The Town should include in its CIP improvement projects for the NH 102/NH 111/Chase Road intersection, the NH 111/Kimball Hill Road/Greeley Road intersection and the NH 3A/County Road (south) and County Road/Belknap Road intersections. The Town should work closely with NH DOT and NRPC to secure federal funding for eligible road projects.
- The Town should develop further engineering studies to assess safety at high accident rate intersections.
- The Town should develop further traffic engineering studies to assess the impact of changing patterns of future traffic conditions, especially along the corridors of NH 3A, Dracut Road, and NH 111.
- The Town should encourage alternative commuting options for residents including fixed route bus routes, carpooling and vanpooling, and commuter rail.
- The Town should reconsider its pavement width requirements for local streets and sidewalks based on function and needs.
- The Town should employ access management techniques for the purpose of preserving roadway capacity and ensuring safe movement for vehicles entering and exiting curb cuts and side roads. These techniques should be applied to major corridors in the Town including NH 3A, NH 102, NH 111 and Dracut Road. Access management techniques that should be pursued include implementing minimum driveway separation distances based on roadway speed, entering into a Memorandum of Understanding with the NH DOT for review of access points and other techniques as recommended in the NRPC *Access Management Guidelines*, 2002.
- The Town should re-assess existing site plan, subdivision and zoning requirements based on recommendations included in the NRPC's, *Non-Residential Development Community Character Guidelines*, 2000. Any revisions based on these site design guidelines could also enhance the access management goals.
- The Town should utilize traffic calming measures where appropriate based on traffic flow and right of way constraints to direct and control traffic through neighborhoods.
- The Planning Board should maintain close contact with the NH DOT to ensure ample opportunity for public and Town input regarding any planned changes to state roads within Hudson or routes feeding traffic into Town.
- The Town should consider utilizing the State's scenic designation statute to preserve the rural integrity of specific roads, with input from the Town's Highway Safety Committee and the public.
- The Town should continue to consider widening and restriping roadways for bicycle access whenever roadways are repaved or reconstructed.
- The Town should connect the missing links in the Town Center sidewalk network.
- The Town should implement the recommended improvements necessary to develop a regional and key connector bicycle and pedestrian network, including the installation of signage, connector routes and crosswalks.
- The Planning Board should ensure that multi-use paths are considered for future development within a one-mile radius of the Benson's site.

- The Town should consider utilizing the remaining Class VI roads for bicycle and pedestrian access.
- The Town should continue to implement the recommendations of the *Town of Hudson, Merrimack River Shoreline Assessment*, *Phase II,* December 2000.

#220F-5

APPENDIX V-I

Classification Schemes

State Aid Classification[11]

Class I, Primary State Highway System, consists of all existing or proposed highways on the primary state highway system, excepting all portions of such highways within the compact sections of towns and cities, provided that the portions of turnpikes and interstate highways within the compact sections of those cities are Class I highways.

Class II, Secondary State-Highway System, consists of all existing or proposed highways on the secondary state highway system, excepting portions of such highways within the compact sections of towns and cities. All sections improved to the satisfaction of the Commissioner are maintained and reconstructed by the State. All unimproved sections, where no state and local funds have been expended, must be maintained by the Town or city in which they are located until improved to the satisfaction of the highway commissioner. All bridges improved to state standards with state aid bridge funds are maintained by the State. All other bridges shall be maintained by the city or town until such improvement is made.

Class III, Recreational Roads, consist of all such roads leading to, and within state reservations designated by the Legislature. The NH DOT assumes full control of reconstruction and maintenance of such roads.

Class IV, Local Roads, consist of all local roads within the urban compact sections of cities and towns listed in RSA 229:5, V. The urban compact section of any such city or town shall be the territory within such city or town where the frontage on any road, in the opinion of the Highway Commissioner, is mainly occupied by dwellings or buildings in which people live or business is conducted, throughout the year. No highway reclassification from Class I or II to Class IV shall take effect until all rehabilitation needed to return the road surface to reputable condition has been completed by the State.

Class V, Rural Local Roads, consist of all other traveled roads which the town or city has the duty to maintain regularly.

Class VI, Local Roads, Not Maintained, consist of all other existing public ways, including roads subject to gates and bars, and roads not maintained in suitable condition for travel for five years or more.

[11] NH Department of Transportation, 2004.

APPENDIX V-1 (Continued)

Classification Schemes

Functional Classification[11]

Principal Arterial, provides corridor movement suitable for substantial statewide or interstate travel and provides continuity for all rural arterials which intercept the urban area. Serves the major traffic movements within urbanized areas such as between central business districts and outlying residential areas, between major inter-city communities or between major suburban centers. Serves a major portion of the trips entering and leaving the urban area, as well as the majority of the through traffic desiring to bypass the central city.

Minor Arterial, serves trips of moderate length at a somewhat lower level of travel mobility than principal arterials. Provides access to geographic areas smaller than those served by the higher system. Provides intra-community continuity, but does not penetrate identifiable neighborhoods.

Collector, collects traffic from local roads and channels it into the arterial system. Provides land access and traffic circulation within residential neighborhoods and commercial and industrial areas.

Local, comprise all facilities not on higher systems. Provides access to land and higher systems. Through traffic usage is discouraged.

Town of Hudson Street Classification

Major Streets - Streets designed, or required, to carry large volumes of traffic to, from, or through the Town.

Collector Streets- Streets designed, or required, to collect traffic from minor streets and distributing traffic to major streets.

Commercial Streets - Streets designed, or required, to serve industrial or mercantile concentrations and carry traffic to major streets.

Residential Streets - Streets designed, or required, to provide vehicular access to abutting residential properties.

Service Streets - Streets designed, or required, to provide vehicular access to abutting commercial or industrial properties.

Access Streets - Streets or minor ways**,** designed, or required, to provide vehicular access to off-street loading or off-street parking facilities.

[11] NH Department of Transportation, 2004.

APPENDIX V-2

Existing Weekday Traffic Counts and Historic Trends In Hudson

	Barrett Hill Road E. of Greeley Street 229034		Belknap Road S. of Central Street 229069		Bush Hill Road S. of Kimball Hill Road 229043	
Year	Month	Total	Month	Total	Month	Total
1983		1,965				
1984						
1985						
1986					5	3,004
1987	5	2,635		5,323		
1988	8	2,811				
1989			6	5,889		
1990						
1991	5	2,970				
1992			6	5,938	5	2,176
1993	7	3,435				
1994	7	4,004	5	6,005	5	2,357
1995	7	3,611	5	5,653		
1996					5	2,395
1997	7	3,395			7	2,492
1998			11	5,937		
1999						
2000					5	2,985
2001			8	5,976		

	Central Street E. of Adelaide Street 229053		Chase Street S. of School Street 229503		Country Road @ Brook 229085	
Year	Month	Total	Month	Total	Month	Total
1989						
1990			8	8,841		
1991						
1992	8	5,548			9	4,872
1993						
1994	7	5,330				
1995	7	4,451	10	9,539		
1996					9	4,689
1997	7	5,251				
1998			6	10,165		
1999					8	5,680
2000	5	5,818				
2001						

Weekday Traffic Count Trends in Hudson

	Dracut Road @ Massachusetts State Line 229054		Dracut Road 1 mile N. of Mass. S/L 229083		Dracut Road S. of NH 3A 229504	
Year	Month	Total	Month	Total	Month	Total
1984						7,300
1985						
1986						
1987						
1988	8	7,765				
1989					6	8,083
1990						
1991	5	6,392			6	8,456
1992	5	6,390				
1993	6	7,333			6	10,365
1994	8	7,245	6	10,544		
1995	7	7,065	7	9,738		
1996	8	7,669				
1997			7	11,031	5	11,018
1998	11	7,628				
1999	8	8,192				
2000			9	11,772		
2001	9	7,923				

	Flagstone Drive W. of NH 3A 229505		Greeley Street N. of NH 111 229519		Greeley Street S. of Highland Street 229033	
Year	Month	Total	Month	Total	Month	Total
1983	5	4,027				2,524
1984						
1985						
1986			5	4,442		
1987						
1988					8	3,751
1989					8	3,659
1990						
1991					5	3,652
1992	5	3,620				
1993						
1994					7	4,770
1995			5	5,148	7	4,461
1996						
1997					7	4,952
1998						
1999						
2000					5	5,944
2001						

Weekday Traffic Count Trends in Hudson

	Greeley Street N. of Highland Street 229084					
Year	Month	Total	Month	Total	Month	Total
1997	7	3,401				
1998						
1999						
2000	5	4,735				
2001						

	Highland Street N. of George Street 229032		Kimball Hill Road E. of Bush Hill Road 229072		Kimball Hill Road S. of NH 111 229060	
Year	Month	Total	Month	Total	Month	Total
1984		2,112				
1985						
1986				3,188		
1987	5	4,361				
1988			10	3,840		
1989						
1990	10	2,752			10	4,931
1991			10	3,762		
1992						
1993	9	3,151			9	4,950
1994						
1995	7	3,646	7	4,081	7	5,161
1996	8	3,447			8	5,407
1997						
1998			11	3,803	11	5,577
1999	8	4,068				
2000						
2001					8	6,001

Weekday Traffic Count Trends in Hudson

	Library Street N. of Central Street 229091		Library Street S. of School Street 229508		Melendy Road S. of Central Street (@Brook) 229068	
Year	Month	Total	Month	Total	Month	Total
1990			7	8,592	7	2,206
1991						
1992					9	2,612
1993					6	2,885
1994	7	8,975				
1995			10	9,128		
1996						
1997	7	8,738			5	2,720
1998						
1999						
2000	9	9,114			5	2,873
2001						

	Old Derry Road @ Londonderry T/L 229056		Old Derry Road E. of NH 102 229086		Pelham Road E. of NH 3A 229509	
Year	Month	Total	Month	Total	Month	Total
1983						696
1984						
1985						
1986						
1987						
1988						
1989					4	3,257
1990						
1991						
1992					5	3,972
1993						
1994			6	2,499	5	4,102
1995	7	432	7	2,730		
1996						
1997					8	3,634
1998	11	564	11	3,315		
1999						
2000						
2001			8	3,340		

Weekday Traffic Count Trends in Hudson

	Pelham Road E. of Melendy Road 229078		Sullivan Road S. of NH 111 229063		Wason Road E. of NH 3A 229038	
Year	Month	Total	Month	Total	Month	Total
1983						1,928
1984						
1985						
1986						
1987					5	2,808
1988					8	4,796
1989			7	1,705		
1990	10	1,036				
1991	5	1,023			5	6,131
1992			9	1,610		
1993			6	1,788	5	7,204
1994	7	985			7	7,691
1995	7	936			7	7,538
1996						
1997	7	1,013	7	1,546	7	8,811
1998						
1999						
2000	5	1,402	5	1,670	9	8,547
2001						

	Wason Road S. of Pelham Road 229037		Webster Street S. of NH 3A (Elm Avene) 229030		NH 102 @ Litchfield Town Line 229021	
Year	Month	Total	Month	Total	Month	Total
1983		895				
1984				811		
1985						
1986						
1987	5	2,412	5	2,142		
1988						
1989					9	16,261
1990					10	15,167
1991	5	1,762			5	15,947
1992			6	2,646	5	16,808
1993					6	16,907
1994						
1995			6	1,576	6	17,175
1996	9	3,030			5	18,208
1997					5	18,268
1998			6	1,396	7	17,905
1999	8	3,360				
2000						
2001			8	1,805	8	17,471

Weekday Traffic Count Trends in Hudson

	NH 102 @ Londonderry Town Line 229514		NH 102 N. of Easy Street 229041		Pelham Road W. of Bush Hill Road 229036	
Year	Month	Total	Month	Total	Month	Total
1983		13,805				
1984						
1985						
1986						
1987						
1988						
1989						
1990						
1991	9	12,517				
1992			5	18,835		
1993	8	12,990				
1994						
1995			5	19,028		
1996						
1997	7	15,221				
1998			7	19,268		
1999					8	1,180
2000						
2001			8	20,253		

	NH 102 N. of Ledge Street 229031		NH 102 N. of NH 111(Ferry Street) 229050		NH 111 @ Windham Town Line 229059	
Year	Month	Total	Month	Total	Month	Total
1983		24,444		16,659		
1984						
1985						
1986		28,800				
1987	5	32,107				
1988						
1989			4	20,582		
1990	10	28,957				
1991					9	14,682
1992	7	29,646			9	16,756
1993	6	31,544	6	21,869		
1994	8	30,196			8	16,471
1995	7	29,744				
1996	8	30,162				
1997			7	20,812	7	17,377
1998						
1999	8	31,386				
2000			5	22,030	5	17,154
2001						

Weekday Traffic Count Trends in Hudson

	NH 111 (Central Street) E. of Greeley Street 229035		NH 111 (Central Street) W. of Kimball Hill Road 229071		Clement Road S. of NH 111 229061	
Year	Month	Total	Month	Total	Month	Total
1983		13,593				
1984						
1985						
1986						
1987	5	16,111				
1988			8	22,447		
1989						
1990	10	16,639				
1991			5	22,395		
1992						
1993	6	18,192	7	22,426		
1994			5	24,395		
1995	5	19,412	7	23,061		
1996	5	18,362	9	23,459		
1997	5	16,755	7	23,237		
1998	7	18,276				
1999	8	18,527			9	818
2000			5	22,245		
2001						

	NH 111 (Ferry Street) E. of Library Street 229051		NH 111 (Ferry Street) N. of Central Street 229042		NH 3A (Central Street) E. of Library Street 229052	
Year	Month	Total	Month	Total	Month	Total
1983		12,619		10,046		
1984						
1985						
1986						
1987	5	13,099	5	10,546		
1988						
1989	6	15,834			8	23,187
1990						
1991	4	15,145				
1992	5	16,421	5	14,191		
1993	6	16,168	7	14,185		
1994	5	16,209			7	23,588
1995	5	15,518	7	14,667	7	23,476
1996	5	15,899				
1997	5	16,295				
1998	7	15,694	7	14,874	7	23,499
1999						
2000						
2001	9	15,571	9	13,468	9	23,061

Weekday Traffic Count Trends in Hudson

	NH 3A (Central Street) W. of Library Street 229044		NH3A (Lowell Road) N. of Pelham Road 229513		NH 3A (Lowell Road) N. of Sagamore Bridge 229039	
Year	Month	Total	Month	Total	Month	Total
1983		14,607				20,060
1984						
1985						
1986						
1987						
1988					8	20,733
1989	8	15,072	4	25,001	8	27,646
1990						
1991			5	26,064	8	27,136
1992	8	14,415				
1993			5	27,071	8	26,674
1994	8	14,952			5	26,145
1995					5	29,445
1996					5	31,589
1997			5	27,393	5	31,712
1998	6	16,201			7	29,622
1999						
2000					7	22,666
2001	9	14,126			11	35,212

	NH 3A (Lowell Road) S. of Central Street 229067		NH 3A (Lowell Road) S. of Pelham Road 229073		NH 3A (Lowell Road) S. of Sagamore Bridge 229049	
Year	Month	Total	Month	Total	Month	Total
1983		15,176				14,173
1984						
1985						
1986						
1987	5	25,441	5	24,541	5	21,305
1988						
1989					6	19,819
1990						
1991						
1992	5	25,365	5	24,794	6	23,593
1993	8	24,566				
1994					7	22,130
1995	8	25,433	5	25,899	7	22,682
1996					5	24,095
1997			7	25,927	5	25,202
1998			11	26,932	6	25,099
1999						
2000					7	27,388
2001	8	25,807	8	28,149	11	23,194

Weekday Traffic Count Trends in Hudson

	NH 3A (River Road) @ Massachusetts State Line 229055		NH 3A (River Road) S. of Dracut Road 229512		NH 3A (Webster Street) S. of Derry Lane 229040	
Year	Month	Total	Month	Total	Month	Total
1983		4,822				
1984				8,500		
1985		5,021				
1986						
1987	5	9,082				
1988						
1989	8	8,622	6	11,535		
1990	10	7,523				
1991	8	9,363	6	11,495		
1992	9	10,581				
1993	6	10,928				
1994	8	11,031			7	8,632
1995	8	11,336			7	8,031
1996			5	12,294	8	8,384
1997	7	10,859				
1998						
1999					8	8,907
2000						
2001	8	10,899				

Source: NRPC.

APPENDIX V-3

Federal Aid

The Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) significantly restructured the federal-aid transportation program. ISTEA was re-authorized and revised in 1998 (the Transportation Equity Act for the 21st Century, TEA-21). Descriptions of the various programs which emerged from these transportation bills are as follows:

National Highway System (NHS): This program funds projects on the designated national highway system on an 80% federal, 20% state/local basis. There are no highway routes in Hudson designated as part of the National Highway System

Surface Transportation Program (STP): This program targets the funding of projects by states and localities for any facility with a higher functional classification than rural minor collector. The flexibility of the STP also allows for funding of lower functional classification roadways at the discretion of states and localities. Funding is based upon an 80% federal and 20% state/local share. Projects selected by the Town using their allocated municipal funds or Enhancements require a 20% municipal match. There are four subcategories of STP funds as described below:

- STP < 200,000 - This category of STP exists to fund projects in small urban areas with a population under 200,000. There are statewide and municipal apportionments.
- STP Any Area - This category of STP funds may be used in urban or rural areas.
- STP Transportation Enhancements - This category funds projects submitted by municipalities and chosen through a statewide selection process. Eligible projects include: bicycle and pedestrian facilities, scenic improvements, and preservation of abandoned railroad corridors, historic preservation, rehabilitation of historic transportation facilities and mitigation of water pollution from highway runoff.
- STP Hazard Elimination - These funds are earmarked for minor projects designed to eliminate hazardous roadway or traffic conditions

Bridge Rehabilitation and Replacement: This category includes bridges which are on-system, i.e. those that are functionally classified as higher than local, and off-system, which are municipally owned. The 80% federal/20% local share applies to the bridge category.

Congestion Mitigation and Air Quality (CMAQ): CMAQ funds are eligible for transportation related projects in ozone and carbon monoxide non-attainment areas. Projects must contribute to meeting attainment of national ambient air quality standards, through reductions in vehicle miles traveled, fuel consumption, reduced delay or other factors. Construction of roadway capacity serving single occupancy vehicles is not eligible for CMAQ funding. Funding is 80% federal, 20% state/local.

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