Chapter 6

TRANSPORTATION

VISION

As a first principle, and in keeping with the 1989 Durham Master Plan, this Transportation chapter reaffirms a commitment to the preservation of the rural and open space aesthetic character of Durham. This chapter seeks to provide an integrated system of transportation for the 21st century that will minimize traffic congestion, reduce related vehicle-generated air pollution, and promote attractive entry corridors and a vibrant, viable downtown business core. This chapter supports the concept of a safe, pedestrian-friendly Town center and consideration for commuters and those with special needs. To these ends, the Town should continue to plan cooperatively with the University of New Hampshire (UNH), the Strafford Regional Planning Commission (SRPC), the Seacoast Metropolitan Planning Organization (MPO), and the New Hampshire Department of Transportation (NHDOT).

This chapter favors alternative transportation modes and routes where appropriate, and strongly supports the continued development of an intermodal transportation strategy for the integration of pedestrians, bicycles, vans, buses, and trains, which reduces the number of single occupancy vehicles, while remaining sensitive to the needs of vehicular access to the downtown business district.

This chapter supports the Town and University developing an educational campaign to promote transportation alternatives with clear signage indicating preferred routes for access to the center of Durham, to the main entrance to the University from the west, and to the Whittemore Center, as well as informational brochures with maps and schedules for van, bus, and train services. This chapter favors public transit, particularly for

commuting students, faculty and staff, rather than private vehicles where possible and feasible. Safe, heated, lighted bus shelters should be provided to increase ridership on public transit.

This chapter supports the sustainable community concept of transportation demand management, which emphasizes bicycling and pedestrian corridors for commuting and recreation, preferably separated from automobiles where appropriate. Other creative solutions to minimize traffic congestion may include varying work and UNH class schedules to avoid the daily mass entrance and exodus from parking facilities and the Town.

This chapter favors adding traffic calming devices on some Town and University roads, both in the downtown area and outside the downtown as necessary (see text box on traffic calming). This may include such traffic-calming methods as installing "roundabouts," installing chicanes, reducing speed limits, or installing speed tables while, at the same time, keeping roads aesthetic by honoring scenic environments and historic districts. To retain the residential character of existing neighborhoods, traffic calming measures plus signage for "residential traffic" may be an appropriate solution to the safety concerns of residents.

Any proposals for parking garages and new or expanded parking lots or roads should be weighed alongside Durham's commitment to preserve the rural beauty and character of the town as well as the direct and indirect costs of increasing parking. Present and future traffic demand and congestion should be reduced through an educational campaign along with reliable bus services, demand-vans, taxis, and special-events shuttles. The construction of new roads should proceed only with proper planning and the consideration of potential increased traffic and development.

The rural character and open-space atmosphere which Durham values is greatly influenced by the rural, open space corridors entering Durham. The open spaces, meadows, and vistas of Dover Road, Newmarket Road, and Route 4 east toward Portsmouth are especially important. It is vital to Durham's integrity that these rural entrance corridors remain protected through zoning and other forms of open space protection for the long-term future.

Traffic Calming

Many communities in the United States are now exploring further measures beyond sidewalks that place pedestrians and other non-motorized modes of travel on a more even level with motorized traffic. These measures, collectively called traffic calming, use the physical design of the roadway to prevent inappropriate automobile speeds. They are not intended for roads where the primary objective is to move traffic quickly through an area. Most often, they are used in residential areas where residents see the road as part of their neighborhood and a place where walking, biking, and social interaction can safely coexist with motorized traffic.

The potential benefits of traffic calming include reduced traffic speeds, reduced traffic volumes (by discouraging "cut-through" traffic on residential streets), and often improved aesthetic quality of streets. An example of some traffic calming techniques include:

Speed humps, speed tables, and raised crosswalks

Speed hump

All of theses techniques involve raising the height of the pavement in a more subtle fashion than with a speed bump, allowing vehicles to pass over them at the intended speed of the road, but preventing excessive speeds and alerting drivers to the existence of non-motorized users.

Chicanes or medians

These effectively narrow road width and slow down traffic by placing a physical impediment either in the middle of the road (median) or on the side of the road (chicane). These lend themselves to landscaping and improve the visual experience for all users of the road, as well as reducing speeds. Both techniques can provide additional safety for crossing pedestrians. Medians may serve as a refuge by allowing pedestrians to cross one lane of travel at a time, while chicanes provided at crosswalks (curb bulbs) reduce the overall distance from one side of the road to another and slow down traffic at those crossings.

Chicane

Modern roundabout

Roundabout

Not to be confused with a traditional high-speed rotary or traffic circle, this is an intersection treatment that forces motorized traffic to slow down to speeds under 25 mph in order to negotiate a center island that can be landscaped. Such speeds allow pedestrians to safely cross around the perimeter of the roundabout and cyclists to safely become a part of the circulating traffic.

NOTE: Text excerpted from the 1999 – 2020 Seacoast Metropolitan Planning Organization Long Rage Transportation Plan. Graphics from the City of Charlotte, North Carolina Web page.

BACKGROUND

INVENTORY OF EXISTING ROADWAYS

According to the New Hampshire Department of Transportation (NHDOT) records, there are 80.4 miles of public roadways and highways within the Town limits (see Map of Town Road System). Based on 1998 data, this total road mileage is divided into six roadway classifications used by the NHDOT.

Class I roads are defined as primary State system highways and include 11.2 miles of road within the Town boundaries. Class II roads, defined as secondary State system highways, include 3.2 miles of road within Durham. This equates to slightly over 14 miles of State-owned and maintained highways within the Town.

All other traveled highways within the Town are Class V, or rural highways, and it is the Town's duty to maintain them on a regular basis. State records show this to be 45.2 miles of road. In addition, Durham also has 14.4 miles of Class IV, or compact system, roads. This class includes all highways within the urban compact section of Town. Urban compact areas include highways that have their frontage mainly occupied by year-round dwellings and/or businesses.

The final road classification within the State highway system is Class VI, which represents all unmaintained highways within the Town. Based on 1998 data, there are approximately 6.3 miles of such roadways in Durham. In addition, there are several roadways in Town that are owned and maintained by the University such as College Road and McDaniel Drive.

Table 6.1 INVENTORY OF DURHAM ROADS

Road Name	State Class	Functional Category	Length in Miles
Route 108	Class I	Arterial	4.70
Route 4 (a.k.a. Piscataqua Road)	Class I	Arterial	6.50
Lee Hook Road	Class II	Arterial	0.45
Madbury Road	Class II	Arterial	0.19
Route 155	Class II	Arterial	0.41
Route 155A & Old Concord Rd.	Class II	Arterial	2.17
Adams Circle	Class IV	Local	0.15
Bagdad Road	Class IV	Local	1.26
Bayview Road	Class IV	Local	0.19
Beard's Landing Road	Class IV	Local	0.17
Burnham Avenue	Class IV	Local	0.20
Coe Drive	Class IV	Local	0.70
Cowell Drive	Class IV	Local	0.17
Croghan Lane	Class IV	Local	0.15
Davis Avenue	Class IV	Local	0.26
Dennison Road	Class IV	Local	0.30
Edgewood Road	Class IV	Collector	0.85
Emerson Road	Class IV	Local	0.74
Faculty Road	Class IV	Collector	0.31
Fairchild Drive	Class IV	Local	0.14
Garden Lane	Class IV	Local	0.36
Garrison Avenue	Class IV	Local	0.28
Glassford Lane	Class IV	Local	0.08
Hampshire Avenue	Class IV	Local	0.21
Hoitt Drive	Class IV	Local	0.15
Littlehale Road	Class IV	Local	0.29
Lundy Lane	Class IV	Local	0.10
Madbury Road	Class IV	Collector	1.37
Magrath Road	Class IV	Local	0.16
Main Street	Class IV	Collector	1.48
Maple Street	Class IV	Local	0.07
Mast Road Extension	Class IV	Local	0.64
Meadow Road	Class IV	Local	0.16
Mill Pond Road	Class IV	Collector	0.49
Mill Road	Class IV	Collector	0.58
Oyster River Road	Class IV	Local	0.56
Park Court	Class IV	Local	0.10
Pettee Brook Lane	Class IV	Collector	0.21
Rosemary Lane	Class IV	Local	0.10
Sauer Terrace	Class IV	Local	0.06
Scotland Road	Class IV	Local	0.08
Strafford Avenue	Class IV	Local	0.34
Thompson Lane	Class IV	Local	0.22
Valentine Hill Road	Class IV	Local	0.14
Wood Road	Class IV	Local	0.16
Woodman Road	Class IV	Local	0.28
Young Drive	Class IV	Local	0.25
Ambler Gerrish Road	Class V	Local	0.45
Back River Road	Class V	Collector	0.35
Bartlett Road	Class V	Local	0.27
Bay Road	Class V	Collector	1.35
Beech Hill Road	Class V	Local	0.13
Bennett Road	Class V	Collector	1.65
Briarwood Lane	Class V	Local	0.08
Bucks Hill Road	Class V	Local	0.58
Bunker Lane	Class V	Local	0.06
Canney Road	Class V	Local	0.73
Carriage Way	Class V	Local	0.21
Cedar Point Road	Class V	Local	0.46
Chesley Drive	Class V	Local	0.09
Cold Springs Road	Class V	Local	0.29
Colony Cove Road	Class V	Local	0.40
Constable Road	Class V	Local	0.15
Cormorant Circle	Class V	Local	0.12
Corson Lane	Class V	Local	0.08
Cutts Road	Class V	Local	0.47
Daisey Drive	Class V	Local	0.08
Dame Road	Class V	Local	2.85
Deer Meadow Road	Class V	Local	1.00
Denbow Road	Class V	Local	0.43
Durham Point Road	Class V	Collector	3.95
Edgerly Garrison Road	Class V	Local	0.40
Edgewood Road Extension	Class V	Local	0.06
Ellison Lane	Class V	Local	0.10
Falls Way Road	Class V	Local	0.20
Ffrost Drive	Class V	Local	0.88
Fogg Drive	Class V	Local	0.52
Fogg Lane	Class V	Local	0.04

(Table 6.1 Inventory of Durham Roads – continued)

Road Name	State Class	Functional Category	Length in Miles
Foss Farm Road	Class V	Local	0.35
Fox Hill Road	Class V	Local	0.29
Griffith Drive	Class V	Local	0.34
Hamel Drive	Class V	Local	0.11
Hemlock Way	Class V	Local	0.20
Jackson's Landing	Class V	Local	0.08
Jenkins Court	Class V	Local	0.07
Johnson Creek Road	Class V	Local	0.30
Kelsey Drive	Class V	Local	0.30
Langley Road	Class V	Local	0.62
Laurel Lane	Class V	Local	0.45
Longmarsh Road	Class V	Local	1.45
Madbury Court	Class V	Local	0.04
Mathes Cove Road	Class V	Local	0.35
Meader Lane	Class V	Local	0.16
Meserve Road	Class V	Local	0.35
Mill Road	Class V	Collector	1.90
Moat Road	Class V	Local	0.06
Moharimet Way	Class V	Local	0.10
Morgan Way	Class V	Local	0.25
Old Bagdad Road	Class V	Local	0.05
Old Landing Road	Class V	Local	0.24
Old Piscataqua Road	Class V	Local	0.28
Orchard Drive	Class V	Local	0.50
Packers Falls Road	Class V	Collector	3.09
Palmer Drive	Class V	Local	0.19
Partridgeberry Lane	Class V	Local	0.09
Pendexter Road Extension	Class V	Local	0.17
Pendexter Road	Class V	Local	0.25
Pinecrest Lane	Class V	Local	0.80
Razorbill Circle	Class V	Local	0.08
Riverview Court	Class V	Local	0.07
Riverview Road	Class V	Local	0.56
Rocky Lane	Class V	Local	0.10
Ross Road	Class V	Local	1.12
Ryan Way	Class V	Local	0.17
Sandybrook Drive	Class V	Local	1.35
Schoolhouse Lane	Class V	Local	0.18
Shearwater Street	Class V	Local	0.41
Simons Lane	Class V	Local	0.43
Spinney Lane	Class V	Local	0.29
Stagecoach Road	Class V	Local	0.34
Stevens Way	Class V	Local	0.30
Stone Quarry Drive	Class V	Local	0.25
Strout Lane	Class V	Local	0.11
Sullivan Falls Road	Class V	Local	0.27
Sumac Lane	Class V	Local	0.43
Sunnyside Drive	Class V	Local	0.42
Surrey Lane	Class V	Local	0.72
Tall Pines Road	Class V	Local	0.43
Technology Drive	Class V	Local	0.47
Timber Brook Lane	Class V	Local	0.09
Tirrell Place	Class V	Local	0.15
Tom Hall Road	Class V	Local	0.08
Watson Road	Class V	Local	0.36
Wednesday Hill Road	Class V	Local	0.45
Willey Creek Road	Class V	Local	0.13
Willey Road	Class V	Local	0.30
Williams Way	Class V	Local	0.26
Winecellar Road	Class V	Local	0.45
Wiswall Road	Class V	Local	1.04
Woodridge Road	Class V	Local	0.93
Woodside Drive	Class V	Local	0.17
Woodward Drive	Class V	Local	0.24
York Drive	Class V	Local	0.22

Table 6.1 summarizes the various roadways within the Town (excluding University roads) based on the State classification system. There are two Class I highways: Route 4 running east-west and Route 108 running north-south. Route 4 connects Durham with Newington and Portsmouth to the east, and with Barrington and eventually Concord to the west. From the north, Route 108 runs approximately 0.8 miles from the Durham-Madbury town line to the Route 4 interchange. Route 108 runs in a north-south direction connecting Durham with Dover (and the Spaulding Turnpike) to the north, then through the portion of Durham's business district known as "Gasoline Alley," then southerly to Newmarket and Exeter. The entire length of this stretch of Route 108 through Durham is approximately 4.7 miles. At its interchange with Route 108, Route 4 becomes the 3.5 mile long "Durham Bypass," a limited access highway which swings northward around the Town and University, with an at grade intersection with Madbury Road and a second interchange at Main Street (also known as Old Concord Road) at the westerly end near the Durham-Lee town line. This interchange forms what the University is promoting as its main entrance, or "western gateway," to its principal parking lots. The entire length of Route 4 in Durham is approximately 6.5 miles.

In terms of Class II roads, the primary roadways in this classification are a portion of Old Concord Road, which runs in an east-west direction, and Mast Road (Route 155A) which runs essentially north-south. Old Concord Road provides access to the downtown, as well as to the University of New Hampshire; it stretches for approximately one mile from Mast Road to the Durham-Lee town line. The second significant Class II road is Mast Road (Route 155A) which connects to Main Street near the west edge of Durham at its northern terminus.

The bulk of other roadways in Durham are defined as Class IV and Class V. Two of the major Class IV roads in Town are Main Street and Madbury Road. Main Street runs from Mast Road to Route 108 providing access to the downtown and UNH. The downtown traffic loop runs one way only on Main Street in an easterly direction from Pettee Brook Lane to Madbury Road with two lanes of traffic plus parking. The westbound portion of the one-way downtown traffic loop is just north of Main Street, running from Madbury Road along Pettee Brook Lane to Rosemary Lane, then intersecting with Main Street where it again becomes two-way west of the intersection. The second major Class IV road is Madbury Road, which connects with Main Street in the downtown at its southern terminus and also to the center of the University campus via Edgewood Road. To the north, Madbury Road connects with Route 155 beyond the Durham-Madbury town line.

For purposes of this analysis, the roads in Table 6.1 have been further subdivided into the following functional categories: arterial, collector, and local.

- Arterial roads are major streets with moderate to fast speeds and high volumes that are designed to provide access to the regional transportation system and to move traffic through or around the Town.
- Collector streets are intermediate streets that collect local traffic from neighborhoods and move it to an adjacent neighborhood or transfers the traffic to the arterial system.
- Local streets provide access to adjacent land, neighborhoods, and subdivisions, and these roads carry a small proportion of the vehicle miles of travel.

Two of the more important collector roads are Durham Point Road and Bay Road which together are 5.3 miles in length. Durham Point Road intersects Route 108 just south of Gasoline Alley and then runs in a southerly direction changing to Bay Road at Crommett Creek. Bay Road continues south until it meets the Newmarket town line. Packers Falls Road in the southwest portion of the town connects with Mill Road, which feeds directly into the southeast side of the University campus. The combined length of these four roads is approximately 10.9 miles.

Two collector streets that were not originally designed to serve in this function are Mill Pond Road and Faculty Road, which are just south of Main Street. Due to the downtown one-way traffic pattern, the Route 108/Main Street intersection, and traffic congestion on Main Street, these roads have served as a bypass for traffic coming into the town from the east and south. Although designed as more local residential streets, recent traffic volumes have been such that these two roadways have been included in the collector category. In addition, Edgewood Road, which was originally intended for residential traffic, now funnels large amounts of traffic to the center of Town and to the University campus as a collector road, as does Madbury Road, which was originally created as a rural residential road connecting Durham and Madbury.

As summarized in Table 6.1, there are 45.2 miles of Class V roads in Durham, along with 6.3 miles of unmaintained Class VI roads. Thus, in aggregate, the road mileage in the Town is 80.4 miles.

EXISTING DEMAND AND CONDITIONS

Table 6.2 shows the average daily traffic counts (ADTs) for key streets within the existing roadway network. The Appendix includes tables that provide changes in traffic volumes over time for many Durham roadways. Any rigorous analysis of available traffic counts (see Appendix) is difficult because of a lack of consistency over time regarding count locations, short time period of the count, time of year (or count dates), and other variables in methodology. However, the data presented in the Appendix has been adjusted as best as possible to provide a consistent picture of traffic counts in Durham.

Table 6.2. Average Daily Traffic (ADT) Counts

Road	Year	ADT
Dover Rd.	Oct. 1997	17,253
Edgewood Rd.	Oct. 1998	3,909
Madbury Rd.	Oct. 1998	6,382
Main St. (Church Hill)	Oct. 1998	17,500
Main St. (W. of Edgewood)	Oct. 1998	10,039
Mast Rd.	Oct. 1997	4,521
Mill Road	Oct. 1997	8,489
Newmarket Rd.	Apr. 1998	13,236
Route 4	1997 Average	17,647

Source: Strafford Regional Planning Commission

The roadways in Durham that indicate a consistent increasing trend in traffic volumes are Route 4, and Main Street in both the downtown area and at Church Hill. According to Fall 1997 traffic counts, approximately 17,253 vehicles per day use Route 108 just south of Route 4. At Route 108 north of Durham Point Road, 13,863 (16,126 in August 1997) ADTs were counted. On the west side of the Central Business District, on Main Street between Edgewood Road and the Central Business District, 12,253 ADTs were reported in 1997. On Main Street Between the Route 108-Main Street intersection and Madbury Road (Church Hill), 17,500 ADTs were counted. The University has made efforts through construction of parking at the western edge of its campus to get traffic to arrive increasingly from the west. However, a significant amount of University-bound traffic, arriving from the north, east, and south, still drives through the center of Town. This is one of the major contributing factors to traffic congestion in the Central Business District. Data is lacking at the western end of Main Street near the "west edge" UNH parking lots to show if this new parking is having an effect on vehicle counts. A systematic traffic count should be conducted over time to assess the impact, if any, the

University's efforts have had on alleviating traffic through Durham's residential streets and the downtown area.

Although additional quantitative data is needed, it should be noted that, if integrated with transportation demand management, relocating parking and increased shuttle services on the westerly edges of the campus should help to alleviate unnecessary through-Town traffic. Subsequent portions of this analysis will explore various alternatives to further alleviate this problem.

The discussion of existing demand should include the projection of Durham's traffic levels under the current zoning and should ideally take into account commuter traffic and University traffic increases. A build-out analysis of the community was conducted (see Chapter 1 –Demographics, Housing, and Growth Management) that did not take into account growth at the University or increases in commuter volumes. Even without University or commuter growth, according to the build-out analysis, the greatest increases in traffic volumes due to growth in Durham are likely to be seen in the following areas: Downtown, Route 4, Durham Point Road, Packers Falls Road, and Bennett Road (see Table 6.3).

Transportation Demand Management

Transportation is not only a significant issue in Durham and at UNH, it has become a significant issue to many universities and their host communities. Universities and towns are beginning to reevaluate the effectiveness of the standard formula of simply providing more parking facilities to accommodate increased automobile traffic. More and more universities and host communities are turning to alternative transportation programs to provide mobility for students and employees. These programs, called Transportation Demand Management Programs (TDMs) encompass programs such as student and employee bus pass programs, bicycle and pedestrian planning, alternative mode incentive programs, and parking management strategies. There are a host of successful case studies, but Cornell University's successful program is profiled here.

Cornell University - Ithaca New York
A decade ago Cornell was experiencing tremendous growth in vehicle traffic causing parking shortages. The university decided to forgo more parking and roads to accommodate the 9,000 employees that were the primary source of its transportation problems. The university found these traditional options were too expensive, would result in more commuters, would diminish the pedestrian environment, and negatively impact campus green space. So in 1991 Cornell instituted a TDM program. Some of the steps in Cornell's program include the following:

- Increasing parking fees to reflect market rates.
- Distributing employee bus passes with free fare for all campus, city, and county buses.
- Bus riders receive a free book of ten one-day perimeter parking permits for each six month period they use the bus. The bus passes are free; however, employees have to give up their semester parking permits.
- Development of a campus to downtown express lunch time bus service. If a rider patronizes downtown businesses validation stickers from the merchants count as one-way fare.
- Commuters who set up carpools are entitled to discounts or even rebates on parking fees. Carpool members turn in their individual permits and obtain one group permit and in some instances reserved parking spaces.
- If an urgent situation arises, employees who use transportation alternatives to get to work can use a ride program from campus security to get them where they need to go.

In just one year, Cornell's TDM program resulted in a 26% decrease in the number of vehicles traveling to campus each day and saved the university $635,634.

It is also worth noting that a similar program by the University of Washington, which was forced into TDM by the city of Seattle, resulted in a 17% decline in vehicle trips in the morning and 9% in the afternoon. In addition, parking permit demand decreased by 22% and parking lot utilization is down by 8%. All of this given the University's 7% growth rate in the past decade.

Source: "Finding a New Way: Campus Transportation for the 21st Century"

Table 6.3. PROJECTION OF TRAFFIC VOLUMES BASED ON DURHAM BUILD-OUT

Year	Regional Transportation Routes					Collector Roads - Effect of Buildout			
	Newmarket Road - North of Durham Point Road	Dover Road - South of U.S Route 4	Main Street - Downtown between Pettee Brook and Mill Rd.	Madbury Road - South of Route 4	U.S. Route 4	Durham Point Road - West of Sunnyside	Packers Falls Road	Bennett Road - at B&M Railroad bridge	Mill Road - West of Plaza
2000	**14,047**	**17,471**	**12,361**	**6,650**	**18,704**	**2,397**	**1,589**	**677**	**8,518**
2001	14,108	17,544	12,680	6,674	19,072	2,453	1,625	713	8,548
2002	14,170	17,618	13,007	6,698	19,448	2,510	1,662	750	8,578
2003	14,233	17,692	13,343	6,722	19,831	2,569	1,700	788	8,608
2004	14,295	17,766	13,687	6,747	20,222	2,628	1,739	827	8,639
2005	**14,358**	**17,841**	**14,040**	**6,771**	**20,620**	**2,688**	**1,778**	**866**	**8,671**
2006	14,421	17,916	14,402	6,795	21,026	2,749	1,817	905	8,703
2007	14,485	17,991	14,774	6,820	21,440	2,812	1,858	946	8,736
2008	14,549	18,067	15,155	6,844	21,863	2,875	1,899	987	8,769
2009	14,613	18,143	15,546	6,869	22,293	2,940	1,941	1,029	8,803
2010	**14,677**	**18,219**	**15,947**	**6,894**	**22,733**	**3,005**	**1,984**	**1,072**	**8,838**
2011	14,742	18,295	16,359	6,918	23,180	3,072	2,027	1,115	8,873
2012	14,806	18,372	16,781	6,943	23,637	3,140	2,071	1,159	8,909
2013	14,872	18,449	17,214	6,968	24,103	3,209	2,116	1,204	8,945
2014	14,937	18,527	17,658	6,993	24,578	3,280	2,162	1,250	8,982
2015	**15,003**	**18,605**	**18,113**	**7,019**	**25,062**	**3,351**	**2,209**	**1,297**	**9,020**
2016	15,069	18,683	18,581	7,044	25,556	3,424	2,256	1,344	9,058
2017	15,135	18,761	19,060	7,069	26,059	3,499	2,304	1,392	9,097
2018	15,202	18,840	19,552	7,095	26,572	3,574	2,353	1,441	9,137
2019	15,269	18,919	20,056	7,120	27,096	3,651	2,403	1,491	9,177
2020	**15,336**	**18,999**	**20,574**	**7,146**	**27,630**	**3,729**	**2,454**	**1,542**	**9,218**
Aver. Annual Growth	**0.5%**	**0.4%**	**3.3%**	**0.4%**	**2.4%**	**2.8%**	**2.7%**	**6.4%**	**0.4%**

Assumptions for Buildout Traffic Volumes:

Durham Point Rd. units include Longmarsh Rd. east of Langmaid Farm and Dame Rd. east of and including 19-12-0.
Packers Falls Rd. traffic count uses Sprucewoods peak hour counts X 9.4% to get daily count.
Bennett Rd. units include Wiswall Rd. and Packers Falls Rd. from Wiswall Rd. south to Newmarket Tonw line.
Mill Rd. units include Packers Falls Rd. to Wiswall Rd.
New unit construction will be dispersed evenly throughout Durham.

Based on the potential areas for development, the build-out map for the community, and existing conditions, the following intersections should be monitored and studied for safety improvements: Route 4/Route 108, Route 4/Main Street, Main Street/Route 108, Durham Point Road/Route 108, Bennett Road/Route 108, Stagecoach Road/Route 108, Mast Road/Main Street, Main Street/College Road, Packers Falls Road/Bennett Road, and Mill Road/Main Street. In addition, it should be recognized that the Route 108/Main Street intersection, even with the planned new traffic signal, is projected to be at level of service "F" within ten years, thus emphasizing the need to find alternative transportation solutions to the single occupancy vehicle.

Roadway Level of Service Described

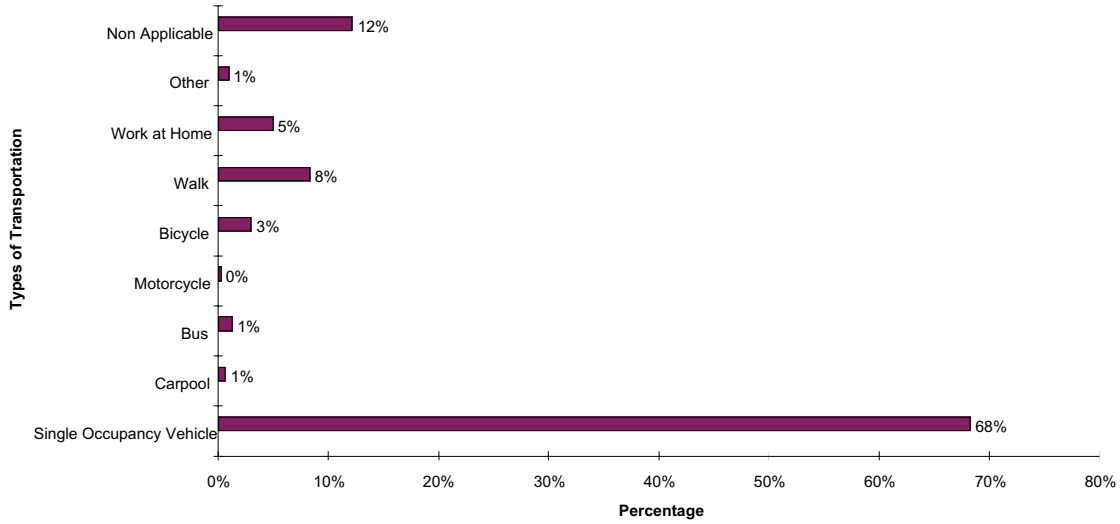
Level Of Service	Description
A	Free flow, with low volumes and high speeds
B	Reasonably free flow, but speeds beginning to be restricted by traffic conditions
C	Stable flow, but most drivers are restricted in the freedom to select their own speeds.
D	Approaching unstable flow, drivers have little freedom to select their own speeds.
E	Unstable flow, may be short stoppages
F	Unacceptable congestion, stop-and-go, forced flow

Source: "Flexibility in Highway Design" by FHWA

The Route 4 corridor through Durham has been an area of safety concerns for many years. From 1993 through November 1997, the corridor from the Scammell Bridge to NH Route 155 was the site of 6 fatalities, 65 injuries, and 170 accidents. The corridor is a major east-west connector for the Seacoast Region with Concord. The corridor also serves as a connector between Route 16 (Spaulding Turnpike) and the University. In 1997, average daily volume of Route 4 was approximately 17,650 vehicles. In addition to being a major east-west transportation corridor, this section of Route 4 serves as the sole means of access to approximately 150 homes, 9 local roads, and 30 driveways. There is also anecdotal evidence of truck traffic using this corridor to bypass the tolls on the Spaulding Turnpike. In addition to the residential character of the corridor, it is also aesthetically and environmentally significant with open vistas, a Town-owned conservation/passive recreation area, and multiple estuary crossings. A study that looks at how to improve the safety of this multi-faceted corridor is warranted.

The 1998 Master Plan survey findings also show that 68% of Durham residents get to work by single occupancy vehicle. The survey also found that walking (8%) and bicycling (3%) to work are more popular in Durham than in other communities in the region. (See Figure 6.1). It is also worth noting the extremely low percentage (1%) of residents that use bus service to get to work, especially considering the fact that 35% of the Durham residents work in Durham (this figure excludes people who work from home).

Table 6.4. DURHAM RESIDENTS PRIMARY MODE OF TRANSPORTATION TO WORK



HISTORIC TRAFFIC CIRCULATION RECOMMENDATIONS

PREVIOUS MASTER PLANS

This section provides a brief overview of recommendations presented in the 1969, 1980, and 1989 Master Plans.

The first Master Plan for the Town of Durham was prepared in 1969 by the Planning Services Group, Inc. That study focused on two primary transportation issues: traffic issues in the Central Business District and Town-wide traffic circulation. Interestingly enough, many of the same problems identified in that study are still prevalent today but are further exacerbated by increased traffic demand.

In 1969, recommendations regarding traffic circulation in the Central Business District evolved around the desire to separate through traffic from local traffic (see Map of 1969 Master Plan).

Figure 6.1. 1969 MASTER PLAN MAP (AVAILABLE AT PLANNING OFFICE)

Traffic circulation recommendations presented in the 1969 Master Plan were based upon existing deficiencies with outlying roadways, as well as recommendations to accommodate future residential and light industrial growth. In 1969, the NHDOT was recommending a relocation of Route 108 east of Newmarket Road and crossing the Oyster River south of Coe's Corner. That concept was carried forth into the 1980 Master Plan. However, in the 1980 plan it was recommended that the actual relocation of Route 108 be shifted further east to minimize impacts on residential areas including the Wedgewood development.

Expanding on the concept of a southern bypass from Newmarket Road to Mill Road, the 1969 plan also recommended that this proposed roadway be extended east and west to tie in with Mast Road at the western terminus, and to the east crossing the relocated Route 108 right-of-way, tying in with Durham Point Road. It was also recommended that Longmarsh Road be relocated and extended east to merge with the northern end of Dame Road. The proposed "Southern Link Road" and Longmarsh Road extensions, together with the bent portion of Durham Point Road, would at that point, form a collector loop road in that part of Town.

The 1969 Master Plan also recommended an access road and a "diamond interchange" from the Route 4 Bypass to Main Street (Concord Road) to direct University-bound traffic, coming from the north and east, away from the downtown portion of Main Street. The proposed road, known now as the "Northern Connector," would go through the northwest quadrant of the UNH campus.

To the west of Route 108, the 1969 plan noted the natural collector loop formed by Mill Road, Packers Falls, and Bennett Roads. The 1969 Master Plan noted that the intersection between Packers Falls and Bennett Roads could have been improved by swinging Wiswall Road due east to meet Bennett Road, and bringing Packers Falls Road up in a straight line from the south. This would also have enabled traffic to avoid the hazardous section of Bennett Road where it dips alongside the Lamprey River.

In 1980, The Planning Services Group undertook an update of the 1969 Master Plan. Subsequent recommendations in the 1980 effort were primarily a reduction in scope of the 1969 recommendations. This was due to the unlikelihood of development of the earlier recommendations combined with the consideration of funding sources and costs.

Dropped from future consideration in the 1980 update was the proposal to relocate Route 108. Also dropped was the "Northern Connector" through

the northwest quadrant of the University's campus from the Route 4 bypass to Main Street west of the railroad tracks. The 1980 plan simply states that this proposed road was removed due to the "foreclosure" by the University. Also revised was the proposed "Southern Link Road" east through Wedgewood. The update recommended a realignment of the unimproved portion of Longmarsh Road to skirt conservation land holdings and to enter Durham Point Road at a safe point. Although the proposed Southern Link Road between Newmarket Road and Mill Road still appeared to be a viable option in 1980, the extension to the west connecting with Mast Road was dropped due to unlikelihood of development. Also recommended to be dropped was the proposed link between Cowell Drive and Bayview Road.

The 1989 Master Plan again included the concept of the Southern Link Road, the extension of Longmarsh Road to Durham Point Road, and the Northern Connector (see Map of the 1989 Master Plan). The plan found that the Northern Connector was warranted in order to redirect traffic accessing UNH to a westerly approach, and to decrease the traffic volumes in the downtown.

It should be noted that many of the primary transportation recommendations developed in the 1969, 1980, and 1989 Master Plans have not been carried out. Ideas, whether new or old, should not be discarded if they have any potential for solving the problems noted in the earlier studies or identified anew.

OTHER PLANS AND STUDIES

In reviewing the past Master Plan summaries for Durham, one can see the issue of a "Northern Connector" recommended and not recommended on several occasions. Because of this, additional background on how this project originated is warranted. In 1961, during the design hearing stage for the Route 4 bypass, the "Northern Connector" was presented to the Town of Durham as a phase of the construction of the bypass. At the public hearing, many Town residents were concerned about the timing of the Northern Connector phase because they foresaw the potential for Madbury Road and Edgewood Roads to be major connectors to the University, and thus suffer increased traffic. The DOT representatives were unsure of the timing for construction of the phase, but assured Durham residents that it would probably be within five years. In addition, the president of the University, Jere Chase, spoke at the hearing in favor of the "Northern Connector." As part of the Route 4 bypass project, the DOT acquired the necessary right-of-way for the interchange required for

Figure 6.2. 1989 MASTER PLAN MAP (AVAILABLE AT PLANNING OFFICE)

the Northern Connector and its connection to Madbury Road. In addition, the DOT sent a letter to the University asking it to reserve the land needed for the Northern Connector right-of-way. Since that time, the University has revised its position to be firmly against the roadway. In addition, in the 1980s when the NHDOT rebuilt the Madbury Road railroad bridge, it did so in such a way that it did not include the alignment for the Northern Connector. Because of these obstacles, and the lack of any detailed needs assessment or feasibility study for improved northern connections, this plan makes a recommendation for a detailed study on the need for improved transportation connections from the north.

Another road project that was not initiated by Durham, but could have many implications on Durham, is the University's proposed "Loop Road." This roadway was first proposed in the University's 1994 Campus Master Plan (see Map of Loop Road). The road is proposed as a continuous roadway, bikeway, and pedestrian way that will interconnect the four quadrants of the University's campus. The road, as proposed, will consist of a combination of realignments and improvements to existing Town and campus roads, together with new connecting roadway segments. The goals of the Loop Road are to reduce traffic on Main Street through the campus, particularly pedestrian traffic; to create a walking campus by removing all but essential service vehicles from the core of the campus; and to provide a framework for expansion of the "walking" academic core. Because of the connection to and potential impact on Town roads, neighborhoods, and businesses the University and Town must work closely to ensure that the Loop Road not only achieves the goals of the University, but the goals of the Town.

TRAFFIC CIRCULATION PREMISES

Prior to an updated discussion of existing problems and alternative recommendations to correct these deficiencies, it is essential to understand the inter-relationship of other components developed in this Master Plan. This will be done by identifying certain assumed "givens" that would directly impact discussion of traffic alternatives.

Most traffic circulation alternatives are in response to a desire to mitigate existing problems. Whether the Town develops along the lower or higher ranges of growth rates does not necessarily dictate the timing of traffic improvements. The problems are already here, and, in fact, many are the same as those which were identified in 1969, 1980, and 1989.

Figure 6.3. UNH LOOP ROAD CONCEPT

[Available at Planning Office.]

One current problem that was not present in 1989 is that the transportation region within which Durham is a member, the Seacoast MPO, is in a nonattainment area for air quality standards. This does not necessarily mean the air quality in Durham is poor; however, the region in which Durham residents frequently drive is not meeting EPA standards. This requires that all of the transportation projects funded through the Federal government for the region, including Durham, require air quality conformity analysis. Furthermore, the region is expected to make continuous forward progress in controlling air pollution emissions within its boundaries until air quality standards are met. Transportation plans, programs, and projects must not (1) worsen existing air quality, (2) create any additional violations, and (3) delay attainment of standards. Thus, alternative transportation projects are encouraged via this requirement. Under a worst case scenario, should projects planned for future funding in the region increase the air quality nonattainment levels for the region, Federal transportation funds could be frozen for the region. Thus, it is in Durham's best interest and the region's best interest to continue to focus efforts on reducing vehicle trips and miles traveled via single occupancy vehicles.

Traffic circulation alternatives in this chapter are based upon the following general premises established, in part, by the 1989 Master Plan and adjusted for this Master Plan update:

1. Higher density residential growth will be directed principally in the central portion of Town in the area north of the Oyster River and Mill Road, and west of Johnson Creek.
2. Office/research development will be focused in the following areas: in the westerly portion of the Town along the Old Concord Road/Mast Road area, the Beech Hill Road area, on the east side of Dover Road from Route 4 to the Madbury town line, and on the northeast side of the Madbury Road/Route 4 intersection (see Chapter 8 – Tax Stabilization).
3. The westerly main access ("gateway") to the University will have an intermodal transportation center, serving buses, trains, pedestrians, shuttles, bicycles, etc.
4. The Town, south of the Oyster River and east of Johnson Creek, is expected to be the less intensively developed portion of the community. Although this may be a less intensely developed area, it will likely generate a greater volume of traffic due to its size.

5. Alternative transportation will likely play an increased role in transportation within Durham, and the automobile will likely remain the primary means of personal transportation.
6. Bicycle and pedestrian corridors will be established.
7. Traffic-calming measures will be introduced to reduce speed and to direct traffic around neighborhoods.
8. Measures will be undertaken to reduce air-polluting single occupancy vehicle usage in order to contribute to the restoration of air quality and conformance to air quality standards.
9. Rural roads will be retained, and improvements to these roads will be such that the roads retain their rural character (e.g., hills, curves, vegetation, stone walls, and in some cases gravel surface).
10. "Gasoline Alley" will have a service access connecting the business and parking off Schoolhouse Lane.

The primary focus on the alternatives for improving traffic circulation in Durham are four-fold: (1) minimize traffic congestion on Main Street in the Central Business District/University area; (2) minimize adverse impacts caused by through traffic on residentially developed streets; (3) minimize demand or strain on the Route 108/Main Street intersection; and (4) reduce air pollution caused by excessive automobile usage.

In terms of minimizing traffic congestion on Main Street in the Central Business District/University area, the most obvious solution would be to redirect traffic that is now entering and leaving the University and the downtown area from the east. A very small percentage of the total traffic volume currently uses the westerly access, Old Concord Road. However, even if existing demand were to be shifted to the west, parking and circulation would continue to be problems in the downtown core. Thus, the primary task is to alleviate and minimize automobile traffic to the extent possible and to encourage alternative routes and alternative transportation modes.

The goal of further expanding University parking lots connected directly to the westerly interchange on Route 4 is long term in nature. Using Route 4 as a collector, most traffic arriving from the west, as well as significant traffic coming in from the north and east, could easily use the existing westerly interchange at Main Street and Route 4 to access existing University parking facilities. However, since UNH provides on-campus parking alternatives via A, B, and C Lots, people will continue to access the University via the east (Main Street and Madbury Road) to first check these parking lots for available spaces and then go to the parking lots located on the west edge of campus. An alternative to address this issue is

to encourage commuters to use the existing or new park-and-ride facilities north and south of the center of Town.

TRAFFIC GOAL AND OBJECTIVES

GOAL:

Promote the improvement of all public ways in the Town, with emphasis on major roads, and encourage a system of transportation that will meet the mobility needs of all local residents by providing for the efficient movement of people, goods, and services within Durham and throughout the region.

OBJECTIVES:

1. Provide a highway and street system that will allow the safe and efficient movement of people and goods throughout Durham.
2. Work to minimize traffic demand and strain on Main Street in the downtown/University area, keeping in mind the ongoing special needs for easy automobile access to business and services.
3. Minimize adverse traffic impact of through traffic on residential streets wherever viable alternatives can be provided.
4. Identify and prioritize intersections that need improvement.
5. Promote a transit system that has a frequent dependable schedule to minimize the increase of private automobile traffic movements.
6. Develop an educational program to improve the commuter habits and traffic patterns within the Durham community (e.g. encourage commuters to share rides to and from work or school to reduce traffic congestion).
7. Promote a bicycle and pedestrian route system and "share the road" campaign to maximize healthful recreational and transportation opportunities in and around Durham in order to reduce or minimize the increase of automobile traffic.
8. Protect the rural character of Durham's designated scenic roads and roads with scenic attributes.
9. Use traffic-calming measures to reduce speed and to direct traffic around neighborhoods.
10. The provision of regulated parking program to ensure turnover of parking in the downtown area.

ANALYSIS:

The single greatest traffic circulation problem facing Durham today, as noted in the Alternatives section of this chapter, is one that has also been identified in the two previous planning documents. That issue focuses on the need to alleviate traffic volume on Main Street, primarily from the Main Street/Route 108 intersection westward to Garrison Avenue. In effect, much of the traffic from the north, south, or east that accesses the downtown/University area passes through the Main Street/Route 108 intersection and proceeds westerly on Main Street. This is borne out by the 1998 traffic volumes which showed an average daily traffic count of slightly over 17,500 movements on the "Church Hill" section of Main Street between Madbury Road and the Main Street/Route 108 intersection. In order to alleviate this situation, the focus should be on reducing or stabilizing the traffic in this area and developing a more circular pattern using the Route 4 bypass to access downtown and the University from a westerly approach. The University should continue efforts to move parking and shuttle services to the west and create appropriate signage designed to redirect traffic. In addition, the University should make efforts to implement a transportation demand management program to reduce the number of vehicles accessing the University (see text box on transportation demand management).

The second major objective presented above identifies the need to redirect through traffic from residential streets whenever viable alternatives are available. Many traffic movements through residential neighborhoods, such as those along Faculty Road, are bypassing the congestion on Main Street and Route 108 to reach various parking lots on the University campus or the Mill Road Plaza. In studying the role, present and future, of any existing roadway, attention should be given to the realities of the existing conditions. For example, considering all of the business and commercial developments in the downtown, including the Mill Road Plaza, Faculty Road is no longer the rural residential road into a rural residential neighborhood that it once was. Faculty Road and the various residences that share it were once abutting farm lands where now a plaza exists. As Durham strives to reduce automobile traffic and to find transit and other alternative transportation modes, the Town will still have to work to reduce the automobile traffic congestion causing bottlenecks and the impact these have on the neighborhoods in Town.

In order to alleviate any negative impacts caused by traffic accessing the University from the south, it has been proposed that the corridor labeled "Southern Link Road" as presented in the l980 and 1989 update of the Master Plan, be maintained as a viable alternative to provide a southern

bypass of the most congested area of the Town. Whether or not this is indeed feasible or beneficial can be answered only with a rigorous, objective traffic planning and environmental impact study. As shown on the l980 and 1989 plans, the Southern Link Road would connect Newmarket Road (Route 108) with Mill Road and terminate at the Mill Road intersection. However, based on University expansion plans to the west, consideration to the possibility of having a connection into the campus north of Mill Road may be precluded by the University's development of the Southwest quadrant of its campus. Similarly, and possibly as part of the above study, another rigorous and objective study should be undertaken to analyze access from the north and east into the University core campus and the downtown area. The corridor referred to as the "Northern Connector" which extends from the Route 4 Bypass through the University's northwest quadrant to A-lot or Main Street should be a part of this study. The University opposes the Northern Connector Corridor and notes that it is not consistent with the University's Master Plan.

RECOMMENDATIONS:

The following recommendations are grouped in similar categories and do not reflect the order of priority. Table 7.5, "Table of Transportation Recommendations," relates each of the following recommendations to the Objectives stated earlier in this chapter and provides recommendations with respect to the timing of implementation for each of the recommendations.

Recommended Road Projects

Main Street/College Road Intersection. Reconfigure existing intersection to include a right-turn lane from Main Street onto College Road. This project will address significant traffic back-ups which occur during peak hours.

Monitor Need for Improvements at Key Intersections. The following intersections should be monitored and studied for safety improvements: Route 4/Route 108, Route 4/Main Street, Main Street/Route 108, Durham Point Road/Route 108, Bennett Road/Route 108, Stagecoach Road/Route 108, Mast Road/Main Street, Main Street/College Road, Packers Falls Road/Bennett Road, Mill Road/Mill Plaza, and Mill Road/Main Street (See map of Intersections to Monitor).

University Loop Road. The University's plan to create a Loop Road designed to reduce vehicular congestion on Main Street and to have a safer pedestrian-friendly walking core campus is supported only if the University successfully completes its engineering analysis on potential impacts on local roads, businesses, and intersections to the Town's satisfaction.

Railroad Bridge on Bennett Road. Repair, maintenance, and/or restoration should be pursued rather than replacement of this bridge. The design and construction of this project should be done with the utmost care and attention so as to retain the historic character of the area. Preservation of the approaches to the bridge and the alignment of the bridge are of particular importance. All work should be done with restoration in mind.

Additional Access to Mill Plaza. Additional access, beyond the existing Mill Road entrance/exit, needs to be created. More detailed analyses should be undertaken of the benefits as well as the disadvantages of an additional point of access.

Recommended Alternative Transportation Improvements

Transportation Education Campaign. Initiate an education campaign that would have components such as (1) using the Route 155A exit as a "main entrance" to the University of New Hampshire and the Whittemore Center in order to accomplish downtown and neighborhood traffic mitigation; (2) discouraging traffic on Madbury Road; (3) and encouraging travelers from the south to use Lee Hook Road to access the University. Funding for this project may be available through Congestion Mitigation and Air Quality (CMAQ) funds. The University is seeking funds for this project in the 1999 – 2000 CMAQ cycle.

Transportation Demand Management Program. It is important that the University work closely with the town and the Strafford Regional Planning Commission to implement the integral elements of reduced core campus parking coupled with an enhanced safe, frequent, timely, less air polluting, economical transit system and Transit Demand Management program.

Railroad Station. Provide improvements for passengers, intermodal access and services, and parking in the vicinity of the railroad station. See Chapter 2 – Sense of Community and Town Facilities for the redevelopment vision for the Craig Supply property, which includes these recommended improvements. Daily Amtrak service should be encouraged

to accommodate ridership, but only if improvements are made for access to the train station and to the parking. Support the efforts to build a passenger-boarding platform on the east side of the tracks to ensure an easy connection to the campus and to the Central Business District.

Traffic Calming Measures. Provide traffic-calming measures on roads where studies determine them warranted. Roads for which traffic calming measures should be evaluated include: Madbury Road, Mill Road, Faculty Road and Edgewood Road.

Sidewalk Projects to Create a Pedestrian Core. It is important to sustain and promote a safe walking core for Durham and provide high quality walking places beyond the core of the Town. These would be but a part of a larger interactive network of safe and aesthetic walking paths as part of Durham and the University's transportation infrastructure. Sidewalk projects identified for construction include (see map of Sidewalks):

- Route 108 from Main Street to Laurel Lane, and, if beneficial, connecting the sidewalk all the way to Bennett Road;
- Main Street from the UNH Field House to the West Edge parking lot;
- Continuous sidewalk from Mill Road along College Brook to Chesley Drive and continuing along Mill Pond Road to Newmarket Road;
- Strafford Avenue from Garrison Avenue to Edgewood Road;
- Connect Route 108 sidewalk with the sidewalk on Durham Point Road and provide a crosswalk to sidewalk located on the south side of Durham Point Road;
- Mill Road to Woodridge and possibly to Spruce Wood;
- Interconnection of the sidewalks within the Emerson and Edgewood Roads area; and
- Sidewalks on both sides of the road in the pedestrian-intensive core of downtown

Bike Lanes and Bike Trails. Continue to work with the NH Department of Transportation and the Seacoast MPO to create bike lanes and bike trails as opportunities present themselves, particularly when highway improvements are planned (e.g., as with Route 108 Newmarket Road improvements and Back River Road/Route 4 intersection improvements). Roads identified for bike lanes include (see map of Bike Lanes and Trails):

- Mast Road (Route 155A) to Packers Falls Road,

- Madbury Road,
- Old Concord Road section of Main Street into the University campus,
- Mill Road,
- Coe Drive,
- Garrison Avenue,
- Route 108, and
- Back River Road.

Areas identified for bike trails include:

- Along College Brook and adjacent to Mill Pond all the way to Jackson's Landing;
- Connection of the Foss Farm neighborhood to the Faculty neighborhood;
- Wagon Track bike trail from Dover Road to Back River Road,; and
- Connection of Wagon Track bike trail to Wagon Hill.

Park-and-Ride Facilities. Investigate sites on Route 108, north and south, for potential park-and-ride facilities to help reduce congestion on Route 108, downtown, and at the University. Ensure that the character of the areas considered for such facilities can be protected through proper design. Whenever possible, efforts should focus on existing parking facilities rather than new ones.

Traffic-Calming/Pedestrian-Friendly Improvements on Main Street and Pettee Brook Lane. These improvements are in the best interests of the Town as well as the University, and should run the entire length of Main Street from Route 108 on the east to the intersection with Route 4 on the west. The Main Street to Jenkins Court section of this plan was implemented by the Town during the summer of 1999. The University is further refining its plans for comparable and compatible traffic-calming devices and changes through the campus on the Town portion of Main Street.

Bus Pull-offs. Consider requiring bus "pull-offs" on all roads classified as arterial and higher where bus service is provided.

Recommended Studies

Transportation Improvements Study for Northwest and Southeastern Linkages to Downtown Durham and UNH. Prepare a feasibility study, needs assessment, and preliminary engineering to study alternatives and recommend the best approach to provide improved transportation connections between the core of Durham/University of New Hampshire to the regional transportation system. This study should include existing regional routes, possible new roads, public transit, shuttle pick-ups, and improved directional signage. The project will determine the best means of getting vehicles of all types from Main Street in Durham to US Route 4 and Newmarket Road. The historical "Northern and Southern" connector road plans and alternatives to these corridors should be considered.

Route 4 Safety Study. With the assistance of the NHDOT, conduct a Route 4 safety study that will include compiling and evaluating data, developing alternatives, and recommending improvements and actions to increase the current and future safety of the US Route 4 corridor in Durham. The study should recommend improvements for the safety of not only the motorists who pass though the corridor, but for those who enter and exit the corridor via the numerous driveways and residential streets. The use of innovative and non-traditional solutions to address safety in the corridor should be encouraged as part of the study. Once the study is complete, implement the recommendations using all means necessary, including the Transportation Improvement Program.

Madbury Road. Should the traffic load along Madbury Road continue to exceed desired levels, undertake a study that explores transportation alternatives, involving the community and residents of the neighborhood. Some transportation options may be to determine if along a critical short segment of Madbury Road traffic flow should be restricted (1) to out-bound only during the early morning hours, (2) to in-bound only during the late afternoon hours, or (3) restrict traffic flow all together by closing off the connection of Madbury Road to Route 4 so as to preclude Madbury Road as a key commuter route for those commuting to and from the University/Town through this residential area. The residents along Madbury Road would be able to assess the trade-offs of the brief periods of inconvenience associated with their own in-bound-only or out-bound-only traffic access, in return for what might be a large reduction in the number of commuters using Madbury Road.

Main Street/Pettee Brook Lane/Madbury Road Traffic Pattern. Over the long term, the downtown one-way traffic pattern should be reevaluated and reconsidered for possible return to two-way traffic. The traffic in the downtown area should be monitored as the transportation improvements recommended in this Master Plan are implemented. If the improvements are successful in reducing the traffic volume in downtown, consider implementing a two-way traffic pattern in the downtown. The one-way downtown loop often causes increased traffic circulation, air pollution, and congestion, as drivers/vehicles circulate unnecessarily to get to their destination or in search of parking.

Downtown and Commercial Core Parking. Develop a parking plan that addresses downtown business needs and the demand for UNH parking through the following steps: (1) Inventory existing available parking, types of spaces, transit connections, and the coordination and connections among parking lots; (2) Prepare options for parking solutions. This may include a mix of encouraging carpooling, especially for persons going to UNH, more convenient public transportation, and/or providing surface parking and/or parking garages to solve the parking for downtown; (3) The Town and UNH should work cooperatively to provide parking necessary for a dense downtown and for UNH commuters. UNH should be encouraged to address its parking policies; and (4) The Town should make parking available for commercial uses, while limiting availability for commuter uses.

Recommended Policies

Limit on Additional Traffic Generation by UNH. The Town should request that the University not consider any further expansion of the University which results in additional daily vehicular trips in the community. Thus, for any expansion of the University, the University would develop alternative transportation measures through a transportation demand management program to keep the level of vehicle trips constant. This acknowledges that the University is the major traffic generator for the Town, and is the primary source of commuters to the Town. Policies such as this should be established that help address this single major source of traffic. A similar approach was successfully implemented at the University of Washington and Cornell University (See text box earlier in this chapter on TDM).

University Special Events. Work with the University to study traffic impacts on the residential streets in Durham caused by special events at the University. The Town and University should work together to minimize these impacts with consideration of proposals such as closing the residential streets to nonresidents (e.g., Madbury Road and Edgewood Road) during the peak influx and exit to these events and creating one-way entrances and exits on Town and University roads.

Local Option Fee for Transportation Projects. Explore other revenue generating options for transportation projects, including the State-approved per vehicle registration tax assessment that can up a maximum of $5. Based upon Durham's 1998 vehicle registration information, this would raise approximately $30,125 that Durham could then use on transportation projects or for local match funding for State and Federal projects. See the Appendix for additional information on this option.

New Developments Contribute to Sidewalk Network. Require new developments to tie into and extend the existing sidewalk network which will lead to an incremental expansion of the sidewalk network.

Bicycle Parking Requirement. As part of the Site Plan Regulations, require seacoast area developers to provide parking for bicycles (e.g., bike racks), just as there are parking requirements for automobiles.

Air Pollution and Air Quality. In order to respond to and mitigate air quality concerns, encourage all forms of transportation that stand as an alternative to private motor vehicles, including transit systems, bikeways, and pedestrian paths.

Shared Access. Implement a policy to permit cross-access easements for commercial lots abutting one another so the driver does not need to exit onto the road in order to get to the neighboring property. In addition, shared drives should be encouraged under the Subdivision Regulations for new subdivisions along the rural and scenic roads in Durham (e.g., Durham Point Road, Bennett Road, Packers Falls Road, portions of Mill Road, Long Marsh Road, Dame Road) to not only improve safety but to keep the rural character of the area.

Access Management. Create a relationship with the NHDOT to improve access management on State roads in Durham and to work with the State to ensure that the entrance permits it processes are issued, at a minimum, with Durham's input. The Town should also recommend that the NHDOT abide by Durham's local ordinances and regulations with respect to issuance of entrance permits.

Rural and Scenic Road and Entrance Standards. Develop road and entrance standards for Durham's more rural and scenic roads. These standards should be consistent with the character of these roadways, balancing scenic characteristics, safety, and sight lines. Current regulations have forced the unnecessary removal of trees and widening of roads in the past, contributing to the loss of the area's character. New roads in rural areas should be consistent in design with the rural collector roads feeding them.

Speed Limits. Establish a standard 25 mph or less speed limit for densely developed residential neighborhoods in Town. Currently roads such as Faculty Road, Bagdad Road, Edgewood Road, and others have higher speed limits that may be inappropriate. Reduce all residential road speeds to 25 mph or less and increase traffic speed enforcement.

Class VI Roads. Class VI roads are important recreational assets, provide excellent walking opportunities, and should not be paved, except where such pavements are required for bicycling and walking paths like the "Wagon Track" bike trail or for developments that are determined to be of fiscal benefit to the Town.

Issuance of Building Permits on Class VI Highways. Develop a policy that provides guidelines for the issuance of building permits for lots with frontage on a Class VI highway. This policy should base the issuance of permits on maintenance issues, the appropriateness of the road improvements, and the liability assumed by the applicant.

Locally Scenic Roads. Consider the additional roads in Durham that may qualify as locally scenic roads, such as the portion of Mill Road west of the railroad tracks, Longmarsh Road, and Dame Road. Develop Durham-specific scenic road regulations that will protect the character of the roads designated as scenic by the Town.

Visual Simulations. For any major transportation project to be undertaken in Durham, as part of the design review phase, encourage the preparation of visual simulations to allow the citizens to better understand the project. These simulations would show before and after "photos" of the project.

Road Improvement Programs. Establish a road resurfacing and improvement schedule that is recommended to and endorsed by the Planning Board and the Town Council.

Reduce Impact of Aircraft Flights. The town should consider ordinances and/or policies to regulate the altitude of air traffic over Durham. In addition, town representation on the Pease Development Authority Noise Compatibility Committee should be continued.

Recommendations Requiring Direct UNH Action

The following recommendations are for items directly under the purview of the University of New Hampshire. However, since the University is the single largest traffic generator in the community, the Master Plan brings forward these recommendations on behalf of the Town for the University to implement. These recommendations are the result of UNH, Strafford Regional Planning Commission, and Town officials attending a conference on university and town transportation issues. The trip report from this conference is included in the Appendix. The Town will provide support to the University in the implementation of these recommendations.

UNH Parking Subsidy. In the interest of the Town as well as the University, request that the University remove its substantial parking subsidy (estimated to be $2.7 million per year), thus possibly significantly reducing the number of vehicles both on campus and throughout the town. A reallocation of a portion of this subsidy to the enhancement of the transit system could have a substantial positive impact on the campus as well as the entire community by providing incentives for alternatives to the single occupancy vehicle.

Transit Ride Pass Program. Request that the University institute a transit ride pass program for faculty, staff, and students that encourages the use of transit and carpooling rather than the single occupant automobile.

Wildcat Transit Marketing. Encourage Wildcat Transit to put more money into marketing its transit program. Nationally, successful university transit operations put at least two percent of their operating budget toward marketing their services.

Wildcat Transit Location Analysis. Request that Wildcat Transit perform a location analysis of the University student, faculty, and staff populations so that it can better target its routes and timing of those routes so as to reduce traffic volumes within Durham.

Expand Wildcat Transit Service. Expand University shuttle into Town, neighborhoods, and businesses to better service the students, faculty, staff

and community members who frequent such areas. Establish transit service between Durham and Rochester, between Durham and Concord, and possibly to satellite parking at the Lee Traffic Circle.

Wildcat Bike Racks. Request that Wildcat Transit continue to install bike racks on all of its buses, and at bus stops.

University "Pool" Vehicles. Request that the University make "pool" vehicles available to faculty, staff, and students who use non-automobile transit to get to the University so that they can perform errands and other activities, as needed, during the work day.

University "Smart Parking Pass." Request that the University consider instituting a "smart parking pass" program that electronically bills student commuter vehicles based upon the location of their parking. A higher rate would be charged for parking closer to the core of campus than outer locations (e.g., the western edge of the campus).

CONCLUSION

Bearing in mind the commitment to the preservation of the rural and open space aesthetic character of Durham, the realization of the importance of air quality improvement in the Town of Durham, and the disruption to the quality of life that comes from vehicular congestion, this chapter supports a principle that maximizes incentives for the use of alternative transportation modes and routes. This commitment takes the form of support for traffic demand management, traffic calming, narrower roads, slower speeds, development of bike and pedestrian facilities, proper consideration of road networks as part of neighborhoods, pedestrian paths and passageways, adequate shelters for public transit, and a first-rate public transit system with frequency and routes designed to serve all who need it. Movement of Durham in all of these directions would result in the further protection and improvement of air quality and the protection and preservation of the open space and rural aesthetic character valued by the community.

The thrust of the work for the Transportation chapter is an attempt to articulate a vision and a means by which that vision can be achieved for the Town of Durham, as it relates to transportation issues affecting the community now and into the future. The chapter includes some analysis of available data and includes formulated goals, objectives, and recommendations. The chapter does not include exhaustive analysis of detailed data pertaining to each of the issues. That would involve a scope

of work that goes beyond this Master Planning effort. The completion of the various studies, as recommended herein, will provide the more complete information base required for knowledgeable decisions to be made regarding implementation. These decisions will then allow the Town to pursue an implementation plan designed to achieve the vision of providing an integrated system of transportation for Durham in the 21st century while restoring and preserving the rural and open space aesthetic character of the community.

Table 6.5. TRANSPORTATION RECOMMENDATIONS: TIMING AND RELATION TO OBJECTIVES [AVAILABLE AT PLANNING OFFICE