

CHAPTER 9

TRANSPORTATION

STATEMENT OF PURPOSE

The City of Lebanon shall strive for a balanced, multi-modal transportation system that provides incentives for increased use of transit, bicycle and pedestrian modes, supports compact, mixed-use development, and contributes to decreases in both traffic congestion and volumes.

OVERVIEW OF EXISTING CONDITIONS

Lebanon's prominence as a regional economic center has had a great impact on the land use development patterns and transportation infrastructure in the City. The intersection of Interstates 89 and 91 in nearby White River Junction and the unique and desirable geography of the Upper Valley create conditions for an ideal transportation network. US Routes 4 and 5 and NH Routes 12A, 10 and 120 further improve the accessibility of the City from surrounding towns, facilitating traffic flow to the employment centers of Hartford, Lebanon and Hanover. Lebanon's Airport, the Concord-White River rail corridor, and transit service all diversify the transportation system. This system has contributed greatly to Lebanon's attractive business environment and the activity and growth of the Upper Valley. At the same time, growth in traffic and congestion has been one of the major byproducts of the economic expansion experienced in the Upper Valley region over the last couple of decades.

Increasingly, the regional housing shortage and centralized nature of the job market has contributed to longer commutes for Upper Valley workers. This dispersed residential pattern is difficult for transit or rideshare to serve effectively, so like most rural areas, there is a heavy reliance on automobile use. This regional land use pattern has dramatic impacts upon the highways and bridges in the City of Lebanon, travel time for commuters, the quality of the environment, and the safety and character of neighborhoods. The 1999 Build-Out Analysis completed by UVLSRPC projected that under current zoning, Lebanon's future land use will have a much higher proportion of commercial and industrial development than exists today, further increasing the number of commuters who must cross Lebanon's gateways during peak hours to provide labor to the region's economy.

TRANSPORTATION/LAND USE CONNECTION

Residential development. Lebanon supports relatively densely populated residential and intensively developed commercial cores, surrounded by sparsely populated residential and agricultural/forest land. Lebanon's early developments are more compact, while newer growth areas (those that extend beyond the original settlement areas) stretch the City's transportation and emergency services. Scattered residential development that has occurred in outlying areas such as Hardy Hill, Sunset Rock, Stevens Road, and Poverty Lane are not efficient from a mobility standpoint as these areas are separated from all commercial, civic and employment areas.

Commercial development. New commercial development is expansive and linear, especially along Route 12A. The Route 12A commercial district is a destination for shoppers from a large market area, which makes congestion and traffic accidents a particular concern. Excessive access points and turning conflicts along the main thoroughfare and throughout parking areas exacerbate collisions. The resulting situations create costs to the community in terms of staff time for police, fire and ambulance service, traffic congestion, and damage to personal property.

Below is a table illustrating different land use features and their potential transportation impacts.

Table 1: Land Use Features and Transportation Impacts

Feature	Characteristics	Impact
Density	Compactness of development	Higher density development makes transit more economically feasible
Land use mix	Different land uses within a development, neighborhood or region	Shorter trip distances reduce the need for vehicle ownership
Transit Accessibility or Transit Oriented Development	Locate commercial and residential development near transit stations	Increases transit use
Pedestrian Environment/ Urban Design Factors	Features that enhance the pedestrian or bicycle environment such as crosswalks, sidewalks, benches, landscaping, bike lanes, bike paths, bike parking.	Increases the desirability of bicycling or walking
Regional Patterns of Development	Refers to the dispersion, clustering, centralization patterns within a region	Encourages transit use by locating activities closer together

Source: EPA Guidance: Improving Air Quality Through Land Use Activities, January 2001.

ROADWAY SYSTEM

Highways and Bridges

Inventory. Lebanon’s roads are broken into five different classes per State statutes. The State maintained highway system consists of four classes: Class I, the primary State system; Class II, the secondary State system; Class III, State recreational roads; and Class IIIa, boating access roads. The municipally maintained highway system consists of three classes: Class IV, urban compact section highways; Class V, town or city roads and streets; and Class VI, all other public ways including roads subject to gates and bars. The City has roughly 40 miles of Class IV highways and 50 miles of Class V that must be maintained to allow safe and continued access to properties within the City and mobility through the City (See Table 2, below).

Table 2: Highway Mileage by Class

Class	Description	Mileage
I	Primary State Highway System	25
II	Secondary State Highway System	8
IV	State highways within the urban compact (see note 1 below)	40
V	All highways for which the City is responsible	50
VI	Discontinued or unmaintained roads	7
TOTAL		130

Source: NH Department of Public Works and Hwys, "Classified Road Mileage", January 2002.

- RSA 229:5.IV. "The compact section of any such city or town shall be the territory within such city or town where the frontage on any highway, in the opinion of the commissioner of transportation, is mainly occupied by dwellings or buildings in which people live or business is conducted, throughout the year and not for a season only."

Roadway Network and Land Use. Roadways serve two basic functions: *access* to properties and *mobility* between different locations. Traffic accidents and congestion occur when roads are interrupted by curb cuts and intersections. Roadway improvement projects, zoning district boundaries, and individual subdivision, zoning, site plan, driveway permit and building permit applications, should be undertaken so that roads remain appropriate to the abutting properties and that the allowable land uses are compatible with the adjacent road. Care should also be taken when laying out new roads so that the new infrastructure fits the intended land use and vice versa.

Highway Design can have a dramatic impact upon driver behavior. Various design elements, often referred to as "traffic calming," aesthetically enhance a corridor while encouraging drivers to slow down. Traffic calming is speed control built into the design of highways and the built environment. This technique is most frequently used in populated areas where slow traffic speeds are important to pedestrian and/or bicycle safety. Applications of traffic calming include narrowing roadways, roundabouts, curb extensions, village gateways, decorative planting and signs, to name a few.

Bridges. Bridges are essential elements of the City's roadway network and often present the weakest link in that network, since many structures are in various states of disrepair. The location of bridges within the floodway also presents a potential safety hazard as it may segregate two portions of the community if washed out in a flood event, and may severely limit emergency vehicle access to residents. There are four State-owned bridges in Lebanon that appear on the New Hampshire Department of Transportation's Red List, and four municipally owned bridges on the State's Red List. New Hampshire Red listed bridges require interim inspections due to known deficiencies, poor conditions, weight restriction or type of construction.

In this bi-state Upper Valley economy, the two Connecticut River crossings are essential to the City as links between the Lebanon and Hartford employment center and employee residential areas, as well as for emergency vehicle access. The regular maintenance of these structures is paramount for the safety and economic well being of the City and its residents. In addition, to the extent feasible, pedestrian and bicycle-related improvements should be incorporated into regular maintenance work and major alterations to the City's bridges.

Table 3: Red Listed Bridges

Bridge #	Ownership	Location
058/127	State	US Route 4 over Connecticut River
066/059	Municipal	True's Brook Road over Blood's Brook
077/107	Municipal	US Route 4 over BMRR/Mascoma River (NU Bridge on Miracle Mile)
121/117	Municipal	NH Route 120 over NHRR/Mascoma River (Hanover Street)
154/113	Municipal	Riverside Drive over Mascoma River (Packard Hill Covered Bridge)
156/117	State	I-89 NB over Hardy Hill Road
188/126	State	US Route 4 over NHRR/Mascoma River
192/129	State	Payne Road over NHRR

Traffic Volumes

Traffic volumes have greatly increased on the major highways in Lebanon and can be expected to continue to grow along with the Upper Valley's continued economic growth. Traffic congestion at certain key locations, particularly Rt. 120 commuter traffic and Rt. 12A shopping traffic, is not likely to improve substantially without a more comprehensive investigation of managing demand and network-wide improvements.

Table 4: Annual Average Daily Traffic (AADT)

Location	1991	1993	1995	1998	2001	2004
I-89 SB-NB West of NH 120 Exit 18-19	27,400	31,000	32,000	33,000	32,000	34,000
I-89 at VT State Line	26,800	29,400	31,400	34,200	36,500	38,500
Route 10 South of Wilder Dam	6,800	6,500	6,600	6,900	7,200	...
Route 4 East of I-89 Exit 17	10,300	12,000	12,000	12,000	12,000	15,000
Route 4 Mechanic St West of Poverty Lane	N/A	N/A	N/A	...	15,000	16,000
Route 4 Mechanic St. East of I-89 & NH 10 Exits	N/A	13,000	14,000	14,000	14,000	15,000
NH 120 1 Mile South of Hanover TL	11,100	12,000	12,000	14,700	17,600	18,200
NH 120 South of Heater Road	N/A	N/A	12,000	...	26,000	23,000
NH 12A South of Glen Road	N/A	N/A	14,000	15,000	15,000	17,000
<u>NH 120 North of Kimball Street</u>	<u>N/A</u>	<u>N/A</u>	<u>5,400*</u>	<u>5,400</u>	<u>N/A</u>	<u>N/A</u>
<u>NH 120 North of Kinne Street</u>	<u>3,000</u>	<u>3,700</u>	<u>3,500</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>

* NOTE: NHDOT count on NH Route 120 north of Kimball Street was completed in 1994

Parking

Parking is an essential component of economic development as it contributes to the access of business establishments. However, the need for parking is often dependent upon the proximity of differing land uses, such as residential to commercial. Too much parking is visually unpleasant and often disconnects different facilities, making walking or transit use difficult. The interactions between parking, transit, automobile use and walking are complex. If a community were to decrease the supply or increase the cost of parking, for example, there could be a significant increase in the use of transit. Similarly, if a large parking lot separates a sidewalk from a shopping plaza the appeal to walk is lost. These examples are some of the obvious types of interactions and part of the reason why parking is critical in shaping our environment.

The core development areas of downtown Lebanon and West Lebanon Village are well served by parking facilities designed around the existing pedestrian-oriented village centers. In these areas, people may park on the street or in lots located behind buildings in the downtown location and walk from one shop to another. A cluster of key services in the Lebanon Central Business District such as the post office and library, for instance, are located within a very close proximity making this an attractive setting and an efficient one. These existing mixed-use areas should be encouraged, expanded and replicated in other areas.

RAIL

Lebanon is home to a portion of the Boston and Maine (partially abandoned) freight rail line. Commercial freight traffic along this White River Junction, VT to Concord, NH railroad line has been abandoned for over thirty years. There is no passenger rail service within the community. The nearest passenger rail line, which runs north south from St. Albans, Vermont to New London, Connecticut along the Central Vermont rail line, is located in White River Junction, Vermont.

Rail transportation in New England has been a struggling industry, particularly when it does not include the long-haul transport of bulk commodities such as paper, grain, sand/gravel or coal. The Claremont Concord Railroad currently transports gravel and sand between White River Junction, Vermont and the Lebanon Industrial Rail Zone via the B&M line. The State of New Hampshire owns most of this line, which spans from Concord to White River Junction. Although there are no immediate plans to reopen the line, the future potential for ground freight on a more direct route between Concord and White River Junction holds possibilities. Increased utilization of freight rail services could lessen the impact on the City's road network and transportation costs for business and industry. Still, this abandoned rail line is the existing Northern Rail Trail which is a valuable recreation, and to a lesser degree, transportation resource that should be preserved regardless of the continuation of rail service.

Passenger rail in the Upper Valley is a future possibility as well. Currently, there is an investigation into the development of high-speed rail between Boston and Montreal. Phase One of the studies is complete and the results indicate that potential ridership is high enough to warrant further study. The next phase will evaluate the costs and benefits of the service and may be of interest to Lebanon as a portion of the corridor could be within the City. Another future possibility is utilizing the existing rail infrastructure for commuter travel.

Many of the issues affecting rail transportation, both passenger and freight, are beyond local control. However, Lebanon should plan to leverage the economic benefits (lower transportation costs) of the probable restoration of freight rail and integrate alternative modes of transportation into the larger system during its redevelopment. Lebanon's involvement in the process of reopening or constructing any rail line is critical as the impact on the City will be significant. The planning process will require strong regional advocacy, as there are many competing interests.

TRANSIT

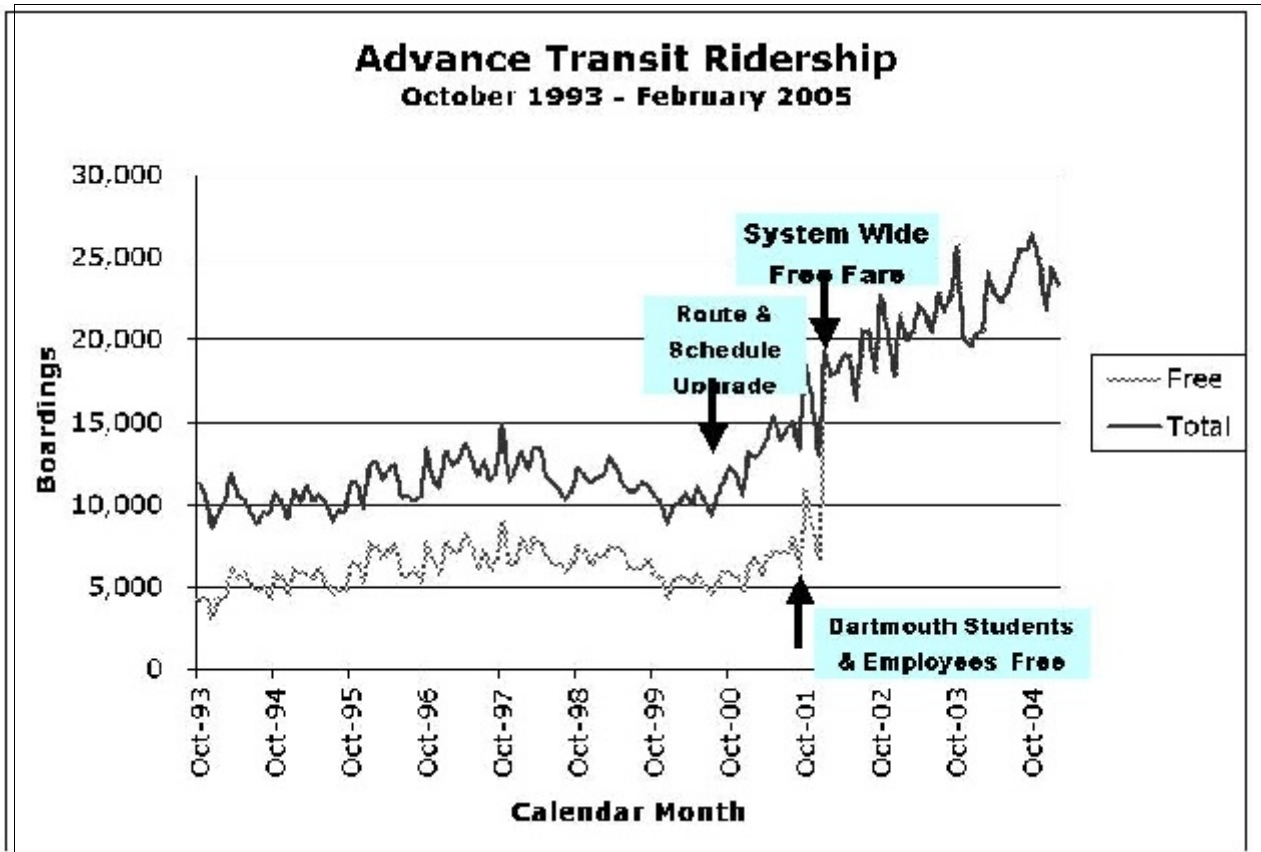
Advance Transit (AT) is the primary fixed-route transit provider in the Upper Valley. Additionally, AT provides shuttle service for Dartmouth Hitchcock Medical Center and Dartmouth College. Since January 2002, all services are free, subsidized by the municipalities served, Dartmouth Hitchcock Medical Center, and Dartmouth College. Buses and vans are handicapped accessible and have bicycle racks. Advance Transit works closely with communities, business, and industry to develop and maintain transportation options for Upper Valley residents and employees.

There are other transportation providers or public-private partnerships operating in the Upper Valley whose services are primarily for the elderly or disabled, as well as for linkages to area employers from other regions. Grafton County Senior Citizens Council and United Developmental Services provide paratransit (door-to-door) service to the elderly and disabled in the Lebanon area. Stagecoach Transportation Services provides similar service in neighboring Vermont communities and Community Transportation Services does the same for Sullivan County.

AT primarily operates around the denser populated core of the Upper Valley. However, many of the individuals that are transit-dependent (elderly, disabled, and lower-income) are located further away from the core on the outer reaches of the service area. This makes service difficult economically for the transit provider and logistically difficult for users making, for example, connections with childcare providers. It also increases the demand on an already short supply of park & ride lots.

Advance Transit's fixed-route system currently provides regular scheduled service to the core Lebanon/Hanover/White River Junction area in addition to service to Enfield, Canaan, Norwich, Wilder and Hartford. It is primarily structured to serve employees and shoppers with destinations in the Lebanon-Hanover-Hartford job center. Since the fixed-route service was upgraded in October 2000, ridership has more than doubled as shown in Figure 1 (*Source: Operational Impact of Advance Transit, June 2005*).

Figure 1: Advance Transit Ridership



TRANSPORTATION DEMAND MANAGEMENT

Park & Ride Lots and Ridesharing

The Upper Valley Transportation Management Association (UVTMA) is a current initiative by employers and public entities to lessen travel demand rather than create infrastructure to support more vehicles.

Transportation demand management consists of a broad range of strategies that are intended to reduce and reshape demands on transportation infrastructure including employer flextime and staggered shifts, parking management, commuter incentives, and bike and pedestrian improvements. Upper Valley Rideshare (UVRS) is one of those strategies provided by Advance Transit. In order to match prospective carpoolers with others, UVRS maintains a database of area commuters who are interested in carpooling. Those who participate receive a “match list” of those who commute to similar origins and destinations. An online “rideboard” lists new ride options weekly. UVRS also guarantees a ride home for those registered in their program. This program offers many benefits to the City at no public expense.

There are no formal park & ride lots in Lebanon and few with excess capacity serving the job center.

Park & ride lots are integral in facilitating intermodal connections and supporting transit use. Large new lots in fast growing areas such as Grantham (underway) and Enfield would enable additional car and vanpooling. Major employers are also exploring this concept by developing satellite parking lots for employees and serving them with bus services in order to limit the development of parking on valuable land.

BICYCLE AND PEDESTRIAN

Transportation is not just the realm of cars and other motorized vehicles. Bicycle and foot travel are viable modes of transportation and have been indicated as desirable by many residents. Certain segments of the population typically have limited options to get around the City, such as the young, elderly and other special needs populations who for various reasons cannot drive. The lack of viable alternative modes of travel greatly restricts the freedom of many residents and impacts the quality of life of everyone. Of particular importance is the creation of a plan to assist in the development of infrastructure to support walking and biking. This is especially critical to ensure that the City is in compliance with the Americans with Disabilities Act (ADA).

The creation of the Lebanon Pedestrian and Bicycle Advisory Committee (LPBAC) was an outcome of the last Lebanon Master Plan (1993) to make the City more walkable and bikeable by facilitating, enhancing, and encouraging safe pedestrian and bicycle travel and connectivity among the related infrastructure. Since its inception, the LPBAC has been a successful information resource to City departments and has facilitated the development of various projects Citywide.

The Lebanon Recreation and Parks Department is another resource to the City. The Department is currently working on the Liveable, Walkable Lebanon Plan, a master plan for trails, bike ways, and pedestrian walks, in partnership with the Upper Valley Trails Alliance, the Planning Office, and Conservation Commission.

The New Hampshire Department of Transportation also provides resources and information localities. The state manages the Transportation Enhancement funding program, which is geared towards funding bicycling and pedestrian improvements. The state also undertakes planning activities as well, including the recent statewide bicycle route map that identifies interconnected bicycle routes along state roads.

It is a commonly held belief that the typical pedestrian will walk an average of ½ mile to get from point A to point B; and the typical bicyclist is willing to travel an average of 2 miles. With that in mind, compact land use development patterns that are easily accessible by public transport and bicycle/pedestrian travel should be implemented to facilitate and encourage these efficient and inexpensive forms of alternatives to motor vehicles.

The Northern Rail Trail provides excellent recreational and transportation access for bicycles and pedestrians from the Carter Community Building Association (CCBA) area to Enfield and beyond. The extension of the Rail Trail to connect with West Lebanon would be extremely beneficial for improved access for children and less confident cyclists.

AIR

The City of Lebanon owns and operates an airport for general and commercial aviation with service to selected major cities in the Northeast. The facility includes an air traffic control tower, two runways and hanger facilities. Air freight does not account for a large percentage of operations at the airport.

Due to a number of factors including the airport's small size and population base and the competition with Manchester NH Airport and Burlington VT Airport, commercial air service has struggled in recent years. The number of total outbound passengers peaked in 1993 at about 53,000 when three commercial carriers operated at the airport. Over the last 23 years the average annual boardings totals about 33,000, which is a 37 percent reduction from the peak, but about 300 percent higher than 2004 figures (8,000). Currently, only one commercial carrier operates at the airport.

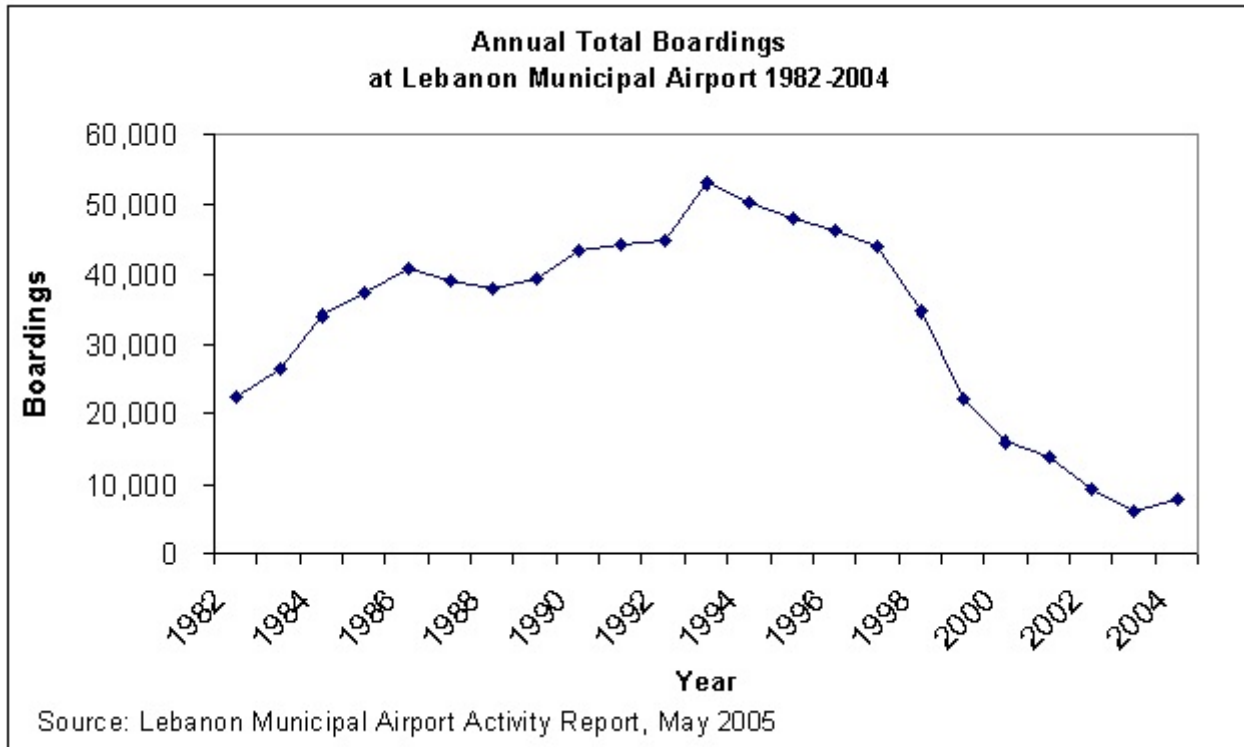
As a result of declining use, the airport has recently found it challenging to operate without financial support from the city's general fund, which is contrary to its stated mission to be self-sustaining. A federal subsidy allows the sole commercial carrier to continue to operate at the airport. The group "Fly Lebanon", a partnership between the City of Lebanon and the Greater Lebanon Area Chamber of Commerce, is making an effort to promote and provide incentives to use commercial service at the airport.

Current plans, which seek to develop hangar space as a source of revenue, are moving forward. The City Council for the 2006 fiscal year budget approved an expenditure of \$900,000 for the construction of said hangars.

An Airport Advisory Committee and Airport Manager provide guidance for the operation of the airport. The airport currently has a Master Plan for operations and future improvements. Its first three goals are:

- Meet FAA planning standards and criteria;
- Plan new terminal area development concept alternatives to be feasible and cost effective;
- Maximize operational efficiency.

Figure 2: Annual Total Boardings, Lebanon Municipal Airport



ISSUE IDENTIFICATION

Transportation issues were discussed in depth at the 1999 “Lebanon: A Look Ahead” forum which were then incorporated in Chapter 15 - Land Use of the Master Plan. As identified in this report, the strengths of the City’s transportation system include Interstates 89 and 91, available parking, well-maintained roads, access to and from other communities, Lebanon Airport, transit services and scenic roads. The weaknesses revolve around a lack of pedestrian and bicycle facilities, dangerous intersections and traffic congestion at select locations, for example NH 12A and Main Street in West Lebanon. Limited airline and transit services were also identified as weaknesses as well as no rail passenger service.

Issue 1: Access Management

Access management is the practice of controlling access points along roadways to minimize conflicting traffic movements and to maximize roadway capacity and system efficiency. It involves limiting overly abundant, poorly designed access points and driveways. Often access management can be improved by focusing on site improvements, such as defined entryways and exits, shared driveways, and connections between adjacent subdivisions, for example. The Zoning Ordinance can further aid the process by coordinating traffic volumes of a proposed use with frontage requirements, lot sizes, curb cuts, and signage.

Effective Access Management:

- Reduces crashes by as much as 50%.
- Increases capacity 23-45%.
- Extends life of the highway
- Treats applications for access permits consistently.
- Protects investment in abutting property.
- Reduces travel time and delay by 40-60%.
- Decreases fuel consumption by 35%.
- Reduces vehicular emissions.
- Reduces transportation costs.

Source: Access Management, Location and Design; US Department of Transportation, Federal Highway Administration, National Highway institute, April 2000.

The chart below indicates that despite a similar traffic volume as that of Route 120 (see Table 4 above for traffic volume data), Route 12A has significantly more accidents because of a number of access management concerns, including excessive curb cuts and driveway spacing, and the existence of a Two-Way Left Turn Lane (TWLTL).

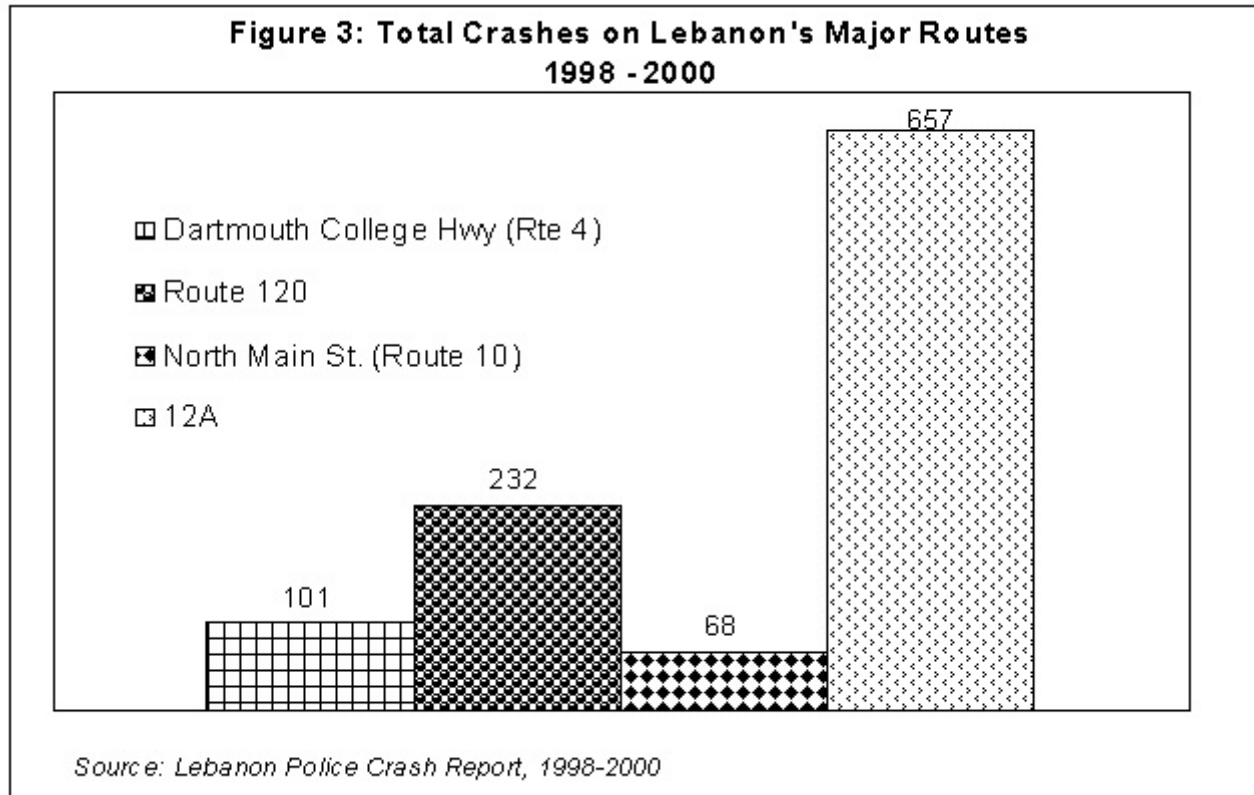
Route 12A and the Need for Access Management

Route 12A in Lebanon is undoubtedly the best example of an area that could benefit from extensive and well-planned access management measures.

The Route 12A problems include poorly coordinated on-site circulation, including excessive curb cuts, forcing trips onto Route 12A which contributes to multiple traffic conflicts, which cause an increase in traffic congestion, which cause reduced capacity and pedestrian safety, which results in pressures to increase capacity.

The solution to preserving investment in highways and improving safety is to not always increase roadway capacity but is to manage access. Studies by the Florida Department of Transportation concluded that a four-lane divided roadway with a one-half mile signal spacing and *limited* access can carry the same traffic volume as a six-lane divided roadway with one-quarter mile signal spacing and *poorly* designed median openings (Source: NHI Access Management, Location and Design, April 2000).

In 2005, a Dartmouth College architecture class studied the Route 12A area and presented conceptual designs for the corridor to the Lebanon Planning Board. In an attempt to address typical suburban sprawl, the design proposed by the students included a Town Center layout, with mixed uses and a grid of new streets to improve internal circulation. In addition, the designs included significant access management changes to the 12A corridor. For example, the students proposed to eliminate left turn movements except at new roundabouts, which would be placed at key intersections along the route.



Access management includes the following access:

- Medians. Crash rates on major roadways with jersey barriers or solid (non-traversable) medians have been found to be substantially lower than undivided roadways or roadways with a continuous two-way left turn lane (TWLTL), like Route 12A. Safety is also reduced where median openings are too close.
- Auxiliary lanes. Left and right turn bays minimize the conflict between turning vehicles and through traffic.
- Signalized intersection spacing. Long, uniform signalized intersection spacing facilitates the use of timing plans that can respond to peak and off-peak traffic conditions.
- Driveway location and design. Driveways should be spaced a minimum distance apart, the distance depending on traffic speeds and the road's functional classification.
- Corner clearance. Corner clearance is the distance from an intersection to the nearest access connection. Appropriate corner clearance standards preserve good traffic operations.
- Joint and cross access. This is the requirement to consolidate driveways serving more than one property and providing circulation between adjacent parcels. This will help separate driveway spacing as well.
- Reverse frontage. Lots abutting the thoroughfare should not be allowed direct access to the thoroughfare. Instead an interior street should be required, which would eliminate conflicts between high-speed traffic and lower entrance/exit traffic. Access to the thoroughfare is provided at locations that can be designed safely.

Parking

The City' Zoning Ordinance has parking requirements that result in vast paved areas built for maximum parking demand rather than one standard serving the needs for all but a few days each year. Those parking areas are also often uncoordinated with and isolated from similar adjacent land uses.

With a more coordinated approach, in which numerous buildings share access point and parking facilities, the total number of parking spaces could be greatly reduced. Maximum parking spaces that reduce the number of total parking spaces required for businesses should be considered. Currently, private parking in the City is permitted during the site plan or subdivision process. Standards in the Zoning Ordinance require a minimum number of parking spaces according to the type and size of a development. Often developers provide more parking than is required when regulations provide no maximum number of allowable spaces. Pressures to increase the supply of parking in downtowns, particularly when done site-by-site in a piecemeal manner, may disrupt the interaction of a downtown. As more parking is created to support the automobile, the ability to walk from one activity to the next is diminished and parking demands are likely to increase. This contributes to additional traffic congestion as well.

Issue 2: Traffic Congestion and Flow

Traffic congestion is a problem along many of the major highways throughout the City, such as NH 12A, NH 120 and US 4. Congestion at Rt. 12A, for instance, has impacts that go beyond delays for shoppers, including reduced mobility and increased emergency response times for residents of Plainfield. There have been numerous solutions proposed for traffic congestion on Rt. 12A, including widening the road and creating a "loop road" that would run from the existing Kmart parking lot parallel to the river and behind the Upper Valley Plaza contingent on on-going environmental assessment.

Redundancy (the availability of numerous routes for travel from point A to point B) is desirable to reduce congestion at some of these locations and to provide improved access to such as Dartmouth Hitchcock Medical Center. This improved access may include the discussed connector road from DHMC to Route 10 or I-91, as was investigated in the 1988 Upper Valley Transportation Study¹. This alternative (predating DHMC's move to Lebanon) was projected at that time to significantly reduce traffic at existing river crossings. However, a connector only to Route 10 will more than likely not reduce traffic through the Village of West Lebanon and Hanover's downtown. Issues have recently arisen about increased traffic problems that need to be investigated in these two areas.

Other ideas for a connector to I-91 include crossing the Connecticut River by gondola and monorail.

"Concurrency management" may also be beneficial to Lebanon, as it would regulate traffic congestion by identifying tolerable levels of congestion, which could be used as a basis for development permitting and municipal capital investments. This is important because often the increased costs of providing those additional services and infrastructure improvements are not fully realized by the increased tax revenues generated by those new residential developments.

¹ Prepared by Vanasse Hagen Brustlin and Charles River Associates for Upper Valley Lake Sunapee Council (now UVLSRPC), 1988.

Access management, telecommuting, ridesharing, flexible work schedules, transit and other alternative transportation modes are all practices that can help mitigate traffic congestion. In addition, zoning that encourages mixed-use development can help reduce the distance of a commute or lunch-hour trips. There should continue to be thoughtful consideration and regional discussion concerning how to mitigate traffic congestion within the main travel corridors. Future decision-making relative to land use, site development, and infrastructure improvements will need to include new approaches to mitigate future traffic and its demands on the City's transportation system. It will be difficult to solve Lebanon's future transportation issues in isolation or with strict engineering or road building solutions. It will require a well-planned and integrated transportation system that supports all modes of transportation. The City must balance an adequate and equitable transportation system for its residents and business with cost of constructing and maintaining such a system.

Traffic Calming

When traffic congestion reaches a saturation point, usually during peak hours, motorists seek alternative routes, often through residential neighborhoods, and/or become less safety conscious. Traffic calming techniques can be used to slow down and control traffic on streets where it is necessary for motorized traffic, pedestrians and bicyclists to coexist. Traffic calming measures include:

- Narrowing streets. Wide streets often encourage faster speeds. Extending curbs, eliminating multiple lanes, and adding bicycle lanes can help reduce speeds.
- Break up straightaways. Straightaways on roads encourage speeding. Making physical alterations such as speed humps², speed tables, rumble strips, and roundabouts discourage high speeds.
- Realign and redesign intersections to be more pedestrian friendly by adding “neckdowns” (a curb and esplanade extension toward the center of the roadway that narrows a travel lane or street causing a reduction in speed) and changing signal times to add more time for walking across streets.

Lebanon has several areas that may benefit from traffic calming, most notably, the traffic circulation around Colburn Park. There have been pedestrian fatalities in this area in recent years. The multiple travel lanes with no lane markings, high vehicular speeds, diagonal parking, exceedingly long crosswalks with no islands-of-refuge, and high vehicular counts mixing with the many pedestrians crossing the roadway make for a dangerous area for pedestrians.

Mt Support Road, Heater Road, Gould Road Maple Street, and Mascoma Street are other examples that could benefit from traffic calming measures. It is essential that the design and implementation of traffic calming measures be based on a comprehensive review of the area roadways to ensure that the intended purpose is met and that it is appropriate for the roadway and existing conditions.

² Distinguished from speed “bumps” in that they are more gradual breaks in the pavement and thus not as disruptive to motorists.

Issue 3: Balance and Choice in Transportation

For people to choose alternative transportation over use of their automobiles, there must be viable alternatives to driving, such as the following:

- Walking routes must be safe, direct, and attractive. Homes must be close to workplaces and services.
- Land uses and streetscapes must be human-scaled, balancing pedestrian amenities with automobile access.
- Public streets must support a balanced variety of uses, with the balance being different for different streets based on their function.
- Transit service must be convenient, reliable, and timely.
- Bicycle routes must be safe and destinations must have convenient and secure parking for bicycles.

Supporting Transit

Development has been oriented to the use of automobiles at the expense of public interaction and inexpensive transportation. The goal should be to create developments that include a safe and ample multi-modal transportation network linking residential areas to commercial, educational, recreational, and cultural centers. This network would include limiting roadway widening projects in favor of safe and attractive facilities for pedestrians, bicycles and transit.

Ridership on all Advance Transit (AT) routes has increased dramatically in recent years. Improved conditions, however, would better support mass transportation even more. For example, there are areas along the Route 120 corridor that do not have park-and-ride lots for commuters wishing to use bus service. A good location for such lot could be at Exit 18 of I-89.

Pedestrian connections between employers, residents, and bus stops are minimal throughout the area, and bus stops are often inhospitable, provide no shelter, and are not plowed in the winter. Financial support for Advance Transit operations is not secure and may be prohibiting the expansion of service in several key areas.

Linear “strip development” in Lebanon, such as that along Route 12A, is particularly difficult for transit to serve. Buses need to compete with other passenger vehicles for roadway space, causing delays and scheduling difficulties. Likewise, isolated industrial parks pose problems reaching and servicing employees. On a site-specific level, the placement of parking in front of buildings and other design factors contributes towards a heavy reliance on vehicular travel and is a disinvestment in transit service.

Providing Bicycle and Pedestrian Alternatives

Automobile-centered growth has resulted in diminished bicycle and pedestrian accessibility. Alternative transportation needs should be addressed in all roadway projects in such a way that attractive and safe facilities are available throughout the community:

- For busy and high-speed locations a landscaped buffer (esplanade) should be placed between the sidewalk and the roadway.

- Benches, ample and well-placed crosswalks, shade trees, and other landscaping should be provided to encourage walking.
- Appropriate design features, such as curb-extensions at all crosswalks where the driver of a vehicle can easily see a pedestrian, should be provided to reduce chances for pedestrian-vehicle conflicts.
- Bicycling accommodations should be provided allowing cyclists to safely travel the roadways throughout the City.
- Ample support facilities, such as bike racks or lockers, should be available at all employment, commercial, and cultural centers to encourage bicycling as a viable form of transportation.

The City should encourage and promote the development of interconnected networks of sidewalks, bicycle routes and paths, and other recreational trails that facilitate better transportation throughout the community. There is a network of sidewalks that allows residents to walk within the two urban centers, but there is limited access between them, as well as very limited or inadequate facilities in the NH Route 12A corridor. Five-foot or wider shoulders are available for cyclists in numerous locations throughout Lebanon; however, numerous inconsistencies exist and many areas have no shoulders at all which does not allow cyclists safe continuous access throughout the City. In addition, many bridges, such as the US Route 4 Bridge over the Connecticut River between West Lebanon and White River Junction, are quite narrow and pose a significant hazard for cyclists as they compete for access with cars and trucks. Other obstacles such as on-street drainage grates and vertical curbs can pose a safety hazard to cyclists and limit accessibility for anyone but the most confident cyclists.

In 1994, the City Council established the Bicycle/Pedestrian Path Committee who then in 1995 completed an interim report and master plan for pedestrian and bicycle facilities. This Committee became a standing committee in September 1995 and is named the Pedestrian and Bicyclist Advisory Committee.

Because of the mandate of the Americans with Disabilities Act that municipalities provide reasonable accommodations for persons with disabilities to its facilities, including conservation lands and other open space lands, the Conservation Commission, in January of 2001, passed a policy calling for a master plan for its trail systems. Said master plan is to address trails intended for those people who use power chairs and power scooters.

The scope of this trails master plan was expanded in 2005 when the City contracted with a consultant to produce a master plan that also included a pedestrian and bicyclist network for the entire City. The Upper Valley Trails Alliance partnered with the City in order to look at the networking with adjoining communities. Titled “Liveable, Walkable Lebanon”, the plan is in preparation.

VISION

The transportation system for the City of Lebanon shall be balanced and integrated to improve mobility, enhance the quality of life, improve the attractiveness of the neighborhoods, and support the planned regional growth of business and industry. Transportation decisions shall be based on ecologically sound and health-promoting principles, shall focus on reinforcing Lebanon's residential neighborhoods, and shall be pedestrian and bicycle friendly.

ACTION PROGRAM FOR TRANSPORTATION

The 1999 weekend forum “Lebanon: A Look Ahead”, and the evolution of ideas and concepts contained in the 1993 Lebanon Master Plan provide the basis for the following Action Program. The recommendations are to guide Lebanon towards achieving its vision while adhering to four basic goals:

1. *Preserve* existing infrastructure;
2. *Diversify* transportation options and expand choice;
3. *Direct* development toward supporting alternate transportation modes; and
4. Maintain a unified vision of growth, which *integrates* diverse transportation options and land use planning.

Issue 1: Access Management

- A. Create local access management policies in an effort to ensure that future development and road access adheres to sound access management principles.
- B. Create and implement access management retrofit plans on Route 12A, Miracle Mile, and Mechanic Street. These plans should include strong land use components that investigate nodal development, which concentrate growth and mixed land uses to minimize transportation demand.

Issue 2: Traffic Congestion and Flow

- A. Manage traffic volume growth through efforts that promote alternatives to vehicle trips, such as telecommuting, ridesharing and transit use.
- B. Implement access management techniques, such as minimizing curb cuts, to preserve capacity and increase safety in key highway corridors including Route 12A and 120, Miracle Mile and Mechanic Street.
- C. Ensure adequate on- and off-site traffic circulation associated with commercial development.

- D. Develop and implement a City-wide traffic plan that discourages through-traffic in residential areas by using traffic-calming measures.
- E. Implement techniques such as transportation demand management as a preferred alternative to increasing highway capacity.
- F. Develop a corridor plan for Route 120, including consideration of a planned connection to Rt. 10 or I-91 by gondola, tram, or a vehicular bridge over the Connecticut River.
- G. Develop a long-range redevelopment plan for Rt. 12A, which balances environmental and transportation concerns along with mixed use development, a loop road around the area, and pedestrian/bicycle movement.

Issue 3: Providing Balance and Choice

Transit

- A. Provide transit providers with improved facilities such as pull-off areas at all urban transit stops, assistance with bus shelter construction, snow removal and parking facilities for transit users.
- B. A system of park and ride lots should be established along major travel corridors within the City.
- C. Support and advocate for park-and-ride lots outside the City of Lebanon.
- D. Continue to support Advance Transit financially.
- E. Provide City employees with incentives to promote increased use of public transportation.
- F. Support and promote the use of UV Rideshare.
- G. Encourage developments that are easily served by public transit, through the following:
 - Ensure transit and other supporting facilities are required during subdivision and site plan review processes.
 - Encourage business and industry to provide commuter benefits.
 - Assist, train and partner with developers to create transit-oriented development, such as: Including front walks to the street (not driveway); garages in the rear; front porches; mixed land uses; and sidewalks.

Bicycle and Pedestrian

- A. Promote safe intersection design and bicycle, pedestrian and transit friendly traffic signalization.
- B. Include pathways for bicycles and pedestrians whenever vehicular bridges are being rehabilitated or replaced.
- C. Promote improved pedestrian facilities throughout the City including a well-maintained, interconnected sidewalk network, benches, landscaping that provides pedestrian shade, and attractive non-obtrusive lighting.
- D. Promote safe pedestrian accommodations including curb-extensions at all crosswalk locations and segregated sidewalks with landscape buffers along all major roadways.
- E. Develop facilities to allow for independent child mobility such as bike paths.
- F. Consider having all rehabilitated and replaced bridges widened to include 5-foot shoulders where connections to complementary pedestrian and bicycle facilities exist.
- G. Promote a consistent network of wide shoulders or bike lanes on rural highways for cyclists and shared use of narrower roads through urban areas.
- H. Support the Pedestrian and Bicycle Committee in creating a comprehensive pedestrian and bicycle facilities plan which identifies areas where linkages can be made and where additional infrastructure is warranted (both within and outside the City) to serve development. This plan will act as the basis for requiring infrastructure improvements during subdivision and site plan review applications and provide clarification to questions regarding the placement of facilities. Broad cooperation between relevant City departments is critical to the success of this plan.
- I. Bicycle racks and lockers should be installed in public spaces throughout the community and required by developers as part of site plan approval.
- J. Cooperate with the Friends of the Northern Rail Trail to maintain and extend the existing trail.
- K. The Planning Board should coordinate with the Recreation Department in the development of the Trails Master Plan.
- L. The City should complete their Americans with Disabilities Act (ADA) transition plan to ensure public facilities meeting ADA guidelines.
- M. The City and state shall consider including bicycle and pedestrian facilities to all bridge and road projects.

General Recommendations

- A. Continue to cooperate with surrounding communities and the regional planning commission in seeking local solutions for regional transportation problems.
- B. Cooperate with regional transportation management association and transportation demand management initiatives.
- C. Continue to be active on the UVLSRPC Transportation Advisory Committee (TAC).
- D. Continue to use pavement management systems to maintain roads and streets efficiently.
- E. Continue to work closely with the Town of Hanover on addressing solutions to congestion on Rt. 120.
- F. With the NH Department of Transportation, carry out the following Ten Year Plan Improvement projects:
 - 1. Reconstruction of the Interchange and bridges at exit 20, including approached on Route 12A
 - 2. Rehabilitate Route 4A
 - 3. Route 4 Bridge replacement over Mascoma River (near Route 4A)
 - 4. Reconstruct Mechanic Street from High Street to I-89 ramps
 - 5. Route 4 rehabilitate bridge over Conn. River
 - 6. Route 120 add southbound lane from Lahaye Drive to Etna Road
 - 7. Various Airport projects (10 total)
 - 8. Various Interstate projects (4 total)
 - 9. Make pedestrian and bicyclist improvements and repairs to all bridges.
- G. Continue to be a leader in developing creative solutions to transportation problems including investigating the future use of High Occupancy Vehicle Lanes to aid transit buses and supporting the consideration of rail transit along the existing rail line from Bellows Falls and Randolph, Vermont to the Upper Valley for regional commuters.
- H. Consider the purchase of hybrid vehicles using biodiesel and/or other alternative fuels for all appropriate City vehicles.