9 |

Transportation

9 | A

Vision & Purpose

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

The City of Lebanon shall strive for a balanced and integrated multi-modal (the combination of transit, motor vehicle, air, rail, pedestrian, and bicycle transportation) transportation system that provides incentives for increased use of transit, bicycle and pedestrian modes; supports compact, mixed-use development; reduces carbon footprints, and contributes to decreases in both traffic congestion and volumes. The City shall approach transportation issues with an eye to the prevention of future challenges, as well as seeking to remedy existing problems and support sustainable development.

A transportation implementation plan is needed to attain this vision while coordinating and integrating its elements into other planning areas such as land use and economic development.

key points | vision & purpose

- Support regional growth and improve mobility, quality of life and neighborhood character through provision of a balanced, integrated multi-modal transportation system.
- Promote compact, mixed-use development that will increase the efficiency of the City's transportation network.
- Reduce the City's carbon footprint, decrease traffic congestion and promote healthier lifestyles by increasing transit use, walking and bicycling.

9 | B

Issues & Priorities

9 | B-1

Transportation and Land Use

For both residential and non-residential development, promoting a more compact land use pattern that can be efficiently served by multi-modal transportation systems is a priority.

9 | B-1a **Residential Development.** The residential neighborhoods within Lebanon's core areas are relatively densely developed and are located in proximity to the central business districts. These core areas are surrounded by sparsely populated residential and agricultural/forest land. The scattered residential development that has occurred in those outlying areas - such as Hardy Hill, Sunset Rock, Stevens Road, and Poverty Lane - is not efficient from a transportation standpoint due to its distance from commercial, civic and employment areas. This development pattern is stretching the City's services and infrastructure, in addition to the transportation system. Scattered rural residential development cannot be efficiently served by public transit and is too spread out for most residents to walk or bike to their destinations.

9 | B-1b **Nonresidential Development.** The commercial development that has occurred in Lebanon in recent decades 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. This adds costs to the community in terms of staff time for police, fire and ambulance service, traffic congestion, and damage to personal property. Route 120, from downtown Lebanon to Hanover, is already experiencing similar challenges as it develops, and efforts are needed now to avert the creation of the traffic prob-

key points | issues & priorities

- Promote a more compact land use pattern that can be efficiently served by a multi-modal transportation system.
- Coordinate transportation and economic development to provide those living and/or working in the City access to viable transportation choices.
- Establish and protect the City's green infrastructure including trails, greenways and riparian corridors that serve as non-motorized transportation connections.
- Promote active living, biking and walking as part of the daily routine, which provides dramatic improvements in public health.

key points | existing conditions & trends

- Lebanon's location at the intersection of the region's major transportation routes contributes greatly to the City's economic vitality and quality of life.
- Traffic volumes and congestion have increased on major highways in the City, while Lebanon's rural roads retain much of their scenic character.
- Bridges are essential to the City's transportation network and the regional economy, but are vulnerable to damage from storms or other disasters, as well as to degradation due to age and limited maintenance.
- There is a network of sidewalks that allows residents to walk within Lebanon's two core areas, but there is limited connectivity between them, as well as very limited or inadequate facilities within other major transportation corridors for pedestrians and bicyclists.
- Advance Transit provides regular scheduled service in the City and region, and is primarily structured to serve employees and shoppers with destinations in the Lebanon-Hanover-Hartford employment center.
- A short segment of rail line within the City has recently been reactivated for commercial freight traffic, while the remainder of the corridor provides valuable recreation and bike/pedestrian infrastructure as the Northern Rail Trail.
- The City of Lebanon owns and operates an airport for general and commercial aviation with service to selected major cities in the Northeast.
- The core area of downtown Lebanon is well served by parking facilities designed around the existing pedestrian-oriented village center, while additional parking is needed for the West Lebanon Central Business District.
- Coordinated efforts by the region's employers, local government, public entities and non-profits continue to lessen travel demand rather than create additional infrastructure to support more single occupant vehicles.

lems evident along Route 12A. A more compact, mixed-use development pattern would be less auto-dependent, allowing people to safely walk or bike between destinations and increasing the efficiency of public transit.

9 | B-2

Transportation and Economic Development

Sustainable economic development can be facilitated, supported and coordinated by a well-executed, balanced transportation plan that reduces the resources required for businesses to succeed (e.g. less required parking, shorter length of utility infrastructure and more users per increment defraying cost, etc.). Creative economy and quality of life are also supported by effective coordination of transportation and economy through facilitating varied living styles and enabling viable choices for travel. Quality and diversity of employment opportunities abound when the cost to access places of work diminish to a point where those with economic challenges can have affordable access to workplaces and shopping. More effective coordination of transportation and economic development is needed to provide those living and/or working in the City access to viable transportation choices for their journey between home and work and to other destinations in the City and region.

9 | B-3

Transportation and the Environment

The connection between transportation and the environment is often known as "green infrastructure". Green infrastructure includes trails, greenways, and riparian corridors that can constitute key transportation connections for non-motorized modes in less built-up areas and a means of bringing more of the natural environment into built-up areas. Advantages go beyond transportation; green infrastructure corridors can provide great benefits for air pollution control and stormwater management.

9 | B-4

Transportation and Health

Active living has come to mean biking and walking as part of the daily routine which has dramatic improvements in public health. By having more pleasant and more convenient ways to walk and bike as a part of daily life, people tend to choose walking and biking in greater numbers.

9 | C

Existing Conditions & Trends

9 | C-1

Transportation Network

The intersection of Interstates 89 and 91 in nearby White River Junction, Vermont 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 City's accessibility 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 and the Upper Valley's economic vitality and quality of life. At the same time, growth in traffic and congestion has been one of the major by-products of the economic expansion experienced in the City and region in recent decades.

Increasingly, the de-centralized nature of the housing market has contributed to longer commutes for Upper Valley workers. This dispersed residential pattern is difficult for transit or ride-share 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, the safety and character of neighborhoods, and the cost of municipal services.

9 | C-2

Roads

9 | C-2a **Inventory.** 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.

9 | C-2b **Roads and Land Use.** Streets and roads serve many functions. First, they act as corridors for conveyance of people, either walking, biking, in transit or in cars. They also serve as corridors for utilities, stormwater management and urban green areas with tree shading and landscaping. They are also public spaces encouraging interaction between neighbors. They facilitate access to buildings and different land uses. They can also communicate with travelers, telling them that they are in a special place and how they are expected to behave while there with signage and landscape cues. 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 compatible with adjacent land uses. Care should also be taken when laying out new roads so that the new infrastructure fits the intended land use and vice versa.

9 | C-2c **Traffic Safety and Congestion.** 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 Route 120 commuter traffic and Route 12A shopping traffic, is not likely to improve substantially without a more comprehensive investigation of managing demand and network-wide improvements.

Traffic congestion is a problem along many of the major highways throughout the City, such as Route 12A, Route 120 and Route 4. Congestion on Route 12A, for instance, has impacts that go beyond delays for shoppers, including reduced mobility and increased emergency response times for residents of Plainfield.

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. Congestion also exacerbates the problem of through-traffic trucking on local roads. As a result of the weight limits on Interstate 91 in Vermont, many heavy trucks come through downtown West Lebanon.

Speeding can also arise from road facilities that are not designed appropriately for the context. Wide roads in residential neighborhoods are typical examples of this. When access is too cluttered and speeds are too high, this can also lead to safety problems and accidents, as witnessed on Route 12A.

Redundancy (the availability of multiple routes for travel from point A to point B) is desirable to reduce congestion and to provide improved access to major destinations such as Dartmouth Hitchcock Medical Center.

Road Class	Miles
Interstate	23.6
State Maintained	19.9
City Access - Public Works Road	5.3
State Road - City Maintained	8.4
Private Business Access	6.7
Class V	86.0
Class VI (non-maintained)	9.0
Private Road	12.0

lebanon road mileage by class

old pine tree cemetery road

9 | C-2d **Scenic Roads and Rural Character.** Lebanon has the following designated scenic roads:

- Stevens Road and Sunset Rock Road (1989)
- Eastman Hill (1990)
- Poverty Lane, Slayton Hill and Great Brook Road (1993)
- Old Pine Tree Cemetery Road (2003)

Preserving the historic nature of these roadways helps to sustain the rural feel of the community. The narrow, gently curving designs, stone walls, and surrounding vegetation evoke rural and historic character. A visually pleasing environment makes a significant contribution to a community's overall quality of life. The erosion of the visual character of a community can have not only psychological impacts, but also very real economic impacts through the loss of tourism and an inability to market the community to prospective businesses and residents. As with other environmental impacts, visual degradation can happen incrementally, slowly changing the character of a community.

9 | C-3

Bridges

Bridges are essential elements of the City's transportation network; they often present the weakest link in that network and often are more complicated to build or maintain than other parts of the thoroughfare. Many structures are in various states of disrepair, having greater exposure to the elements and greater cost to repair. The location of bridges within the floodway also presents a potential safety hazard as it may isolate portions of the community if washed out in a flood event, and may severely limit emergency vehicle access. There are four state-owned and two city-owned bridges in Lebanon that appear on the New Hampshire Department of Transportation's Red List. Bridges on the Red List require interim inspections due to known deficiencies, poor conditions, weight restriction or type of construction.

In the bi-state Upper Valley economy, the two Connecticut River crossings are essential to the City as links between the Lebanon and Hartford, VT employment centers and 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, pedestrian and bicycle-related improvements need to be incorporated into regular maintenance work and major alterations to the City's bridges.

9 | C-4

Pedestrian and Bicycle Facilities

A network of sidewalks allows residents to walk within Lebanon's two core areas, but there is limited connectivity between them, as well as very limited or inadequate facilities along the Route 12A and Route 120 corridors. The compilation of a complete sidewalk inventory of the City has been undertaken, and will be a component of an overall pedestrian/bikeway plan in accordance with the City's pursuit of a multi-modal transportation system.

The Northern Rail Trail provides excellent recreational and transportation access for bicycles and pedestrians from downtown Lebanon to Enfield and beyond. The extension of the Rail Trail to connect with West Lebanon would be extremely beneficial for improved access for everyone, as well as making the Miracle Mile and West

Lebanon shopping districts accessible by bicycle, and should be actively pursued. The Mascoma River Greenway Project aims to make this connection whether or not the railway can be used as a base.

For cyclists, there are available five-foot or wider shoulders 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.

The Lebanon Pedestrian and Bicyclist Advisory Committee (LPBAC) was created in 1995 with a charge to make the City more walkable and bikable by facilitating, enhancing, and encouraging safe pedestrian and bicycle travel and connectivity among the related infrastructure. LPBAC has completed an interim report and master plan for pedestrian and bicycle facilities. The New Hampshire Department of Transportation provides a variety of resources supporting pedestrian/bike infrastructure, including managing the Transportation Enhancement funding program, which is geared towards bicycling and pedestrian improvements.

The "Blueprint for Community Trails" (2007) report summarizes a vision for a citywide bicycle- and pedestrian-trail network with connections to the surrounding towns of Hanover, Enfield, Plainfield, and Hartford. Based on a public workshop in March 2006, that vision will need coordination and prioritization in the larger context of the updated Lebanon Master Plan (2011), including review by related City boards/committees and staff.

9 | C-5

Public Transit

Advance Transit (AT) is the primary fixed-route transit provider in the Upper Valley, providing regular scheduled bus service to the core Lebanon/Hanover/White River Junction area in addition to Enfield, Canaan, Norwich, Wilder and Hartford. Additionally, AT provides shuttle service for Dartmouth Hitchcock Medical Center and Dartmouth College.

Advance Transit works closely with communities, business and industry to develop and maintain transportation options for Upper Valley residents and employees. 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 economically difficult for the transit provider and logistically difficult for users. It also increases the demand on an already short supply of park and ride lots.

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 para-transit (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.

route 10 near sachem village, west lebanon

downtown lebanon transit stop

9 | C-6

Rail

Lebanon is home to a portion of the former Boston and Maine freight rail line. Except for approximately 2 miles from the Connecticut River easterly, commercial freight traffic along this White River Junction, VT to Concord, NH railroad line has not been active for more than 30 years. Part of this line now provides valuable recreation and bike/pedestrian infrastructure as the Northern Rail Trail.

There is currently no passenger rail service within the community although it is a future possibility. The nearest passenger rail line, provided by Amtrak, runs through White River Junction, Vermont, providing north/south connections between St. Albans, Vermont and New London, Connecticut along the Central Vermont rail line.

There is currently an investigation into the development of high-speed rail between Boston and Montreal. Phase One of the study is complete, and indicates 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. Additionally, Lebanon has recently joined the New England Regional Rail Coalition, an advocacy group for enhanced rail service in New England.

9 | C-7

Airport

The City of Lebanon owns and operates an airport for general and commercial aviation with scheduled daily service to Boston and White Plains, New York. The facility includes an air traffic control tower, two runways and hangars.

A 2008 survey indicated that general aviation, particularly corporate jet activity is the most critical economic component of the airport. The airport accommodates regional and national corporate aviation needs, providing access to Dartmouth Hitchcock Medical Center (DHMC) and Dartmouth College, as well as other businesses and institutions.

“Fly Lebanon,” a partnership between the City of Lebanon and the Greater Lebanon Area Chamber of Commerce, has been working to promote incentives for increased passenger use of the airport. In recent years, several factors have challenged commercial air service to and from Lebanon, including the airport’s small size and population base; competition from larger airports with low-fare carriers in Manchester, NH and Burlington, VT and restructuring of the airline industry.

9 | C-8

Parking

Parking is an essential component of transportation, but also 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, from residential to commercial.

The core area of downtown Lebanon is somewhat well served by parking facilities designed around the existing pedestrian-oriented village center. In this area, 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, are located within very close proximity making this an attractive and efficient setting. These existing mixed-use areas should be encouraged, expanded and replicated

in other areas. The same is not true for West Lebanon. Here, while there is some on-street parking, there is not enough for the visitors to the village.

9|C-9 Transportation Demand Management

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 single occupant vehicles. Transportation demand management (TDM) 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 Ride-share (UVRS), provided by Advance Transit, maintains a database of area commuters carpooling and offers an online 'ride board' to facilitate carpooling and ride sharing. There are no formal park and ride lots in Lebanon and few with excess capacity serving the job center. Park and ride lots are integral in facilitating inter-modal connections and supporting transit use. Large new lots in fast growing areas such as Grantham and Enfield enable additional car- and van-pooling. 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.

In 2009, federal funds totaling $500,000 were secured for exploration of an inter-modal transit facility to serve the Upper Valley. The concept included parking for several hundred vehicles, whose drivers could then board buses and/or other forms of transportation to go to work and elsewhere, including destinations outside the region. Although the effort did not result in any infrastructure improvements, it highlighted the need to continue exploring enhancements to transportation infrastructure within the region.

9|D Future Challenges & Opportunities

9|D-1 Alternative Land Use and Traffic Approaches

Traditionally, Lebanon has viewed its transportation system as consisting of a roadway network emphasizing automobiles, with some alternative transportation facilities. The future challenge is to recognize the connections between key places in Lebanon as a web of interconnecting options that reinforce and sustain one another.

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.

key points | future challenges & opportunities

- Lebanon needs a safe, interconnected, multi-modal transportation network that links residential areas to commercial, educational, recreational and cultural centers.
- There needs to be ongoing consideration and regional discussion concerning how to mitigate traffic congestion within Lebanon's main travel corridors. The City should take steps to protect and enhance the character of its scenic highway corridors.
- 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.
- The City should seek to make improvements to better support mass transportation and should continue to advocate for expanded transit service within the region.
- The City should carefully weigh the potential economic, environmental and quality of life benefits and costs that restoring major rail lines through the region would have and advocate for the community's best interest with the railroad and state.
- Parking should be planned with consideration for the overall goal of encouraging a multi-modal transportation system.
- Lebanon needs more effective transportation management strategies, in addition to improved facilities, to reach its goals of a better performing transportation system.

- Transit service must be convenient, reliable, and timely.
- Bicycle routes must be safe and destinations must have convenient and secure parking for bicycles.
- Ride-share opportunities and incentives not to drive must be provided.

Development has been oriented to the use of automobiles at the expense of other transportation modes. 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. The network must be complete for all mode paths; sidewalks that just end, bus stops in drainage ditches, and bicycles crossing high-speed thoroughfares are all examples of incomplete mode paths. Complete streets are a tool to help ensure a complete mode path in the network, creating a way for all modes that use the road segment to share the right-of-way safely and efficiently.

Future transportation facilities that require consideration include inter-modal stations, rapid-transit stations and stops, green infrastructure, better gateways and transitions between changing corridor demands and other components necessary to complete trips. They may also entail different modes than those currently served by Lebanon. Examples of these may include river travel and horse trails, as well as a connector to I-91 that includes crossing the Connecticut River by gondola, tram or monorail. Inter-modal stations may offer bike repair and storage facilities or easier means to put bikes on transit. They may offer ride-share, car-share or smart-carpool facilities. Stations and stops may promote more rapid transit by having dedicated lanes, at-level entry for quick loading and unloading, and easy transfers between routes and modes.

9 | D-2

Roads

9 | D-2a

Traffic Congestion. Current projects under construction by NHDOT to address traffic congestion along Route 12A include raising and lengthening of the Exit 20 bridge overpass to allow for more lanes underneath and the widening of Route 12A between Airport Road and the K-Mart plaza.

Alternatives to improve access to DHMC were investigated in the 1988 Upper Valley Transportation Study, which predated DHMC's move to Lebanon. The study included a connector road from DHMC to Route 10 or I-91. This alternative 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 West Lebanon Central Business District or downtown Hanover.

Access management, telecommuting, ride-sharing, 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.

9 | D-2b **Scenic Roads and Gateways.** Many of Lebanon's highways are still scenic and should remain so. Effort should continue to support the City's Scenic Roads Ordinance, and to encourage citizen input via petition identifying and designating more local scenic roads. Care should be taken when the City works on scenic roads, and stone walls and significant trees along these roads should be preserved. While balancing public safety concerns with rural design can be challenging, it is important to design standards for scenic roads that compromise neither safety nor local character. The City should begin to set design guidelines for the visual landscape.

Scenic roads will also be protected by directing commercial and residential development towards already developed areas. When development does occur along the City's scenic corridors, it should be appropriately sited and screened so as to reduce its negative visual impact. Green buffers, conservation design, and landscaping in harmony with the natural and historic features of the landscape, all contribute to preserving scenic values. A flexible scenic corridors overlay district would help protect the City's character from inappropriate development and land uses.

The City should also help maintain the scenic appearance of its entry ways by creating landscaping standards for those portions of entry corridors not already built up, at I-89 and Routes 120, 10, 4 and 12A. Using gateways to help guide developments away from rural areas towards existing built-up areas will benefit the downtown economies, in addition to maintaining scenic character. The City should strive to improve the appearance of more developed corridors, as well, by avoiding haphazard, unsightly, or inadequate landscaping that does not protect and conform to the natural features of the area.

Better gateways may add aesthetic value to Lebanon, but also could better communicate travel direction, routes and behavior to travelers. Similarly, better transitions between corridors may improve mode flow and safety and again communicate changes in travel behavior like speed changes (for all modes) and changes in mode priority, e.g. from a bike boulevard to a pedestrian greenway (where both modes are allowed, but one has priority). Green infrastructure can be enhanced with more trails and greenways and riparian ways adding both to connections for travelers and enhancing Lebanon's environment.

9 | D-3 Pedestrian and Bicycle Facilities

There continues to be high public interest in the development of pedestrian and bicycle infrastructure, as well as many practical reasons to prioritize concrete actions on improving these modes of the City's overall transportation plan, including aesthetic, environmental and public health benefits. As such, the City should encourage and promote the development of interconnected networks of sidewalks, bicycle routes and paths, and recreational trails that facilitate better transportation throughout the community, especially to meet the needs of the young, elderly and other populations who do not drive. This initiative is especially critical to ensure that the City is in compliance with the Americans with Disabilities Act (ADA).

Automobile-centered growth has generally resulted in diminished bicycle and pedestrian accessibility. All transportation needs should be addressed in all roadway projects so that that attractive and safe facilities are available throughout the community, such as complete streets.

route 120 northward from exit 18

9 | D-4

Transit

Ridership on all Advance Transit (AT) routes has increased dramatically in recent years. Improved conditions, however, such as a network of park-and-ride lots, would better support mass transportation. 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. A new transit route linking the Upper Valley with the Precision Valley via Route 120 is also needed.

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 limiting 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. The City should work in cooperation with Advance Transit to address these issues, as transit is a key element in the multi-modal approach.

9 | D-5

Rail

Many of the issues affecting rail transportation, both passenger and freight, are beyond local control. However, the City should consider the potential economic and environmental benefits that restoring major rail lines through the region could encourage. For example, more rail use could alleviate road congestion and costs related to road maintenance. On the other hand, the revival of rail transportation could negatively affect residential neighborhoods that have grown accustomed to cleaner, quieter surroundings since the decline of the railroad. The City's continued involvement in decisions about any rail line is critical, as the local impact will be significant and there are many competing interests.

9 | D-6

Parking

Parking shall be planned with consideration for the overall goal of encouraging a multi-modal transportation system. Needs of pedestrians, bicycles and transit should be balanced with the needs of individual automobile users as well as aesthetic considerations.

Bike parking and stations also need to be provided if bike travel is to become truly viable. Facilities need to be provided at major destinations and bus stops to allow bicycles riders to access places on their bikes and extend their range on transit facilities.

9 | D-7

Management Strategies

9 | D-7a

Access Management. The solution to preserving investment in highways and improving safety is to not always increase roadway capacity but to manage access. Access management uses a variety of techniques to minimize conflicting traffic movements and optimize 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 entry ways and exits, shared driveways, and connections between adjacent subdivisions. Effective access management:[1]

- 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.

Zoning can help by coordinating anticipated traffic volumes and speeds with frontage, lot size, curb cut, and signage requirements and requiring development that concentrates growth and mixed land uses in nodes to minimize transportation demand in key highway corridors.

Common access management techniques include:

- **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), such as 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.

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

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, which contributes to multiple traffic conflicts, causes an increase in traffic congestion, and reduces capacity and pedestrian safety. Redundant access points should be evaluated for possible closure in the context of site plan review for future developments. Already existing redundant access points should be closed. More attention to access management will improve Routes 10 and 4 as well.

9|D-7b **Concurrency Management.** Concurrency management may also be beneficial to Lebanon. This technique regulates 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 developments. The City must balance an adequate and equitable transportation system for its residents and businesses with cost of constructing and maintaining such a system.

9|D-7c **Traffic Calming.** Thoroughfare design can have a dramatic impact on driver behavior. Design elements, often referred to as traffic calming, encourage drivers to slow down and aesthetically enhance a corridor, both of which are important to pedestrian and bicycle safety. 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 combine with the many pedestrians crossing the roadway to make a dangerous area for pedestrians.

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.
- **Breaking Up Straightaways.** Straightaways on roads encourage speeding. Making physical alterations such as speed humps, speed tables, rumble strips, chicanes, and roundabouts discourage high speeds.
- **Redesigning Intersections.** 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.

Mt. Support Road, Heater Road and Mascoma Street are among roads 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 their intended purpose is met and that they are appropriate for the roadway and existing conditions.

Gould Road, Dulac Street and Maple Street provide success stories where speed tables have been installed and seem to be working well to calm traffic.

9 | D-7d **Complete Streets and Complete Networks.** The City strives toward a transportation policy and development plan that is based on the Complete Networks and Complete Streets model, which includes safe access for all users (including pedestrians, bicyclists, motorists and transit riders).

Complete networks promote continuous connections of all places by all modes supported by the City. If one were to travel to a given destination via bicycle, the traveler should be able to ride on comfortable and safe routes the entire way to get to that destination and have appropriate facilities for storing the bicycle once there. Similar considerations are necessary for the other modes chosen to serve Lebanon, ensuring a viable "complete trip" for the entire length of the trip. If a traveler cannot walk to a convenient bus stop or one cannot get into the building from the parking lot, the mode is not viable. If a given route for a given mode is too circuitous, again the mode becomes less viable, less "complete".

Complete streets are designed for all potential right-of-way users, integrating safely all mode routes in an efficient use of the street corridor. This does not mean that all modes use all street segments. It would be prohibitively expensive and inefficient to accommodate public transit on all corridors, but all viable modes should have a route available and those routes should all safely share the right-of-way on the streets where they co-locate. Finally the facilities selected for the modes on a given corridor should be appropriate to local context and needs, and should adhere to community vision, for instance being of the proper scale and using signage consistent with that of the neighborhood.

Previous planning initiatives and zoning requirements once favored vast paved areas built for maximum demand that are often under used. Changes to the zoning ordinance in 2008 promoted the current goal of optimizing land use and encouraging complete street downtown cores that are bike and pedestrian friendly. This change in goals and strategy should be fully supported to create a multi-modal transportation system. Parking must be optimized by coordinating uses and facilities to encourage a multi-modal system. The needs of pedestrians, bicyclists, transit, and aesthetic considerations should be balanced with those of automobile users, especially in central business district areas.

9 | D-7e **Performance Measures.** Another future challenge is to transition from simply measuring and monitoring facets of transportation, e.g. volume, to understanding the net desired performance of transportation in achieving more sustainable and satisfying outcomes, e.g. more volume per incremental investment or per desired destination. Street metrics must include other considerations than level of service and automobile mobility in order to provide better performing, better integrated modal facilities and ensure the safe interaction of the multiple modes on a given corridor. To rise to these challenges, Lebanon must examine its transportation management strategies as well as its facilities to arrive at this higher performing network fabric connecting the places that Lebanon values.

9 | D-7f **Strategic Transportation Funding.** To assure adequate, efficient, and effective transportation development, as outlined in this Master Plan, the City of Lebanon shall actively pursue various forms of funding. Funds gathered from impact fees, grants, and other sources shall be used to pay for transportation studies and uses within the City, encompassing a regional scope, including but not limited to:

- Periodic corridor studies
- Multi-modal center(s) and related system(s)

- Traffic flow and improvement studies
- Freight movement studies and programs
- Mass transit, local and regional bus transit
- Carpools and park-and-rides
- Rail feasibility studies and programs
- Bicycle and pedestrian network and infrastructure studies and uses

Application of funds may include, but is not limited to:

- Upgrading and replacement of outmoded and deteriorating existing transportation infrastructure
- Developing and constructing a multi-modal transportation center(s) and system(s)
- Developing pedestrian and bicycle access to existing retail, employment, and other job destinations
- Creating incentives for alternative methods of transportation, including public transit, carpools, walking & biking
- Traffic calming techniques
- Creating within Lebanon the concept of “Complete Streets”

The City shall actively pursue federal, state, and regional monies for projects identified in this Master Plan. The City shall also actively pursue public and private grants to achieve the same objectives as listed above, including the use of public/private partnerships.

Outcomes & Strategies

OUTCOME 1 Promote a more compact land use pattern that can be efficiently served by a multi-modal transportation system.

STRATEGIES		ACTIONS	
1	Encourage developments that are easily served by public transit.	Require transit and support facilities during subdivision and site plan review.	1
2	Assist, train and partner with developers to create transit oriented development with front walks along streets, garages at the rear of properties, front porches, mixed land uses and sidewalks.	Develop and implement a citywide traffic plan that discourages through traffic in residential areas by using traffic calming measures.	2
3	Address parking needs to ensure adequate but not excessive parking for development.	Develop a citywide transportation master plan.	3
4	Ensure adequate on and off-site traffic circulation for commercial development.	Develop a long range redevelopment plan for Route 12A, which balances environmental and transportation concerns with mixed-use development and pedestrian/bicycle movement.	4

OUTCOME 2 Coordinate transportation and economic development to provide those living and/or working in the City access to viable transportation choices.

STRATEGIES		ACTIONS	
1	Encourage businesses and industries to provide commuter benefits.	Pursue an access management memorandum of understanding with the New Hampshire Department of Transportation for Route 12A and Route 4, at a minimum.	1
2	Create local access management policies in an effort to ensure that future development and road access adhere to sound access management principles.	Create and implement access management retrofit plans on Route 12A, Miracle Mile, and Mechanic Street in Lebanon and Routes 10 and 4 in West Lebanon.	2
3	Manage the growth in traffic volume by promoting alternatives to vehicle trips, such as telecommuting, ride-sharing, and transit use.	Coordinate with state and federal transportation authorities to take action needed to ensure that the heaviest trucks and equipment continue to have access to I-89 and its bridges, as well as I-91.	3
4	Explore using remaining rail connections to move heavy loads across the Connecticut River from western New Hampshire to eastern Vermont.	Work with the New Hampshire Department of Transportation to develop a corridor plan for Route 120.	4
5	Implement techniques, such as transportation demand management, as the preferred alternative to increasing highway capacity.	Improve facilities at urban transit stops, such as pull off areas, and assist with bus shelter construction, snow removal, and parking facilities.	5
6	Work with Advance Transit to implement the recently completed bus stop feasibility study.	Provide City employees with incentives that promote the use of public transportation.	6
7	Establish a system of park-and-ride lots along major travel corridors, especially outside of the City.	Continue to be active on the Upper Valley Regional Planning Commission's Transportation Advisory Committee.	7
8	Continue financial support of Advance Transit.	Continue to use pavement management systems to efficiently maintain roads and streets.	8
9	Support and promote the use of Upper Valley Ride-share.	Carry out the ten year plan with the aid of the New Hampshire Department of Transportation and other possible funding sources.	9
10	Support transit routes to Alice Peck Day Memorial Hospital and other underserved destinations.	Purchase hybrid vehicles using biodiesel and/or other alternative fuels for all appropriate City vehicles.	10
11	Continue to work with surrounding communities and the Regional Planning Commission to seek local solutions for regional transportation problems.		
12	Continue to cooperate with the Upper Valley Transportation Management Association on transportation demand management initiatives.		

OUTCOME 2

Coordinate transportation and economic development to provide those living and/or working in the City access to viable transportation choices.

STRATEGIES

13. Continue to work with Hanover, the state Department of Transportation, and UVLSRPC to address congestion on Route 120 and prevent future problems as the corridor develops.
14. Be a leader in developing creative solutions to transportation problems, including the future use of high occupancy vehicle lanes to aid transit buses.
15. Support rail transit along the existing rail line from Bellows Falls and Randolph to Lebanon/Hartford/ Hanover for regional commuters.

OUTCOME 3

Identify and protect the City's green infrastructure including trails, greenways and riparian corridors that serve as non-motorized transportation connections.

STRATEGIES

1. Cooperate with groups, such as Friends of the Northern Rail Trail and the Upper Valley Trails Alliance, to maintain and extend the existing rail trail from Lebanon to West Lebanon.

ACTIONS

1. Coordinate with the Planning Board, Conservation Commission, Pedestrian and Bicycle Advisory Committee and the Recreation Department to develop a trails master plan.

OUTCOME 4

Promote active living, biking and walking as part of the daily routine, which has dramatic improvements in public health.

STRATEGIES

1. Promote safe intersection design and bicycle, pedestrian, and transit friendly traffic signals.
2. Support the Pedestrian and Bicycle Advisory Committee in creating a comprehensive pedestrian and bicycle facilities plan which identifies where linkages can be made and additional infrastructure is warranted, both in and outside the City.
3. Provide a landscaped buffer between the sidewalk & roadway of busy & high speed streets, where feasible.
4. Promote improved pedestrian facilities throughout the City, including a well maintained, interconnected network of sidewalks, benches, and landscaping that provides shade for pedestrians and attractive, non-obtrusive lighting.
5. Promote safe pedestrian accommodations, including curb extensions where appropriate, at crosswalk locations and segregated sidewalks with landscape buffers along all major roadways.
6. Promote a consistent network of wide shoulders or bike lanes on rural highways for cyclists and shared use of narrower roads in urban areas with appropriate signage and road markings.
7. Provide dedicated bike facilities to allow cyclists to safely travel City roads, including bike lanes and cycle tracks, as well as more bike-focused facilities like multi-use paths and sharrows (shared lanes).

ACTIONS

1. Include five foot shoulders in all City and state bridge and road projects to provide safe bicycle and pedestrian access
2. Complete the Americans with Disabilities Act transition plan to ensure that public facilities meet ADA guidelines.
3. Develop facilities to allow for independent child mobility, such as separated bike paths.
4. Install bicycle racks, showers, and lockers in public spaces throughout the community.
5. Require developers to install bicycle racks, showers, and lockers as part of site plan approval.