

Transportation & Circulation

OVERVIEW

Through decades of planning, regulation, and investment, Lincoln has worked to preserve and enhance its scenic road-sides, vistas, and rural appearance, and it has established an impressive network of trails and roadside paths. However, increased traffic volumes coupled with the absence of sidewalks or paths except on major roads, has created an increasingly unsafe environment for local drivers, walkers, and bikers. Enhanced traffic calming, traffic enforcement, and non-vehicular modes of transportation have become necessities. Improving the paths and trails for bikers and encouraging shared motor vehicle use will help to increase mobility for residents and enhance Lincoln's sense of community. Although these goals present substantial challenges due to the town's dispersed development pattern, limited funds, and lack of viable local transportation options, they deserve further study consistent with Lincoln's history of thoughtful, innovative planning.



Key Findings

- ❖ Lincoln has about sixty-three miles of roadways, the majority of which are local roads. Lincoln's major roadways include Route 2, Route 2A, Route 126/Concord Road, and Route 117/ South Great Road.
- ❖ In 2000, 2,555 Lincoln residents commuted to other cities and towns for work. A total of 881 commuters from other communities traveled to Lincoln for work, bringing the total number of daily commuters to 3,436.
- ❖ Eighty-three percent of Lincoln residents traveled by car and five percent by train, although only twenty-four percent of all Lincoln commuters work in Cambridge or Boston, the primary destination of the train. Less than one percent of Lincoln residents commuted by bicycle, and eleven percent worked from home – a much larger percentage than the regional average. The town's carpool participation rate was less than surrounding towns.
- ❖ Available data show that traffic volumes on Route 2 and Route 128/I-95 have not increased in recent years. However, planned developments along the Route 128/I-95 corridor could cause a significant increase in trips to and from the new sites.

- ❖ Major developments already approved in communities around Lincoln, notably Waltham and Weston, will add almost 59,000 trips to connecting roads. Traffic increases will have a continuing impact on many of the regional roadways serving Lincoln's area, such as Great South Road (Route 117), Routes 2 and 2A, and Winter Street.
- ❖ The number of traffic accidents in Lincoln has decreased over the past few years. Of accidents that did occur, most were along the town's major roadways, including Route 2 and 2A, Bedford and Lincoln Roads, Route 117, and to a somewhat lesser extent, Route 126.
- ❖ Lincoln has seventy-two miles of trails and ten miles of roadside paths. These trails and paths connect at key points and are owned and maintained by a variety of municipal, non-profit, and private entities.
- ❖ Lincoln's transportation-disadvantaged populations include people between the 5 and 18 years old and those 65 and over, lower income people, and people with disabilities. The town's age-based transportation disadvantaged population increased by 311 people between 1990 and 2008, and as of 2000, Lincoln had about 348 people with physical and sensory disabilities that could preclude them from driving. Demographic estimates for 2008 show that about fifteen percent of the town's households have low or moderate incomes.

Key Challenges

- ❖ Lincoln has seen traffic volumes increase in recent years. This can create an unsafe environment for pedestrians using roadways without roadside paths and for drivers to get out of their driveways.
- ❖ Lincoln's low-density development pattern and historically rural nature mean that there are few transportation options other than the car. However, the town is fortunate to have a commuter rail station linking it to Cambridge and Boston. Lincoln could work to increase ridership among a target group of resident commuters.
- ❖ Lincoln's roadside paths need ongoing maintenance. Whether the town will be able to adequately care for this infrastructure will depend on its other transportation priorities and adequate revenue to pay for capital improvements.
- ❖ Although Lincoln's paths and trails could be enhanced to accommodate more diverse uses, such as high-speed cycling and mountain biking, increasing the diversity of uses can cause user conflicts and possible degradation of trails. Lincoln will continue to program its trails and paths for uses that are desired, compatible, and sustainable.
- ❖ Increasing mobility for Lincoln's seniors and people with disabilities remains a challenge due to the town's dispersed development pattern, limited funds, and lack of local transportation options.
- ❖ Regional transportation issues pose probably the most significant challenges for Lincoln, and consequently, the town will continue to be involved in several regional organizations that address these concerns.
- ❖ Many of Lincoln's roadways require significant maintenance and even reconstruction. Having initiated a Roadway Paving Program in 2008, Lincoln has taken important steps to address this problem. As roadway maintenance efforts continue, Lincoln will continue to balance preserving the rural aesthetic of Lincoln's roads with public safety and budgetary challenges. Since there is a concern that repaving and other roadway improvements may lead to increased speeds, the town plans to respond through increased monitoring and enforcement. Additional traffic calming measures may also be considered.

- ❖ Route 2 is a major presence in the town, and the proposed upgrade of the Crosby's Corner section will affect its immediate vicinity as well as peripheral roadways while under construction.. Residents and public officials will continue to stay involved and aware of all plans for this roadway, whether proposed or underway.
- ❖ Overall, Lincoln residents are highly protective of the town's low-density development pattern and the privacy and autonomy this brings. At the same time, they want solutions to transportation inconveniences, namely increased traffic and congestion. Understanding the relationships and tradeoffs between land use and transportation will be critical to having a meaningful public discussion about real transportation options in Lincoln in the future.

EXISTING CONDITIONS & TRENDS

Few aspects of life in Lincoln are untouched by transportation. Although Lincoln is a small suburb, its transportation system is developed and complex, and represents an important part of the town's past, present, future. The original roadways that once connected the town center to farmsteads still remain, and they provide the foundation of Lincoln's road network today. Lincoln is unique in that it has preserved a roadway design based on a distinctly rural aesthetic that makes travel along its streets and roads a beautiful experience. Also, Lincoln's network of roadside paths and trails is a remarkable amenity not found in most communities. While in many towns a sense of place is imparted only through buildings and open space, in Lincoln the roadways and paths play an equal if not greater role in communicating the town's aesthetic and social values.

Major highways cut through Lincoln, too, and they raise concerns faced in most communities. Lincoln is also served by commuter rail, an amenity that has no doubt played a role in the town's development and the socio-economic makeup of its population, and it also serves as a major source of opportunity for the town's future development. Today, Lincoln's transportation system incorporates influences from its very early days as a farming community, and from the railway era, the post-war highway boom, and up to the present day.

Despite Lincoln's transportation assets, it has important challenges. A transportation system - especially the amount of vehicle traffic it carries - is a major determinant of a town's quality of life. In the past twenty years, Lincoln and the surrounding communities have experienced modest yet constant population growth due to their convenient access to major highways and proximity to commuter routes and the commuter rail system. This access, combined with Lincoln's attractive, rural character, makes the town an especially desirable place to visit and live. In addition, development beyond Lincoln's boundaries has generated more traffic on local roadways, all of which has put pressure on its transportation infrastructure. As development continues both locally and regionally, providing a safe, adequate, and equitable transportation system while maintaining Lincoln's unique sense of place will be a major challenge for the town.

Roadways

Lincoln's origins as an agricultural community can be seen in many aspects of its town form, including the roadways. As in many small towns in Massachusetts, Lincoln's roadway structure still retains the framework of a system of agricultural roads that radiate from a modest town center that evolved after its succession from Concord, Lexington and Weston in 1754. This occurred after citizens petitioned the state legislature on the grounds that travel distances to and from various churches on Sunday were to onerous. With minor realignments, Lincoln's radial road network remains remarkably intact, and new subdivisions and larger infrastructure projects have gradually filled in and overlaid this framework. Its street pattern, coupled with sensitive treatment

of its town center and the roads themselves, has left Lincoln with a vivid sense of the feel and function of its original roadway network. This adds immeasurably to the authenticity and appeal of the town today.

While the historic transportation and land use pattern has been retained over the years, Lincoln is not unfamiliar with the forces and effects of regional transportation infrastructure. Route 128/I-95 nearby connects Lincoln to the culture and economy of the greater Boston area and beyond. For Lincoln, and for many other small towns along Route 128, this connection is undoubtedly a source both of affluence and prosperity, but also congestion and growth pressures. Although Route 128 poses indirect forces on Lincoln, the highway does not actually run through town. Instead, it skirts along Lincoln's eastern edge, providing access via the Trapelo Road exit just beyond the town line. Route 2A traverses the town running east and west across its northern third and Route 2 forms the boundary between the area known as North Lincoln and the rest of town. Both of these roads, but Route 2 in particular, have been the focus of over three decades of highway planning and public process, aspects of which continue to this day.

Lincoln residents have wrestled with the presence of Route 2 for years. Route 2, which extends from Boston to Petersburg, NY, was built between 1929 and 1933. In the 1950s, when massive highway construction projects were being planned throughout the country, state transportation authorities identified a segment of Route 2 for inclusion in plans for an "Inner Belt" highway system around Boston's first-ring suburbs. One part of the proposal called for an expansion and re-alignment Route 2 between Route 27 in Acton and Route 128 in Lexington. Although plans for Boston's Inner Belt were cancelled in the early 1970s, planning for changes to Route 2 continued. Some alternatives would have changed both the function of the roadway – whether it would become a limited access expressway, stay a locally accessible arterial, or some combination of the two – and its alignment through Lincoln. A so-called "northern alignment," which would have curved northward from Crosby's Corner and skirted the southern boundary of the Minute Man National Historic Park, was favored by some Lincoln residents.¹ Various alternatives were carried through a prolonged environmental review and public process that involved numerous Lincoln town officials and residents, but the state abandoned plans for substantial changes to Route 2, including the northern alignment, in 1978.²

In the early 1990s, MassHighway and area towns reached agreement on a strategy of on-line improvements without additional travel lanes. The Crosby's Corner intersection on the Lincoln/Concord line presented safety issues because Route 2 turns through an angle at traffic lights at the foot of a hill. Also, as traffic increased it became increasingly unsafe to have a large number of direct access points to the highway from individual houses and residential side streets between Bedford Road in Lincoln and Sandy Pond Road in Concord. A further problem was the lack of width to provide median barriers and breakdown lanes. A major design exercise by MassHighway with input from Lincoln resulted in the Crosby's Corner project, which will reconstruct the highway, replace the angle with a curve, create a grade-separated intersection with an underpass for local traffic, reduce the grades, widen the right of way to add barriers and breakdown lanes, and create new service roads for access to properties. Initially, ten homeowners agreed in principle to have their houses taken to facilitate the project, and ultimately, seven Lincoln homes on the north side of Route 2 were taken by the state. Others will be affected by it, both positively and negatively. Lincoln will need to adjust some of its services to the new street pattern and ensure that routes for pedestrians and cyclists are linked to the new underpass. This project is scheduled for construction in 2010-2013.

1 Skidmore, Owings & Merrill (Route 2 Consultant Team), "Memorandum to Route 2 Participants, 12 June 1973," Lincoln Public Library Archives, Route 2 Studies (1973).

2 Town of Lincoln, Land Use Conference Committee, *Route to Tomorrow: Challenges and Choices*, (October 1983), and Anthony J. DiSarcina, P.E., ASCE, to Community Opportunities Group, Inc., 6 June 2008.

FUNCTIONAL CLASSIFICATION OF ROADWAYS

Route 2 is Lincoln's only *principal arterial*: a roadway designed to support regional mobility at relatively high speeds. In the hierarchy of functional classifications used in transportation planning, the purpose of arterials is to move goods and people efficiently over long distances. While Route 2 has absorbed a considerable amount of attention over the years, Lincoln has other major roadways, too. They are not as heavily traveled as Route 2, but they provide access to neighboring communities and the greater region, delivering traffic between roadways higher and lower in the hierarchy. These roadways include:³

- ❖ State Route 126 (Concord Road), located on the westerly side of town, is a major north-south urban principal arterial roadway that provides access to Concord to the north and Wayland to the south.
- ❖ Route 117 (South Great Road), North Great Road (Route 2A), Trapelo Road, Bedford Road south of Route 2, and Lincoln Road function as urban minor arterials. These roads provide crucial linkages between principal arterials and collector streets.
- ❖ Lexington Road, Codman Road, Winter Street, Tower Road, Old Bedford Road, Bedford Road north of Route 2, and Virginia Road are examples of urban collectors: roads that carry traffic between local and neighborhood-level streets and the arterial road network.

All other roads in Lincoln fall into the category of local streets, or roads designed to serve a community's homes and businesses and guide traffic to the collector and arterial system. Map 9.1 illustrates the physical relationships between these roadways, commuter rail service, and Lincoln's network of trails and roadside paths.

BRIDGES

Lincoln neither owns nor maintains any roadway bridges. However, the Lincoln Department of Public Works (DPW) is responsible for several of the roadside path bridges over brooks and streams throughout town. According to the DPW Superintendent, these bridges are in fair to poor condition and they require maintenance.⁴

Journey-to-Work

The Bureau of the Census reports journey-to-work data for states, counties, and municipalities as part of the decennial census. Two types of commuting patterns are available for each city or town: where employed residents travel *to* for work, and where non-residents travel *from* to the community. According to Census 2000, Lincoln's total employed population included 3,983 people, and approximately fourteen percent worked locally

Table 9.1
Functional Classification of Lincoln's Roadways

Functional Classification	Centerline Miles	Percent Total
Principal Arterial	3.09	4.9%
Urban Principal Arterial	2.63	4.2%
Urban Minor Arterial	11.16	17.8%
Urban Collector	7.87	12.6%
Local	37.88	60.5%
Total	62.63	100.0%

Source: Massachusetts Executive Office of Transportation, Office of Transportation Planning, "2007 Road Inventory" (June 2008), MassGIS.

³ Note: the "urban" designation attached to the functional class of Lincoln's roads does not mean that the roadways look "urban." Urban and rural roadway classifications refer to differences in population density between metropolitan and non-metropolitan areas.

⁴ Chris Bibbo, Superintendent of Public Works, to Community Opportunities Group, Inc., 9 June 2008.

while twenty-seven percent worked in Bedford and seventeen percent in Boston.⁵ However, these figures include the population living at Hanscom Air Force Base (HAFB), which helps to explain the very large percentage of people reporting Bedford as their place of employment. For Lincoln’s own 2,555 residents commuting to non-local jobs, it appears that most traveled to Boston, Cambridge, neighboring towns, and the employment centers near I-90 and Route 128/I-95.

Lincoln is a destination for workers from other communities, too. In 2000, 2,432 people reported Lincoln as their place of employment, including nearly twenty-three percent who also live in the town – most being residents of Lincoln itself, not HAFB. The remaining seventy-seven percent, or about 1,900 people, commuted from other locations. Approximately five percent commuted from Boston, the second highest generator of local workers. Many others commuted from Cambridge, Somerville, or one of the nearby communities such as Waltham, Bedford, Arlington, or Maynard. Together, the journey to work data illustrate that on a typical weekday, as many as 6,400 workers use the local and regional transportation networks to travel within, from, and to Lincoln for work.

Table 9.2
Journey-to-Work Data for Lincoln Residents (Including HAFB)

Location of Employment	Number of Residents	Percent Employed Residents
Bedford	1,083	27.2%
Boston	669	16.8%
Lincoln	547	13.7%
Cambridge	291	7.3%
Waltham	138	3.5%
Concord	133	3.3%
Burlington	95	2.4%
Lexington	64	1.6%
Wellesley	49	1.2%
Newton	38	1.0%

Source: Census 2000, MCD/County to MCD/County Worker Flow Files. Note: (1) Other towns and cities not listed each comprise less than one percent.

Table 9.3
Journey-to-Work Data for Lincoln Employees (Including HAFB)

Location of Residence	Number of Residents Employed in Lincoln	Percent Total Employment in Lincoln	Location of Residence	Number of Residents Employed in Lincoln	Percent Total Employment in Lincoln
Lincoln	547	22.5%	Quincy	33	1.4%
Boston	109	4.5%	Billerica	32	1.3%
Cambridge	67	2.8%	Littleton	31	1.3%
Somerville	56	2.3%	Sudbury	31	1.3%
Bedford	55	2.3%	Lowell	29	1.2%
Chelmsford	55	2.3%	Belmont	28	1.2%
Maynard	52	2.1%	Stow	28	1.2%
Arlington	50	2.1%	Lexington	27	1.1%
Waltham	46	1.9%	Boxborough	26	1.1%
Worcester	39	1.6%	Watertown	25	1.0%
Acton	38	1.6%	Wellesley	24	1.0%

Source: Census 2000, MCD/County to MCD/County Worker Flow Files. Notes: (1) Other towns and cities not listed each comprise less than one percent of the total.

MODE SHARE

In addition to collecting data on *where* people work in relation to where they live, the Bureau of the Census collects data on *how* people commute between work and home, or what *mode* of transportation they use. This is

⁵ U.S. Department of Commerce, Bureau of the Census, Census 2000, Census Transportation Planning Package, Census of Housing and Population, Part 3, 2003.

referred to as a *mode share* or *modal split*. Like most rural or suburban towns in the United States, Lincoln residents commute primarily by car. In the last decennial census, eighty-two percent of Lincoln residents reported that they traveled by car to work. Of those who drove, approximately seventy-seven percent of all commuters traveled in single-occupant vehicles and only five percent in multiple-occupant vehicles, e.g., carpools.

Lincoln's mode share for single-occupant automobile travel is similar to the regional mode share. However, the percentage of residents who traveled in multi-person vehicles in Lincoln is slightly smaller than the regional mode share of about seven percent.⁶ This may be because more residents in communities along Route 128 participate in ridesharing and carpooling programs, such as those offered by the 128 Business Council. However, despite a heavy reliance of single-occupancy vehicles, Lincoln is the only town in the region with a reported decrease in the number of registered vehicles between 1997 and 2002.⁷

Table 9.4
Mode Shares in Lincoln and Region (Including Hanscom AFB)

Mode	Lincoln Mode Share		Regional Mode Share	
	Number	Percent	Number	Percent
Single-Occupant Automobile	2,650	77.3%	58,369	76.7%
Multiple-Occupant Automobile	168	4.9%	5,096	6.7%
Bus	20	0.6%	1,970	2.6%
Rail	149	4.3%	2,797	3.7%
Walk	145	4.2%	3,037	4.0%
Bicycle	8	0.2%	284	0.4%
Work at Home	285	8.3%	4,240	5.6%
Other	4	0.1%	345	0.5%
Total	3,429	100.0%	76,138	100.0%

Source: Census 2000, Census Transportation Planning Package, Part 3 – CT, MA, RI, May 2004. Note: Lincoln includes Hanscom.

Table 9.5
Comparison of Lincoln Census Tracts and Boston Metropolitan Area by Mode Share

Mode	Tract 3601		Tract 3602		Region	
	Number	Percent	Number	Percent	Number	Percent
Single-Occupant Automobile	1,104	77.3%	2,046	80.1%	1,167,914	68.2%
Multiple Occupant Automobile	135	9.5%	65	2.5%	140,848	8.2%
Public Transportation						
Bus	24	1.7%	9	0.4%	82,710	4.8%
Subway or Commuter Rail	10	0.7%	122	4.8%	148,491	8.7%
Other	0	0.0%	0	0.0%	6,283	0.4%
Motorcycle	0	0.0%	0	0.0%	838	0.0%
Bicycle	9	0.6%	0	0.0%	9351	0.5%
Walked	127	8.9%	24	0.9%	90,054	5.3%
Other Means	13	0.9%	9	0.4%	8630	0.5%
Worked at Home	6	0.4%	280	11.0%	57,815	3.4%
Total	1,428	100.0%	2,555	100.0%	1,712,934	100.0%

Source: Census 2000, Summary File 3, Table P30. Note: Mode share data for Lincoln and the region and for Lincoln's two census tracts differ slightly because due to reporting methodology.

6 Census 2000, Census Transportation Planning Package, Part 3 – CT, MA, RI, (May 2004).

7 Mass Stats, [http://merlot.caliper.com/maptitude/MassStatsNETVersion/\(S\(yrorkp55nydors55ospxvj45\)\)/map.aspx](http://merlot.caliper.com/maptitude/MassStatsNETVersion/(S(yrorkp55nydors55ospxvj45))/map.aspx).

With such a large percentage of Lincoln residents traveling by car to get to work, it follows that few use transit. In Lincoln, the main source of public transportation is the MBTA commuter rail. In 2000, just over four percent of Lincoln residents traveled by rail for work, compared to 3.7 percent of regional commuters. Another significant feature of the mode share data is that compared to neighboring communities, a larger percentage of Lincoln residents work at home.

While mode share statistics for Lincoln as a whole shed light on local travel patterns, breaking the numbers down by *census tract* provides another dimension to the data. Lincoln includes two census tracts, one composed of HAFB and Hanscom Field (Tract 3601), and the other composed of the rest of town (Tract 3602). Examining mode share for these very different areas shows that most of the people who walked to work in Lincoln lived (and presumably worked) at HAFB, and that most of those who took the train did not. Also, the data show that Lincoln's large percentage of work-at-home people is attributable to the population primarily *outside* of HAFB: eleven percent of the residents in Tract 3602 reportedly worked at home in 2000, which is a very large percentage compared with neighboring towns or the Boston metropolitan area as a whole.

Vehicular Traffic Volumes

Traffic volume counts indicate how heavily a road is used. Typically, traffic volume data represent the number of vehicles that pass a certain point within a 24-hour hour period. The Massachusetts Highway Department (MassHighway) counts traffic for selected roads throughout the state from traffic stations or points along the roadway. Some roadways are counted continuously on a year-round basis. Others are counted for a certain period every few years, and some are done on a case-by-case basis when a construction or rehabilitation project necessitates data collection. For this reason, traffic counts for roadways in and around Lincoln are available only for certain years.

Table 9.6 presents available traffic counts for major routes in and near Lincoln. The data indicate that although Route 2 and Route 128/I-95 are heavily traveled roads, they do not appear to be experiencing an increase in traffic volumes. Route 2 volumes have ranged between 42,000 vehicles per day to slightly more than 50,000 over the years, depending on the counting location. The Route 128/I-95 traffic stations with multi-year data also showed decreases in traffic volumes. For the stations south of Route 2 along Route 128, it is not clear whether traffic has increased, decreased, or remained stable. The most recent data indicate these segments of the roadway carry between 172,000 and 180,000 vehicles per day.

Traffic volumes are not recorded consistently for local roads. Often, they are produced for a particular study or project. In 1999, Lincoln's Traffic Management Committee conducted a study that recorded *peak hour traffic* on roads considered to be the most heavily affected by growth in traffic volumes.⁸ At the time, a particular safety concern was whether residents had ample time to exit their driveways. As a rule, motorists entering traffic require a 200 ft. line of sight and about five seconds to merge safely into traffic. The data from 1999 (Table 9.7) showed that due to high traffic volumes, people living on some of Lincoln's roads did not have enough time to exit their driveways safely.

Stack-ups at intersections are another consequence of increasing traffic volumes on local roads, and it has become common at some junctions in Lincoln during the peak period. Stack-ups and increasing traffic in general could reflect a rise in non-local trips (drivers from other cities or towns who pass through Lincoln on their way to other destinations) or growth in local trips. Lincoln residents sense that the increasing traffic and congestion

⁸ Peak hours are defined as 6:30am – 9:30am and 3:30pm – 7:00pm.

they see in town, especially during peak period, stems primarily from non-local traffic. While regional growth and development undoubtedly play a role in Lincoln's traffic patterns, the absence of current data makes it impossible to determine whether the cars on Lincoln's roads are local or non-local. Lincoln's traffic mitigation efforts may need to be geared to reducing vehicle trips and speeds within the town as much as "taming" traffic that originates elsewhere.

Table 9.6
Average Daily Traffic: Major Routes

Route/Street	Town	Location	Average Daily Traffic				
			1997	1998	1999	2000	2001
Route 2	Lincoln	At Lexington Town Line	47,600			50,100	
Route 2	Lincoln	West of Bedford Road					
Route 2	Concord	West of Route 126					
Route 2	Concord	0.2 km East of Concord Rotary	46,879	47,407	47,161	47,011	46,354
Route 128/I-95	Lexington	North of Route 2A	174,215	172,102	174,219	169,897	
Route 128/I-95	Lexington	North of Route 2	166,778		177,815		
Route 128/I-95	Lexington	South of Route 2	173,120	177,105	179,104	180,605	
Route 128/I-95	Waltham	North of Winter Street	173,637	174,337	178,835		
Route 128/I-95	Waltham	South of Winter Street	169,712	170,766	176,956	178,343	172,230
Route/Street	Town	Location	Average Daily Traffic				
			2002	2003	2004	2005	2006
Route 2	Lincoln	At Lexington Town Line		47,600			48,700
Route 2	Lincoln	West of Bedford Road					44,400
Route 2	Concord	West of Route 126					42,800
Route 2	Concord	0.2 km East of Concord Rotary	47,595	47,137		45,754	45,662
Route 128/I-95	Lexington	North of Route 2A			159,000	171,800	159,735
Route 128/I-95	Lexington	North of Route 2					154,500
Route 128/I-95	Lexington	South of Route 2					
Route 128/I-95	Waltham	North of Winter Street					
Route 128/I-95	Waltham	South of Winter Street					

Source: Executive Office of Transportation, Massachusetts Highway Department, Traffic Volume Counts, Route Traffic Volume Count Listing, <http://www.mhd.state.ma.us/default.asp?pgid=content/traffic01&sid=about#para>.

Table 9.7
Peak Hour Traffic Volumes on Lincoln's Major Roadways

Roadway	Peak Hour Volume	Avg. Distance Between Cars (seconds)	24 Hour Volume
Route 2A	1,822	2	20,695
South Great Rd. – Rt. 117	1,374	3	12,391
Lincoln Road	1,065	3	10,530
Trapelo Road	869	4	7,644
Concord Road – Rt. 126	710	5	7,314
Bedford Road. South	641	6	6,242
Bedford Road North	528	7	4,516
Sandy Pond (between 5 Corners and Baker Bridge)	376	10	N/A
Codman Road	325	11	3,154

Source: Town of Lincoln, Traffic Management Committee Report (August 2000).

TRAFFIC ACCIDENTS

MassHighway collects data on the number, type, and location of traffic accidents from the Registry of Motor Vehicles. In 2004, 2005, and 2006, motorists were involved in 150, 167, and 144 traffic accidents in Lincoln, respectively. With the exception of one death in 2004, the accidents involved no fatalities. Recently, MassHighway changed its traffic accident reporting system by adding data that allow accidents to be mapped.⁹ Though available only for 2005 and 2006, the data show that most accidents in Lincoln occur along its major roadways, including Route 2 and 2A, Bedford and Lincoln Roads, Route 117, and to a somewhat lesser extent, Route 126 (Map 9.2). On roadways such as Bedford Road and Lincoln Road, accidents seem to occur at intersections with local roads rather than along an uninterrupted stretch of road. The same is not true for Routes 117 and 2, where accidents occur both at intersections and along the open road. These data also show clusters of accidents at two major intersections: Five Corners and Crosby's Corner.

Public Transportation

The Massachusetts Bay Transportation Authority (MBTA) Commuter Rail Station, located on Lincoln Road in South Lincoln, is the primary source of public transportation in Lincoln. Trains run between Fitchburg and Boston's North Station, offering fifteen inbound boarding times in Lincoln on a typical weekday. The frequency of train stops in Lincoln varies, but weekday service is limited to five stops in Lincoln between 6:30 am and 9 am, and five trains departing from North Station between 4:30 pm and 7 pm that make stops in Lincoln.¹⁰



Travel time between Lincoln Station and Boston is approximately 28-36 minutes. Over the past several years, daily boarding volumes have fluctuated at Lincoln's commuter rail station. In February 2003, 2004, and 2005, there were 300, 219, and 226 average daily inbound Lincoln passengers respectively on a typical weekday.¹¹

Like most suburban commuter rail stations, Lincoln's is primarily a park-and-ride facility. Three parking lots provide a total of approximately 170 parking spaces: a commercial property on which the MBTA has rights to fifteen spaces, a town-owned, unpaved lot with about forty-two spaces, and a town-owned paved pay lot with 101 spaces.¹² In 2002, the Central Transportation Planning Staff (CTPS) conducted a park-and-ride lot

⁹ Note: Due to limitations of MassHighway Crash Data, not all accidents can be mapped. For 2005, 89 percent of reported accidents are represented on the map. In 2006, 69 percent of reported accidents were represented. However, of the accidents not represented on the map, most also occurred along major roadways and at the key intersections described above.

¹⁰ Massachusetts Bay Transportation Authority, <http://www.mbta.com/schedules> and [maps/rail/lines.com](http://www.mbta.com/maps/rail/lines.com).

¹¹ Massachusetts Bay Transportation Authority, *MBTA Ridership and Service Statistics* ['The Blue Book'], Tenth Edition, Revised 2006 (2006).

¹² Mark Whitehead to Community Opportunities Group, Inc., 10 June 2008.

utilization survey and found that Lincoln station's parking lot was between fifty percent and eighty-five percent utilized during peak period. By contrast, the next four stations to the west (Concord, West Concord, South Action, and Littleton), all of a size similar to Lincoln's station, were fully utilized. The next two stations to the east (Silver Hill and Hastings) are much smaller, with only a few spaces each, and they were less than fifty percent full, and the next station eastward (Brandeis-Roberts) was also less than half full.¹³ In the fall and winter of 2003-2004, the Lincoln Police Department conducted its own survey of the Lincoln station parking lot and found that on average, only forty percent of the spaces were used.¹⁴

Lincoln Station is not accessible to people with disabilities and the station lacks passenger facilities such as a shelter and public restrooms. Although there are no plans to address accessibility issues at or make general improvements to Lincoln Station, the MBTA has started a five-year improvements project for the Fitchburg Line which will enhance train service in general. Since the Fitchburg Line is the oldest commuter line in the MBTA system and it experiences the most service delays, the current project will seek to increase travel speeds, which are predicted to improve on-time reliability from eighty-three percent to ninety-five percent. The improvements also will focus on providing an enhanced passenger experience through amenities such as wireless internet access. The improvements project began a design and development phase in 2008 and all construction is scheduled for completion by 2012.¹⁵

In addition to commuter rail service, the MBTA provides paratransit service (THE RIDE) to elderly or disabled Lincoln residents. There is no local bus service in Lincoln, but the MBTA's Route 76 travels to HAFB from the Alewife Red Line station.

Bicycle and Pedestrian Facilities

One of the most notable aspects of Lincoln's transportation system is its network of trails and roadside paths. Lincoln has nearly eighty miles of trails, including ten miles of roadside paths.¹⁶ The roadside paths provide a safe, pleasant route for walking and low-speed biking along Lincoln's roadways, which typically have little or no shoulder space. The paths can be seen along stretches of major local routes, the longest segment running next to Lincoln Road and continuing on Bedford Road above Route 2. Other paths follow the eastern side of Trapelo Road, Codman Road, Great South Road (Route 117), an Concord Road (Route 126). Together, the paths provide access to most parts of town. Lincoln also has designated



13 Boston Metropolitan Planning Organization, *The 2004 Congestion Management System Report*, Chapter 5 (2004), <http://www.bostonmpo.org/bostonmpo/resources/reports.htm#cms>.

14 Town of Lincoln, Police Department, *Lincoln Police Department Survey*, Sep. 03 – Feb 04, "Commuter Lot Utilization," (2004). Note: the Police Department Survey considered the total number of spaces at the Lincoln MBTA to be 99.

15 The Metropolitan Bay Transportation Authority, About the MBTA, "The Fitchburg Commuter Rail Line Improvement Project," http://www.mbta.com/about_the_mbta/t_projects/.

16 Town of Lincoln, Open Space Committee, *Open Space and Recreation Plan* (March 2008).

crosswalks throughout town. The crosswalks at the school complex on Lincoln Road and along Sandy Pond Road are slightly elevated to serve as traffic calming features and protect pedestrian safety.

Lincoln's roadside paths provide a remarkable transportation and recreational amenity, but some residents think the paths suffer from poor maintenance and underutilization. According to the Lincoln Department of Public Works (DPW), the roadside paths are indeed neglected. Some have had virtually no maintenance for years, leaving various paths in poor condition. The town-wide paving program that began in 2008 will include some roadside path improvements.¹⁷ However, while the roadside paths provide a safe route for walkers and some bicyclists, they do not accommodate higher-speed bicyclists. Lincoln's 1986 *Report of the Roadside Path Committee* found that high-speed cyclists do not use path system. Instead, they opt for the narrow travel lanes on roadways.¹⁸ Lincoln's road-and-roadside-path structure successfully provides pedestrians and some cyclists with a safe route of travel, but its design conflicts with the needs of high-speed cyclists.

Lincoln's conservation trails system is extensive. The town owns about thirty miles of trails and the state owns another 5.5 miles. Approximately twenty-four miles of trails cross private land. The remaining trail segments are owned by non-profit organizations, land trusts, and other municipalities.¹⁹ Just under half of all trails in Lincoln are maintained by the Lincoln Land Conservation Trust (LLCT). The town maintains about thirty-three percent, excluding roadside paths maintained by the DPW. The remaining trail segments are maintained by the state and other municipalities.²⁰

Regional Transportation Organizations

Regional forces greatly affect local transportation conditions. Below are the key organizations working within Lincoln's region to address regional transportation needs.

METROPOLITAN AREA PLANNING COUNCIL (MAPC) AND BOSTON METROPOLITAN PLANNING ORGANIZATION (MPO)

The Metropolitan Area Planning Council (MAPC) is the regional planning agency serving 101 cities and towns in the Boston area. MAPC researches and compiles plans and recommendations on many issues of regional significance, including transportation, and also provides technical assistance and advocacy to its member communities. MAPC also presents initiatives from Lincoln and other communities to the state, specifically to request funding for transportation and transit-oriented projects. In the past several years, there have not been any requests for infrastructure funding before the MAPC, although there have been many project-related issues that have been brought before MAPC as an overseer of regional development initiatives.²¹

MAPC is one of seven member agencies of the Boston Metropolitan Planning Organization (MPO), the largest of the thirteen regional transportation planning organizations in Massachusetts. The MPO carries out federally-mandated transportation planning responsibilities and also employs technical staff to prepare plans and studies

17 Chris Bibbo, Superintendent of Public Works, to Community Opportunities Group, Inc., 9 June 2008.

18 Town of Lincoln, Roadside Path Committee, "Report of the Roadside Path Master Plan Committee," November, 1986, (1986), 4.

19 Town of Lincoln, 2007 GIS Database: Transportation/Trails, (2007).

20 Ibid.

21 Metropolitan Area Planning Council (MAPC), "About MAPC," http://www.mapc.org/about_mapc.html.

in support local and regional decision-making.²² In addition to its affiliation with the Boston MPO, the MAPC works with cities and towns through eight sub-regional organizations. Lincoln's subregion is the Minuteman Advisory Group on Interlocal Coordination (MAGIC), which also includes Action, Bedford, Bolton, Boxborough, Carlisle, Concord, Hudson, Lexington, Littleton, Maynard, Stow, and Sudbury. MAGIC reviews and comments on developments of regional significance and maintains a subregional priority list of transportation improvements which is used to advocate for state funding.²³

While MAGIC is not currently evaluating any projects that relate directly to Lincoln, MAPC is conducting a transportation planning process for development along the Route 128 corridor between Route 3 and I-90. Lincoln is one of four communities within the study area, which contains approximately fifteen current, proposed, and potential development sites. An initial meeting in 2008 focused on economic development, traffic, and other opportunities and challenges in the study area. Representatives of the four towns signed a memorandum of understanding, committing to cooperate on measures such as increasing transit options, creating mitigation banks for developers, developing shared zoning bylaws to standardize traffic mitigation, and generally coordinating the planning on along the study area.²⁴ The next steps include identifying funds for a corridor study and planning process for the 128 Central area, and for state representative and senators from the four communities to form a caucus and consider a Route 128 corridor planning item for the Transportation Bond Bill.²⁵

128 BUSINESS COUNCIL

Established in 1987, the 128 Business Council is the first Transportation Management Association (TMA) in Massachusetts.²⁶ The Council works to reduce congestion on local and regional roadways, particularly Route 128, by providing employees of member businesses alternative transportation options and information. The Council currently operates six shuttle bus routes serving businesses, residential complexes, office parks, and colleges in Waltham, Lexington, Needham, Newton, Weston, Woburn, Burlington, and North Lexington. In addition to fixed-route bus service, the Council offers transportation demand management services such as carpool and vanpool ride-matching. Currently no Lincoln businesses or organizations participate in the 128 Business Council's programs, but it is possible that some Lincoln residents participate in ride-matching services. Raising awareness of The Council's services could help reduce the number of single-occupancy vehicle trips generated by Lincoln residents.

ROUTE 128 CENTRAL CORRIDOR COALITION

The Route 128 Central Corridor Coalition, composed of representatives from the four communities within the Route 128 corridor between Route 3 and I-90, including Lincoln. Together, these municipalities contain approximately fifteen current, proposed, and potential development sites.²⁷ The Coalition, working with the MAPC, seek regional solutions to the cumulative impact of planned development along the corridor.

22 Boston Metropolitan Planning Organization, "Detailed Information About the MPO," <http://www.bostonmpo.org/bostonmpo/mpo/whatde.htm>.

23 Mark Racicot, MAPC, to Community Opportunities Group, Inc., 6 June 2008.

24 Connie Paige, "Taming traffic on Route 128: Communities join to face the future," *The Boston Globe*, July 27, 2008.

25 MAPC, "128 Central," http://www.mapc.org/transportation/policies_process.html.

26 The MetroWest/495 Transportation Management Association also operates near Lincoln, but its catchment area is limited to Framingham, Hopkinton, Marlborough, Natick Southborough, Sudbury, and Westborough.

27 MAPC, "128 Central," http://www.mapc.org/transportation/policies_process.html.

Transportation Disadvantaged Populations

Transportation systems provide different levels of access to different sectors of the population. Age, income level, and level of physical ability affects a person’s *mobility*, or ability to get around. It is easy to see how these factors might affect one’s mobility in a town like Lincoln, where most transportation is auto-based. Traveling by car or truck is expensive, and it requires drivers be of a certain age and physical ability. A person who is younger or older, has limited financial means, or has a disability will most likely have far less mobility than others. Groups with characteristics that limit their mobility are known as *transportation-disadvantaged populations*.²⁸ In terms of age, they include people 5 and 18 years old and those 65 and over. According to federal census data and available estimates, these populations have moderately increased in Lincoln since 1990. In addition to the populations shown in Table 9.8, the aging of the “Baby Boom” population (the cohort now between about 45 and 64 years old) will create more needs for transportation options, such as paratransit services and housing close to goods and services, connected by well-maintained, accessible walkways.

Table 9.8
Change in Lincoln’s Transportation Disadvantaged Populations by Age, 1990-2008

Age Cohort	1990 Census		Census 2000		2008 Estimate		2000-2008
	Number	Percent	Number	Percent	Number	Percent	Change
Age 0-4	287	6.4%	350	6.8%	364	6.7%	14
Age 5-17	638	14.1%	974	18.9%	1,026	18.8%	52
Age 65-74	444	9.8%	498	9.7%	521	9.5%	23
Age 75-84	208	4.6%	319	6.2%	343	6.3%	24
Age 85+	47	1.0%	67	1.3%	95	1.7%	28
Total Population	4,515	100%	5,152	100.00%	5,463	100%	311

Source: Bureau of the Census, 1990 Census of Population and Housing, Summary File 1, Table P011; Census 2000, Summary File 1, Table P11; Claritas, Inc., Site Reports, and Community Opportunities Group, Inc.

People with lower incomes often depend on access to public transportation more than other groups. Current demographic estimates for Lincoln indicate that about fifteen percent of the town’s households have moderate incomes. Although income is not necessarily a barrier to car ownership or use, the costs of driving disproportionately affect lower-income people. They are more vulnerable to unexpected increases in gas prices and auto-related maintenance costs, all of which threaten both mobility and economic stability.

Another transportation-disadvantaged group is the population with disabilities. While the MBTA’s THE RIDE program serves Lincoln, people with disabilities have few other convenient transportation options. The Lincoln Council on Aging provides free rides for the elderly to medical and other appointments, shopping, and COA activities. According to Census 2000, 13.4 percent of Lincoln’s population reported some type of disability. Among them, eleven percent had a sensory disability and twenty-one percent had a physical disability, both of which could affect a person’s mobility.²⁹

28 Statistics in this section include Hanscom Air Force Base population.

29 Bureau of the Census, Census 2000, Summary File 1, Table P41, <http://factfinder.census.gov>.

NEEDS, ISSUES & CHALLENGES

Major Planned Developments

A community's internal dynamics clearly relate to long-range transportation planning needs, but what happens in the greater region is equally as if not more important. In particular, development trends in nearby communities have the potential to place significant burdens on another town's roadways. Lincoln's location along the rapidly evolving Route 128 corridor makes development trends nearby all the more important for addressing long-term transportation issues. Table 9.9 shows that today, approximately four million sq. ft. of development are at various stages in Lincoln's area, mainly in Waltham and Weston. In addition, a significant amount of development is occurring in other towns nearby, outside the area reported in Table 9.9. The projects range in size from fairly small developments, such as supermarkets and restaurants, to larger, more complex projects, such as the 3.24 million sq. ft. mixed-use Northwest Park development in Burlington. Ultimately, these projects will have a significant impact on many roadways in Lincoln's region. Most of these projects will affect regional roads that cross Lincoln, including Route 117, Routes 2 and 2A, and Winter Street.

Lincoln has taken an active approach to transportation planning, especially for its own roads, roadside paths, and trails. Through investment, development guidance and control, Lincoln has preserved and enhanced its beautiful roads and established a unique network of roadside paths and trails that serve as models for other communities. Due to issues such as traffic congestion, safety, transportation equity, and the growing awareness that private vehicle emissions are the nation's largest contributor to transportation-related greenhouse gases,

Table 9.9
Traffic Generation Potential of Development in Adjacent Communities

Project	Development Summary	Daily Traffic	Peak Hour Traffic (AM and PM)	Possible Lincoln Impacts
Related Development (Polaroid Redevelopment); Rte. 117 near Rte. 128	450 ksf office & 1.24 MSF retail	25,780	1,040 & 2,605	Route 117 & Winter Street
Boston Properties (Waltham Office Center); Totten Pond Road at Winter Street	355 ksf office & 74 ksf retail	10,615	690 & 1,185	Winter Street & Trapelo Road
Equity Office; 175 Wyman Street Wyman Street at Rte. 128	335 ksf office	3,380	495 & 455	Winter Street, Trapelo Road & Route 2
Opus Development; 40 Green Street between Rte. 117 and Rte. 20	360 ksf office, 30 ksf storage, & 180 ksf retail	8,655	621 & 911	Route 117 & Winter Street
Boston Properties; Fourth Avenue Third and Fourth Avenues	199,500 sf office	2,270	325 & 300	Winter Street, Trapelo Road, & Route 2
Northland Investments; Main and Moody on the Common	267 apartments & 42 ksf retail	3,085	80 & 280	Route 117
Boston Properties- Jones Road Office Development; Rte. 117 and Jones Road	114 ksf office	1,470	210 & 205	Route 117
Mass Broken Stone; Rte. 20 and Rte. 117 in Weston	350 ksf office	3,500	510 & 470	Route 117
Totals	2,163.5 ksf office, 1,536 ksf retail, 267 apartments, & 30 ksf storage	58,755	3,971 & 6,411	

Source: Vanasse Hangen Brustlin, Inc., 2008, based on projects in the permitting process or already permitted as of March 2008.

Lincoln realizes that other imperatives will direct its transportation policy in the future. Among Lincoln’s key transportation challenges are the consequences of increasing traffic volumes and traffic speed.

Traffic Safety and Congestion

Increasing traffic volume continues to challenge Lincoln’s existing transportation infrastructure. Along with a lack of sidewalks or roadside paths in many places, traffic volumes and speed can contribute to creating an unsafe environment for pedestrians using roadways without roadside paths and for drivers to get out of their driveways. Further, the problems associated with increasing traffic and excessive speeds are compounded by the character of Lincoln’s roads and intersections: tree-lined, with curves and undulations, often resulting in limited sight lines. Since Lincoln wants to keep the historic, rural nature of its roads, efforts will continue to control traffic to protect the safety of all roadway users.

...Allowing commercial development in any other area of Lincoln [outside of Lincoln Station] could potentially have significant impacts on local roads and neighborhood streets depending on the type, scale, and density of development and its regional appeal. Accordingly, Lincoln will have to exercise great care in evaluating the tradeoffs among land use, tax revenue enhancement and transportation issues to be sure that the greater good is being served.

Increased traffic volumes during the morning and evening peak hours are a particular problem. It is clear from Table 9.7 that two local roads – Lincoln Road and Trapelo Road – are presently carrying more traffic than Concord Road (Route 126), a state-numbered highway. Together, the traffic data for Lincoln Road, Trapelo Road, Route 2A, and Route 117 support the notion that a fair amount of east-west commuter traffic is responsible for much of the congestion on Lincoln’s roads. The total daily volume of 51,260 on these four roads exceeds that handled on Route 2. Furthermore, the volume of traffic carried on these four roads exceeds the number of Lincoln commuters in single-occupancy vehicles (2,120 round trips) by a factor of twelve. Allowing higher-density development in the Lincoln Station area may have only minor impact on traffic congestion unless it becomes a regional destination. However, allowing commercial development in any other area of Lincoln could potentially have significant impacts on local roads and neighborhood streets depending on the type, scale, and density of development and its regional appeal. Accordingly, Lincoln will have to exercise great care in evaluating the tradeoffs among land use, tax revenue enhancement and transportation issues to be sure that the greater good is being served.

Alternative modes of transportation are often posed as a way to mitigate traffic congestion. Suggestions include shuttle bus service, carpooling, public transportation, telecommuting, and improved pedestrian and bicycle facilities. Due to the town’s low-density land use pattern and because there are few services within walking distance of most households, however, Lincoln residents will probably continue to drive for the vast majority of trips. Any future commercial development in Lincoln should be encouraged or required (depending on a project’s size) to prepare and adhere to a Transportation Demand Management (TDM) plan for employees.

Regional Collaboration

Since most transportation is regional in nature, expanding Lincoln’s transportation options will need to involve regional collaboration. As a small town along the Route 128/I-95 corridor, Lincoln is acutely affected by the development and traffic patterns of the greater region. This is challenging because it means that traffic congestion in Lincoln is caused in part by traffic from neighboring towns. However, a regional connection also presents

opportunities to build regional capacity to address issues that are larger than any one city town. Regional solutions are not an option; they are the *only* effective and long-term way to address significant issues such as congestion, pollution, and safety on major roadways.

Lincoln has proven itself a willing partner in regional transportation initiatives. By participating in MAGIC sub-regional meetings and the Route 2 Corridor Advisory Committee (CAC), providing leadership on HATS, and more recently, initiating the creation of the 128 Central Corridor Coalition, local officials have taken the right steps toward increasing the town's ability to address its pressing transportation issues and needs. In addition, it will be important to build a constituency within town for regional transportation initiatives. While some may feel that the best way to deal with non-local traffic is to attempt to divert it from Lincoln's roadways, these measures will only go so far. Moreover, they will not do anything to address issues such as congestion on major roadways and pollution. The larger scope of transportation dynamics, issues, and solutions needs to be brought into the public discourse as Lincoln plans for its future.

Roadway and Roadside Path Maintenance and Use

Lincoln's 2008 Town-Wide Paving Program will begin to address some of the most pressing maintenance issues that have resulted from years of inadequate attention to local roads. In addition, the program will focus on integrating the town's Roadway Design Guidelines, which promote the rural character of Lincoln's roads through guidance on the design and construction on different types of roadways.³⁰ The Guidelines were adopted by the Board of Selectman in 1997. Although Lincoln works to balance both the aesthetics and logistics of roadway maintenance, the current program may leave some needs insufficiently addressed. This is especially true of the roadside paths, which are less likely to receive immediate attention than neglected roadways.



Keeping both roadways and roadside paths at a level that allows for efficient and comfortable movement by drivers, bicyclists, and pedestrians will remain challenging for Lincoln. In addition, some residents have said that roadside paths and trails are underused. Whether this is empirically true, it will be important to increase the constituency for maintaining and expanding roadside paths and trails. To increase the overall visibility, popularity, and relevance of the paths, Lincoln will need to think of creative ways to encourage residents to take advantage of this unique resource.

Mobility for Transportation Disadvantaged Populations

Since Lincoln is an auto-based town, particular attention must be paid to groups who may face barriers to car use or driving. In many communities, there is a growing awareness that older residents have a difficult time getting from place to place when their sole means of transportation is an automobile. Many older residents have difficulty driving, for physical or other reasons. Today, there are more elderly residents and fewer people to take care of them, and this has forced the issue of mobility for seniors into public dialogue. In addition, some Lincoln residents may face barriers to auto use due to income or a disability. Although each of these groups has transportation needs that require special attention, generally increasing transportation options, including non-

30 Vanasse Hangen Brustlin, Inc. *Roadway Design Guidelines*, 1997.

motorized forms of transportation such as walking and biking, will benefit everyone in some way, and also align with some of the recommendations for mitigating roadway congestion. Additionally, efforts must be made to make the limited non-auto transportation options accessible. This means working with the MBTA to make the Lincoln Station fully accessible to persons with disabilities.

HAFB and Hanscom Field

HAFB generates 10,400 average vehicle trips per day using Hanscom Drive. HAFB lies within a network of major state routes: Route 95/128 on the east, Route 2A on the south, Route 62 on the northwest and Route 4/225 on the northeast. Direct access to HAFB is limited to Vandenburg Gate from Hanscom Drive and Hartwell Gate from Hartwell Avenue. Areas of particular concern are the Bedford Road/Route 2A intersection and Hanscom Drive/Route 2A intersection. According to the *Hanscom Air Force Base Pre-BRAC Community Advance Planning* report (2005), these are two of the most congested intersections. At least 64 percent of the base traffic enters through the Lincoln access. Traffic issues will continue to be problematic, with Operational Level of Service (LOS) approaching 80 seconds of delay at signalized intersections and 50 seconds of delay at unsignalized intersections during peak hours.³¹ HAFB has taken steps to provide traffic mitigation through staggered work times and other TDM practices and works closely with Lincoln to monitor conditions. Changes in land use at HAFB, either through Base closure or realignment, may change the amount of traffic generated along this corridor.

Hanscom Field is a separate facility that is owned and operated by Massport serving general aviation including small aircraft and regional charters. There have been past efforts to expand the commercial use of this property, and any intensity of development that may occur may change the amount of traffic generated along this corridor.

GOALS & RECOMMENDATIONS

Goal TC-1. Increase the safety of Lincoln’s roadways.

- TC-1.1. Implement traffic-calming measures to manage vehicle speeds and reduce the amount of cut-through traffic through certain areas of town.
- TC-1.2. Control traffic speed through speed limit regulation and enforcement in a manner guided by a balanced traffic management program.
- TC-1.3. Institute public education and outreach to encourage traffic safety and awareness for users of Lincoln’s roads, roadside paths, and trails.
- TC-1.4. Continue to coordinate with state and regional transportation agencies regarding Route 2 improvements, including the Crosby’s Corner project, and provide active participation in the 128 Central Corridor Coalition.
- TC-1.5. Assess and, if necessary, improve parking in the center of town.

DISCUSSION

Traffic Calming. Traffic calming is a well-known approach to slowing traffic through physical and non-physical interventions. Discouraging travel on local or residential streets directs cars toward more major roadways, which

31 Mark Whitehead, Town Planner, March 2009.

suggests that traffic calming is an effective solution for reducing what many refer to as “cut-through” traffic. Many types of traffic calming techniques exist today. Some are as simple as narrowing travel lanes and striping pavement to create the perception of narrow lanes. Others involve substantial amounts of design, engineering, and construction, such as speed tables, chicanes, and roundabouts. In addition, making a road one-way is also a form of traffic calming that may be appropriate in some parts of town, although difficult to achieve in rural settings. Since there are many techniques and some may not be appropriate in Lincoln, traffic calming interventions must be selected through an evaluation of a specific roadway’s issues and the advantages and



disadvantages of using a particular type of intervention. Synchronizing general roadway improvements, such as paving, with the evaluation and installation of traffic calming devices can be an efficient and effective way to bring these techniques into a town’s mainstream roadway engineering policy and planning, as long as they are integrated with the town’s preference for maintaining the rural character of its roads.

Lincoln has begun to make substantial progress in this area. The Ad Hoc Traffic and Roadway Design Committee (AHTRC) was charged by the Board of Selectmen to examine approaches to traffic calming in order to inform a town-wide repaving project approved in 2008. Traffic calming considerations will be applied only to roadways included in the study area. However, the AHTRC also recommended to the Board of Selectmen that the town establish a permanent Lincoln Roadway and Traffic Mitigation Committee with broad representation, which would likely encourage traffic calming for other roadway projects in the future.³² In its roadway design principles, the AHTRC identified two key traffic-calming concepts that will be important to keep in mind as Lincoln moves forward:

- ❖ Initiatives to promote safe and appropriate use of roadways should reflect a combination of sound roadway engineering, roadway and roadside design, road user education, and traffic law enforcement.
- ❖ Roadway installations designed to calm traffic should be considered with regard to the specific context of the locale and the desired traffic management objective, balancing rural character, public safety, and maintenance with anticipated outcomes.
- ❖ Given Lincoln’s recent experience with traffic calming policy and planning, next steps should include:
- ❖ Support the work of the AHTRC and further discussion of establishment as a permanent committee;
- ❖ Identify specific areas or roadways in Lincoln with speeding issues for further study; and
- ❖ Continue with public education and outreach efforts about traffic calming in Lincoln.

³² Ad Hoc Traffic and Roadside Committee (AHTRC), Recommendations to Board of Selectmen (Memorandum), 18 December 2008; Addendum 23 January 2009.

Traffic Speed and Enforcement. Evaluating and enforcing speed limits could help to address concerns about traffic speed. While lowering speed limits across the board may seem logical, instituting a blanket speed limit is problematic for a few reasons. First, roadways are not homogenous. They serve different functions and form a hierarchy that accommodates different types of vehicular traffic. Efforts to guide traffic away from some roads, such as neighborhood-level streets, will not work unless drivers have more efficient options on other roads. Accordingly, the “default” speed limits in Massachusetts are set by M.G.L. c. 90, s. 18, which provides that in the absence of posted speed limits, vehicles must not exceed the following:

- ❖ 20 mph in a school zone;
- ❖ 30 mph in a thickly settled area or business district, for a distance of one-eighth of a mile;
- ❖ 40 mph on an undivided highway outside of a thickly settled area or business district, for a distance of one-fourth of a mile; or
- ❖ 50 mph on a divided highway outside of a thickly settled area or business district, for a distance of one-fourth of a mile.³³

Second, changing speed limits requires a traffic study conducted jointly with MassHighway and review and approval by MassHighway before it can be instituted by the town. The results apply only to the roadway segment included in the study. Establishing a speed limit in a different area requires a separate study and could result in a different speed limit, depending on the speed of existing traffic in that area. Some communities have found that traffic studies can result in a higher speed limit than the existing posted limit.

Appropriate speed limits and adequate enforcement are essential for managing speed on local roadways. While a “one-size-fits-all” approach to regulating travel speeds is inappropriate, it makes sense to study and establish speed limits in priority areas and focus enforcement efforts in critical traffic locations. Lincoln could make speed limit regulation and enforcement a consideration when identifying roadways for a traffic calming study. Any move toward possible speed limit adjustments needs discussion with the Lincoln Police Department.

Route 2. Although the possibility of a substantial relocation project for Route 2 is no longer under consideration, the highway remains a major factor in Lincoln. MassHighway is moving forward with improvements to Crosby’s Corner, a project that promises to improve safety and traffic flow. Lincoln residents have been very involved with proposed projects along Route 2 for a long time, exerting considerable influence over the roadway’s development. Residents and the town will need to remain involved in Route 2 planning and monitoring. Local officials will continue to work with the Route 2 CAC, MassHighway, and neighboring towns on Route 2, and to advocate for timely, responsible compliance with all environmental requirements concerning Route 2 improvements.

Parking (and in particular, free parking) is an inefficient use of land that visually detracts from the built environment and encourages auto use. Any unnecessary parking increases should be avoided. Expanding the supply of parking should be initiated only upon clear evidence of a shortage, and with careful consideration of how to manage the negative externalities associated with increased parking and auto use.

³³ MassHighway, Traffic and Safety Engineering, “Speed Limit Regulations,” <http://www.mhd.state.ma.us/default.asp?pgid=content/traffic/speedReg&sid=about>.

Parking in Lincoln Center. Although most of the time there is not a high demand for parking in Lincoln Center, parking can become scarce when events are held at the Library, Bemis Hall, or the First Parish Church. Permanent parking facilities should never be expanded to meet irregular demand, but Lincoln may want to survey and evaluate its parking needs for the center of town during all times of the day, month, and year, and plan for how to meet them. Some improvements may simply be procedural. For example, if overflow parking goes to the First Parish Church for events at Bemis Hall and this causes safety concerns, the town could adopt a strategy to manage vehicular and pedestrian traffic between these two sites when the need arises. If there is a documented need for parking in Lincoln Center, the town will need to work closely with property owners and residents to determine how to meet that need. Since parking (and in particular, free parking) is an inefficient use of land that visually detracts from the built environment and encourages auto use, any unnecessary parking increases should be avoided. Expanding the supply of parking should be initiated only upon clear evidence of a shortage, and with careful consideration of how to manage the negative externalities associated with increased parking and auto use.

Goal TC-2. Encourage the use of both motorized and non-motorized modal alternatives for intra- and inter-town transportation.

- TC-2.1. Improve the attractiveness, of and access to, Lincoln's pedestrian and bicycle infrastructure, including roadway shoulders.
- TC-2.2. Explore feasibility of expanding bicycle access to the trail network in coordination with the Conservation Commission.
- TC-2.3. Explore ways of increasing availability of motorized transportation alternatives, such as ridesharing and shuttle service, and investigate mechanisms to fund them.



DISCUSSION

Pedestrian & Bicycle Infrastructure. Just as Lincoln's roads need to be well-maintained for vehicular use, its other transportation infrastructure, namely the roadside paths, needs to be maintained for non-vehicular use. Lincoln's roadside paths are a great amenity to residents. However, it is generally recognized that the paths are both poorly maintained and underused, and it is likely that the former begets the latter. While Lincoln's town-wide paving program will address some of the roadside paths, residents must develop and maintain vigorous advocacy to ensure as much attention to roadside path maintenance in the future. The more Lincoln can include roadside paths in its paving programming and budgeting and give them equal footing with roadways, the more likely it is that their condition will at least remain constant, if not improve. Maintaining the paths will improve their attractiveness and make them more accessible to a variety of users.

In considering bicycle and pedestrian infrastructure, focusing on roadways makes sense. Pedestrians are often forced to travel on roadside shoulders where roadside paths are lacking. Cyclists also travel on roadways and not roadside paths in order to avoid pedestrian or slower-moving bike traffic. The town's attention to maintaining its roadways, and in particular the edges of the roads, will be important for ensuring the comfort and safety of cyclists. As with the roadside paths, residents should focus on developing and maintaining a strong cycling and

pedestrian constituency, and communicate to the town and DPW that maintaining the shoulders of roadways is essential to pedestrian and bicycle safety.

Bicycle Access to Trails. Opening Lincoln’s trail system to as many forms of non-motorized transportation as possible is a noble objective. Still, just as user conflicts occur along roadways, there will be conflicts along the trails and paths. Providing a network of safe, attractive paths for bicyclists is important for Lincoln, first because the town’s path system could accommodate more than pedestrian use, and second because Lincoln’s roadways leave little room for cyclists. Most of Lincoln’s seventy-two miles of trails are not accessible to some types of cyclists, and consideration should be given to whether they should be upgraded to do so. However, making trails bicycle-accessible raises a few issues. First, opening trails for bicycle uses means that pedestrians, horseback riders and bicyclists will have to cooperate and share the limited path space, adhering to a set of rules or protocol. Second, upgrading trails for bicyclists may mean a change in character or nature of the trail, and will involve additional resources for design, construction, and maintenance. Finally, making substantial changes to the trails and paths may be complicated because of the many owners and stewards involved, and in some areas changing the paths may be inappropriate due to conflicts with the town’s conservation objectives. In light of these issues, Lincoln might consider the following:

- ❖ Undertake a planning process for bicycle paths and trails that:
 - ◆ Inventories and assembles the owners and maintenance-providers for various trails and path segments, including the DPW, Conservation Commission, non-profit organizations such as the Lincoln Land Conservation Trust, real estate trusts, and various private owners, to discuss changes to trail design;
 - ◆ Selects and designates bicycle routes for speed cyclists and mountain cyclists;
 - ◆ Establishes design criteria for routes for speed and mountain bikers; and
 - ◆ Solicits public input, possibly through a bicycle advisory group, on all of the proposed changes.
- ❖ With the help of the DPW and Conservation commission, develop a general idea of design, construction, and maintenance costs for various trail changes and upgrades. This will help trail proponents create a feasible plan of action from the outset.
- ❖ Work with the Recreation Department and other town boards and groups to develop trail and path usage guidelines for walkers, bicyclists, and other users of the resource. The town’s Conservation Commission has issued a *Trail Guide for Bicycles* leaflet and provides conservation rules for trail usage in its Trail Map. These efforts may be expanded to establish a set of rules or guidelines for the many potential users of town trails.
- ❖ Determine a public outreach plan to communicate the rules to town residents. This might include posting information on the town website or developing signage to be posted along trails and paths.

Motorized Transportation Alternatives. Promoting non-motorized forms of transportation should be central to any efforts to reduce the negative consequences of auto use, but roadway infrastructure forms the basis of Lincoln’s transportation system. Most Lincoln residents will continue to use vehicles to travel, both locally and regionally. For this reason, Lincoln should focus on reducing the number of single-occupancy vehicle (SOV) trips generated by its own households.

School Transportation. An obvious form of non-SOV and non-private auto transportation is the public school busing system. School bus ridership has declined in nearly all towns, but not always for the same reasons. Many communities lack a continuous sidewalk system that safely and efficiently delivers walkers to school, yet even in communities with a good pedestrian network, more parents are driving children to school. The results include severe traffic congestion around public school grounds, not to mention the difficulties faced by school authorities as they try to plan for an adequate number of buses to transport a community's children. In Fiscal Year (FY) 2004, the state ended a long-standing policy of reimbursing local schools for a portion of the cost of student transportation. Since then, school systems throughout the Commonwealth – including Lincoln – have charged a school bus user fee for children in grades K-6 living within two miles of the public school they attend, and for all children in grades 7-12.³⁴ Though parents have been driving children to school for decades, the volume of traffic associated with parent transportation has increased dramatically.

The first step Lincoln should take to identify potentially effective solutions involves consulting with parents to determine why so many of them drive their children to school. Although the reasons may seem obvious, there could be many more factors in play than are evident on first glance. The National Center for Safe Routes to School has developed a model questionnaire that can be used to survey parents about their children's mode of transportation to school and the basis for a family's transportation decisions. Strategies to encourage bus transportation, walking, or bicycling will vary significantly depending on the nature of the disincentives. For example, concerns about distance to school differ from concerns about safety or conflicts between bus schedules and children's after-school activities. In addition, town and school officials need to consult with the Lincoln Police Department. Some communities have established morning and afternoon one-way street policies or no-traffic zones around their schools in order to make driving less attractive than riding the school bus or walking to school. These techniques have public safety implications beyond school yard traffic, particularly during morning commuter hours. Larger towns have enlisted local businesses to offer rewards to children who walk or use school transportation services, such as discount coupons from local ice cream shops or candy stores for elementary school students, or sporting goods and music stores for older students. Incentives like these would be difficult in Lincoln because the town's business base is so small, but other incentives could be explored.

Regional Ridesharing. Another opportunity to reduce SOV is ridesharing, which includes carpooling and vanpooling. Carpooling usually involves informal sharing of a private vehicle, while vanpooling usually involves a rented vehicle and is often coordinated by a group and organization. It is possible for Lincoln residents to organize their own carpool and vanpooling systems and associations. Additionally, the 128 Business Council provides ride-matching services for carpooling and vanpooling. One of Lincoln's committees or boards (such as the Ad Hoc Traffic and Roadside Committee, its successor, or another environmentally-oriented group), could provide public information and advocacy for ridesharing.

Transportation Demand Management. A well-known strategy for reducing SOV trips is Transportation Demand Management (TDM). TDM includes several techniques for changing travel behavior to increase the efficiency of a transportation system.³⁵ The most effective financial incentives to reduce driving are employer-driven. Some of the most commonly used include parking cash-outs, or payments to employees for opting not to use a subsidized parking space; travel allowances, where an employee receives a payment instead of a parking subsidy; or transit or rideshare benefits. These incentives encourage commuting by carpool, transit, and walking and biking

34 Note: regional school districts continue to receive school bus transportation reimbursement.

35 Victoria Transport Policy Institute, TDM Encyclopedia, <http://www.vtpi.org/tdm/tdm12.htm>.

instead of commuting in a single-occupancy vehicle.³⁶ Some Lincoln residents may already receive a financial incentive not to drive to their employer. Since TDM is an employer-based program and works best when used by larger companies, it may have limited applicability in Lincoln. Should the town decide to pursue TDM, however, it could begin to develop a policy for encouraging or requiring employers to implement TDM strategies. If Lincoln decides to allow commercial development outside the Lincoln Station area, the town may want to require a TDM plan as part of the special permit process. These types of programs could be very compatible with the Land Use Review Criteria in Appendix B.

Seniors and People with Disabilities. Lincoln residents with disabilities have access to the MBTA's "THE RIDE" service, which offers door-to-door transportation for qualifying people. However, Lincoln Station does not have accessible features such as accessible parking spaces, ramps, or lifts. For elderly residents, Lincoln's Council on Aging provides volunteer-based transportation services. Beyond this, there are few options for transportation-disadvantaged groups. Lincoln could strengthen the resources it has by:

- ❖ Making sure residents get the most out of the MBTA's service by providing outreach and information;
- ❖ Encouraging the MBTA to upgrade the commuter rail station to ensure that it is accessible;
- ❖ Assessing whether there is enough demand to designate a town vehicle, such as a van, for the Council on Aging to provide more regular and predictable transportation services; and
- ❖ Coordinating existing and future paratransit services with events at the Town Offices, the Senior Center, and the commuter rail station.

Goal TC-3. Address transportation issues on a regional level.

- TC-3.1. Continue to build upon partnerships with surrounding towns and regional agencies to address regional traffic congestion through transportation alternatives to single-occupancy vehicle commutes.
- TC-3.2. Encourage ridership on the MBTA commuter rail.
- TC-3.3. Coordinate regional economic development with plans to develop regional transportation infrastructure and congestion management plans.

DISCUSSION

Regional Partnerships. Transportation requires regional solutions. While the dominance of local government in Massachusetts makes regional collaboration difficult, there are several regional organizations through which Lincoln has engaged in regional transportation planning and transportation advocacy. These organizations include the 128 Business Council, MAGIC, the Route 128 Central Corridor Coalition, and the Hanscom Area Town Selectmen (HATS). Lincoln will continue to build upon its existing partnerships with adjacent towns and regional organizations, primarily through leadership from the Board of Selectmen.

Lincoln Station. The MBTA commuter rail system is designed to provide regional access to major employment centers, namely Boston. In 2000, less than half of all Boston-bound commuters from Lincoln used the commuter rail, so there is clearly room to increase Lincoln's MBTA ridership. By targeting its Boston area-bound commuters, Lincoln could strive to increase local ridership by several hundred people. Improvements

³⁶ Victoria Transport Policy Institute, Commuter Financial Incentives, <http://www.vtpi.org/tdm/tdm8.htm>.

already planned for the Fitchburg line will have a positive impact on travel times and general service for riders at Lincoln Station. These overall upgrades may encourage more people to take the commuter rail, but the lack of passenger amenities such as shelter, seating, and services at the station can discourage ridership. Lincoln may want to evaluate conditions at the station, assess whether the amenities are adequate, and work with the MBTA for station improvements. In addition to encouraging the general population to use commuter rail, Lincoln needs to *enable* people with disabilities to access the train. Since Lincoln Station has no accessibility provisions, people with certain disabilities are categorically excluded. As with other station improvements, the town needs to work with the MBTA to ensure that the necessary lifts, ramps, parking spaces, and other accessibility improvements are implemented at Lincoln Station.

Goal TC-4. Coordinate the need for traffic control measures with preserving the rural character of Lincoln’s roadways.

- TC-4.1. Continue to use Lincoln’s Roadway Design Guidelines when reconstructing or maintaining town roads.
- TC-4.2. Consult with and incorporate the recommendations of the Lincoln Garden Club’s Report on Lincoln’s Roadsides preliminarily adopted by the Board of Selectmen for publication in 2009.

DISCUSSION

Lincoln’s *Roadway Design Guidelines* (1997) provide technical guidance for the design of several types of roadways. The guidelines identify the factors that together give the town’s roadways their rural character, such as lane and shoulder width, paving materials, and curbing and drainage treatment, and they prescribe standards to preserve those qualities without detracting from the safety of the roadway. When followed, these guidelines amount to a policy to preserve Lincoln’s rural roads while upholding an acceptable safety standard as well. Currently, the guidelines are being used to provide standards for the town-wide paving program. Since they may require periodic assessment and update over time, it will be important to anticipate and budget adequately for this process to ensure a constant, credible source of roadway design guidance for the town.

The Lincoln Garden Club has recently completed the *Report on Lincoln’s Roadsides*, which will be published in 2009. This document will be used as additional guidance for roadway design and maintenance.

