

Transportation



Introduction

Berlin's transportation system is an important component of the quality of life and economic vitality of the community and the region. This is evident in Berlin's regulation of land use and in its investments in the maintenance and expansion of its infrastructure, both of which play an important role in the evolution of development patterns. Therefore, attention must be given to the impact that public policies have on the interconnected land use and transportation systems. This chapter provides guidance, context, and recommendations for addressing current and future transportation needs.

To be consistent with the community's vision, the goal in this section is to strive to meet all of the various transportation needs, while still maintaining and even enhancing the environment and quality of life in Berlin. The transportation infrastructure must be designed to serve local needs, and be compatible with local land use and community character while also accommodating regional transportation needs. The transportation modes that are supported by this system should strive to support the needs of residents and visitors while conserving energy.

Berlin has a number of transportation systems operating within its borders. While the automobile dominates, much of the downtown is conducive to walking and bicycling. A walkable community is a healthy community for residents, and supports a social and neighborly environment that promotes positive interactions between members of the community. Walkable communities also benefit from a reduced number of automobile trips because some daily tasks can be accomplished as a pedestrian.

Residents' and visitors' inter-regional transportation needs are served by automobiles and limited bus service. NH Route 16 passes through the center of Berlin and serves a great deal of the local traffic in the community, but it is also a significant state and regional transportation route.

Berlin has a number of transportation systems operating within its borders. While the automobile dominates, much of the downtown is conducive to walking and bicycling. While some public transportation options are available, more may be needed within the City and beyond.

Existing Transportation Facilities

The City of Berlin has been designated as an urban compact community because of its population size and the density of development within the downtown area. The City coordinates all maintenance within the compact area, and funding is provided by the State for the care of the state routes and other infrastructure. The City's urban compact zone contains 59 miles of municipally maintained roads (Class VI and Class V roads), .29 miles of unmaintained (Class VI) roads, and nearly 20 miles of private and non-classified (forest service and logging roads). There are also approximately 6.5 miles of City maintained roads outside of the urban compact zone. Also outside the urban compact zone Berlin has 5.32 miles of State Class I trunk line (Route 16), and 5.26 miles of State Class II road (Route 110). The Berlin roadway system can be found on the maps in the Appendix. The City also contains an interconnected system of sidewalks, multi-use paths, and trails for a range of transportation and recreation uses.

The major arteries of the road network in Berlin are NH Route 16, the primary north-south route in the region, and NH Route 110. Route 16 and nearby US Route 2 were the subject of major corridor studies that explored the relationship of land use and transportation along the entire roadway in New Hampshire. The NH Department of Transportation, the Office of State Planning, and North Country Council coordinated these efforts and Berlin was an active participant in both efforts. The major findings in both efforts included:

- An understanding of the relationship between land use and transportation activities;
- An identified need to promote Access Management.

The City also has active rail lines that connect Portland, Maine to Montreal, Quebec, and a municipal airport located to the west in the Town of Milan. Both of these facilities are part of the transportation infrastructure in Berlin, and present opportunities for the movement of goods and people in the future.

City Roadway Network

Major city streets include north-bound Main Street and its parallel, south-bound Pleasant Street, Mason Street connecting the East Side, Jericho Road/Route 110, Green Street which links Route 16 with Route 110, Hillside Avenue, and Hutchins Street/East Milan Road on the East Side.

One tool the City seems to be missing currently is a "transportation improvement plan." This is a comprehensive document which includes information on the current system of roadway and sidewalk infrastructure in the community, the condition of these facilities, and a multi-year framework to prioritize and complete the necessary improvements while eliminating spikes in funding requests. This tool could be a major source of information for a capital improvement plan.

Major Transportation Projects

Two priority projects have already been identified in Berlin (Route 110 and a section of Western Avenue), but no funding is currently available for these projects. The potential project for Route 110 west of the railroad crossing (known as Phase Two) is still being studied by the City and State with support from the Federal Highway Administration. This effort will also include an historical study as the parties involved try to identify an acceptable route for this roadway. In May of 2007 the City submitted a report to the New Hampshire Department of Transportation and the Federal Highway Administration related to the evolution of the NH 110 Phase II project. The full report can be found in the Master Plan Appendix. The report explained that the purpose of NH Route 110 realignment project is to safely and efficiently convey the NH 110 traffic through the downtown area of Berlin.

The project idea was borne out of transportation studies done for the City of Berlin in the 1960's and 1970's. As the City continues to evolve and change, the basic purpose of the project remains. Two major impediments towards meeting the project's purpose are a railroad bridge that has severely deficient underclearance (10'-1") and needs to be elevated, and heavy truck traffic is directed right through the middle of a residential neighborhood. The railroad bridge project (termed Phase One) was completed in 2008. There is currently earmarked federal money available for the Phase Two project. Presently, the City is waiting for a decision on the merits of Alternative 4E taking into account not only the immediate physical impacts that this alternative would have on the historic neighborhood, but also accounting for the long-term viability of the neighborhood and the negative secondary effects of the continuation of a truck route bisecting a neighborhood. It is a high priority to eliminate the forty year truck route detours that have existed in the community and accommodate heavy truck traffic through the area in a manner that minimizes impacts to residents in the neighborhoods. The current detour routes are difficult to navigate for those in the trucking industry, newcomers to the area, and the citizens of our community.

Pavement Management

The Engineering Department has also developed a Pavement Management Program using the Road Surface Management System (RSMS) provided by the University of New Hampshire Technology Transfer Center (T²). This program determines priorities for repair work along City-owned or maintained streets. This Program was initially developed in 1988, and consists of a detailed inventory and recommended repair strategies. The program as a whole should contribute to a process for informed-priority setting, and cost-effective use of increasingly scarce funds. Unfortunately, there has not been funding available to implement the program since the inventory was conducted in 1998, and the City is now falling behind on needed repairs.

Regional Roadway Network

Berlin is served by the north-south Route 16, a major state highway linking the eastern side of New Hampshire, running from Portsmouth to Errol and into Maine. East-west, Route 2 intersects with Route 16 a few miles south of the Berlin line in Gorham, and is the only east-west route connecting northern Vermont, New Hampshire and Maine. Interstate 93, running through the center of the State with Boston at its southern end, is about 35 miles to Berlin's west. Connection with this important highway has been improved through the relocation of NH Route 115 in the Towns of Carroll and Jefferson. NH Route 110, heading northwest from the City, connects Berlin with Groveton and northern Vermont. Route 16 north of the City follows the Androscoggin River linking the rural towns of Milan, Dummer and Errol, and Maine's Rangeley Lakes Region.

Over the years there has been a great deal of discussion around a plan for an east-west highway across northern New England from Calais, Maine, to Montreal. The route that has been studied could potentially follow U.S. Routes 9, 2, and 27. This possibility has been discussed for many years, and any future effort should be closely monitored by the City.

Berlin Municipal Airport

Once the hub of military and civilian activity, the Berlin Municipal Airport has been serving the aviation community since the 1940's. The Airport is located 7 miles north of Berlin in the Town of Milan, New Hampshire, and sits at an elevation of 1,158 feet. The runway is 5,200 feet long by 100 feet wide. Services provided at the Airport include: state of the art fuel facilities; seasonal aircraft rentals; auto, limo and bus rentals; winter plug in; seasonal flight training; pilots' lounge; and after hours service.

Rail Facilities

There are several rail rights-of-way in Berlin, and one of the rail lines is still active. The St. Lawrence and Atlantic line passes through Berlin from Maine and continues up to Montreal with a spur serving the mill sites in Berlin. This rail infrastructure is currently being used for some freight, but no provisions have been made for passengers. To accommodate passenger service in the future the rail infrastructure would need to be upgraded to some extent.

The St. Lawrence & Atlantic Railroad is currently working to raise funds to replace some of the rail that is substandard in an effort to support its freight service, and this investment would help make passenger service possible as well. The main issue for passenger service is the class of track which dictates allowable speed. The higher the class of rail the more stringent the track requirements are. To create a higher class rail line there would need to be further investment in upgrading the infrastructure. According to the New Hampshire Department of Transportation there has been a significant amount of work completed on this line in all 3 states and Quebec, but more would be needed.

Regionally, there has been interest in passenger service between Portland and Montreal on this line in the past, but no active initiatives are underway.

Roadway Related Data

Existing Traffic Volumes and Trends

The structure of the local highway network requires local and regional travelers to share, to a significant degree, the major arterials in Berlin. Local traffic consists mainly of trips from residential areas in and around downtown Berlin and neighboring communities to local businesses and services. These commercial trips generate substantial turning movements. The combination of local trips and through trips on the major arterials often results in slower traffic, capacity constraints, delays, and an increase in vehicle collisions.

From 2000 to 2006 the City experienced a series of mill closings and changes in activity at the mill sites, but no significant changes in traffic volume are apparent. Overall, traffic in Berlin has remained relatively stable as the population in the region has decreased over the past 10 years. Traffic volumes vary somewhat over the course of a year in Berlin due to seasonal fluctuations that affect the tourism industry. Table 1 shows Annual Average Daily Traffic (AADT) counts for Berlin in greater detail.

Table 1 Annual Average Daily Traffic (AADT) Berlin, NH

Location	2000	2001	2002	2003	2004	2005	2006
NH 16 (Riverside Dr.) North of Pleasant St.		9800				9100	
12 th Street Bridge, East of NH 16			4200			4500	
Hutchins St., North of Columbia Ave.	5300			4500			4900
NH 16 (Riverside Dr.), North of Maple St.			9100			8000	
NH 16 (Glen Ave.), South of Brown St.	13000			14000			9900
NH 110 (West Milan Rd.) at Milan Town Line		1700		2100			1900
NH 16 (Milan Rd.) at Milan Town Line		2200		2500			2700
NH 110 (Berlin-Groveton Rd.) at Northern Compact Line	3100			2700			2800
Mason St., East of NH 16			5000			5500	
NH 16 (Pleasant St.) South Bound on Dead River Bridge	6100			6400			
NH 16 (Riverside Dr.) North Bound on Dead River Bridge			5000			4800	
Unity St., North of Mason St.		5700			7300		
Unity Street, Over Androscoggin River		4000			4800		
NH 16 (Pleasant St.) South Bound, South of Diana St.			6500			6100	
NH 16 (Glen Ave.) North Bound, South of Diana Street			6100			6100	

Source: New Hampshire Department of Transportation

Pavement Condition

The New Hampshire Department of Transportation evaluates all state roadways and the Interstate System using a Ride Comfort Index (RCI) of 1 to 5. The rating is based on the roughness of the surface and the amount of work needed to correct it. In Berlin only Route 110 has been evaluated recently. Route 110 is classified by the RCI as needing major work on the majority of roadway segments, and only “some work required” on the remaining segments. Data is also available for City streets from the 1998 Road Surface Management Study. Funding for the implementation of this study has been limited.

Bridge Data

There are 14 major bridges within the urban compact area in Berlin, and one state maintained bridge at Horne Brook outside of the compact area. The pedestrian Bridge over the Androscoggin River is in the worst condition, but is not being used to carry significant weight like the other facilities that are open to vehicles. The Department of Transportation has identified two of the bridges (Hillside Ave. and Saint Lawrence and Atlantic Railroad) as being in fair condition. These facilities will need to be addressed by the City to ensure their safety. Having bridges included in a Transportation Improvement Plan would provide the means to plan for their care and replacement along with other roadway infrastructure.

Table 2 City Maintained Bridges in the Urban Compact

Bridge Name	Waterbody of Location	Condition (2006)
Cascade Street	Over St. Lawrence and Atlantic Railroad	Very Good
St. Lawrence and Atlantic Railroad	Over NH 110	Very Good (New)
Hillside Avenue	Dead River	Fair
St. Lawrence and Atlantic Railroad	Willow Street	Fair
Cole Street	Dead River	Good
East Side Arterial (James C. Cleveland Bridge)	Androscoggin River	Good
NH Route 16 Northbound	Dead River	Satisfactory
NH Route 16 Southbound	Dead River	Very Good
Mason Street	Canal	Good
Mason Street	Dam Sluice	N/A
Mason Street	Androscoggin River	Good
Pedestrian Bridge	Androscoggin River	Poor
12 th Street	Androscoggin River	Good
Hutchins Street	Bean Brook	Very Good

Source: NH Department of Transportation

Crash Data

From 2003 through 2006 there were more than 705 crashes on Berlin's roadways (see Table 3). There were four accidents from 2003 to 2005 that resulted in fatalities, and one accident that resulted in a pedestrian fatality. The four fatalities involving vehicle occupants took place on Jericho Lake Road, Pleasant Street, Diana Street, and E. Mason Street. The pedestrian fatality took place on Exchange Street. Seven pedestrians and 216 passengers were also injured in crashes between 2003 and 2006. The majority of accidents took place on segments of Route 16 and Route 110 within the downtown. Other City Streets with high percentages of accidents included Jericho Lake Road, Hutchins Street, Hillside Avenue, and E. Mason Street.

Table 3 Berlin Crash Data 2003 - 2006

Berlin Crash Data				
	2003	2004	2005	2006
Total Vehicular Accidents	154	227	158	166
Total Injuries	55	63	54	44
Pedestrian Injuries	1	1	2	3
Fatalities	1	2	1	0
Pedestrian Fatalities	0	1	0	0

Source: NH Department of Transportation

Roadway safety is determined by a number of factors, such as road condition, traffic volume and speed, the number of access points and intersections, driver behavior, and vehicle condition. All of these factors are used to evaluate potential for accidents. Referred to as crashes by the Department of Transportation, crash data is commonly used to identify hazardous situations and plan for necessary improvements. In New Hampshire a reportable crash is an incident that causes over \$1,000 of damage or results in a personal injury. As a result the crash data reported in this section will not reflect every crash that has occurred in Berlin in a given year. Local police records may contain some additional crash data from minor incidents.

The Berlin Police Department also tracks intersections within the City that have high accident rates. Table _ shows the intersections in Berlin that are of concern because of the number of accidents from 1999 to 2008. It is not surprising that the intersections in the heart of downtown where traffic volumes and turning movements are higher have seen higher numbers of accidents.

Table 4 Accidents at Intersections (1999-2008)

Intersection of:	Total
Burgess & Grafton	12
Eighth & Finland	12
Exchange & Main	12
Madigan & Second	12
Madigan & Third	12
Burgess & E Mason	28
Main & Twelfth	15
Hillside & Willow	44
High & School	24
Glen & Unity	25
High & Hillside	28
Cole & York	32
Main & Mason	34
Unity & E Mason	37
Green & Pleasant	38
Pleasant & Mason	38

Source: Berlin Police Department

Level of Service

Traffic congestion in New Hampshire is measured in terms of Level of Service (LOS) with LOS A being free flowing and LOS F being heavily congested. Level of Service is determined by comparing the volume of traffic on a roadway section to the roadway's capacity to handle the volume (based on traffic engineering procedures outlined in the Highway Capacity Manual). The capacity is based on roadway factors that affect congestion, including alignment, lane and shoulder width, and the number of access points, among others.

NHDOT has calculated the LOS for the major state highways, including many of the state maintained and numbered routes, based on 2004 traffic data. To ensure uniformity, the traffic volumes utilized for comparison purposes were current weekday evening peak hour volumes (normally an example of a high recurring peak condition) throughout the state. In the Berlin area NH Route 16 was evaluated north and south of the Urban Compact.

NH Route 16 south of the Urban Compact received a moderate rating (LOS C and D) indicating that congestion is not a major issue on this stretch of highway, but that the capacity of this roadway to handle the traffic volume has been reduced. This reduction in capacity is most likely due to the number of roads and driveways that enter the facility. Each entrance onto the roadway creates an opportunity for conflict, and reduces the effectiveness of the roadway to move vehicles efficiently. NH Route 16 north of the Urban Compact received a high rating (LOS A and B) indicating little if any congestion

on this roadway. NH Route 110 west of the Urban Compact also received a high rating (LOS A and B) indicating little if any congestion on this roadway outside of the downtown area.

In addition to traditional highway improvements, a number of non-highway related transportation projects are being implemented incrementally to address congestion and to achieve the overall goal of moving people, goods, and services more efficiently throughout New Hampshire. NHDOT, in cooperation with Maine DOT and the Vermont Agency of Transportation, is leading an effort to implement Intelligent Transportation System (ITS) technologies in the Northern New England region. According to the US Department of Transportation, “ITS represents the next step in the evolution of the nation's entire transportation system. As information technologies and advances in electronics continue to revolutionize all aspects of our modern-day world, from our homes and offices to our schools and even our recreation, they are also being applied to our transportation network. These technologies include the latest in computers, electronics, communications and safety systems.”

The goal is to manage and operate the highways more efficiently and provide timely information to the motorists about travel conditions, delays, and tourism opportunities. Such ITS technologies will assist in addressing congestion, and will extend the life of many roadways by preserving their capacity. According to the NHDOT thirty-one ITS stations will be deployed throughout New Hampshire within the next few years. This network will help regulate inform and direct travelers passing through the North Country as well.

Function and Design

On state routes the City of Berlin should work with the NHDOT to ensure that the designs of any proposed improvements are “Context Sensitive Solutions” (CSS). The intent of CSS is to ensure that roads are not designated solely by the requirements of motor vehicle traffic. Transportation should preserve the scenic, historic, and environmental resources of the places it serves, and allow for a variety of modes beyond motor vehicles.

This is also important on City streets, and a series of suggested street design standards have been included in this chapter to ensure that roadway designs are related to the function of the roadway within the overall system. The stated purpose of each road type should be the basis for its design, use, and maintenance requirements. Local roads serving smaller residential developments could be reduced in scale to enhance neighborhood character, slow traffic speeds, reduce construction and maintenance costs, and still provide safe access.

SPECIAL TRANSPORTATION ISSUES

Workforce Commuting

According to 2006 data from New Hampshire Employment Security, Berlin has a civilian workforce of 4,708 persons. When looking at the commuting data for these workers we see that the mean travel time for Berlin workers is 15.4 minutes. This is much shorter than the New Hampshire average of 25.3 minutes, and the national average of 25.5 minutes. Table 5 shows the distribution of workers by mode of transportation.

Table 5 Modes of Transportation

<i>Mode of Transportation</i>	<i>Percent of Berlin Workers</i>	<i>Percent of New Hampshire Workers</i>	<i>Percent of U.S. Workers</i>
Drive Alone	81.4%	81.8%	75.7%
Carpool	12.1%	9.8%	12.2%
Public Transportation	.4%	.7%	4.7%
Walk	4.6%	2.9%	2.9%
Work at Home	.7%	4.0%	3.3%
Other Means	.8%	.8%	1.2%

Source: US Census 2000

Berlin's distribution of commuters by mode of transportation is very similar to the state and national averages in most categories. It is understandable that Berlin's figures for public transportation would be lower than the national average, considering the limited public transportation in the Berlin area compared to other regions of the U.S. that are more conducive to mass transit. The number of residents that walk to work or carpool are high and indicates a very positive trend.

Bicycle & Pedestrian Facilities

Sidewalks

The sidewalk network in Berlin is primarily in the downtown area, but extends into the adjacent neighborhoods and along the state routes. Pedestrian movement in the downtown is a critical mode of transportation, and a form of recreation. It is key to the quality of life, economic, and physical health of the community. Increased pedestrian activity removes vehicle trips from the roadways, saves energy, improves air quality, reduces demand for parking, and promotes social interactions. To support this, Berlin's streets and intersections should be designed to provide for safe and convenient pedestrian access.

There are numerous safety issues associated with specific segments of sidewalks throughout the community, including minimal separation from travel lanes, multiple and

wide curb cuts, and handicapped accessibility constraints. The City should create guidelines for the design and construction of sidewalks. These guidelines can be used for improvements in the downtown area, and in new developments. The City should also commit to year-round maintenance of sidewalks to ensure that they can be used during the winter months. When these areas are not kept clear pedestrians are forced to walk in the street during the most dangerous time of the year.

Bicycle Routes

State designated bicycle routes are located along portions of Route 16 from Gorham, Unity Street, Hutchins Street, East Milan Road, Mason Street, Main Street, Pleasant Street, Green Street, 3rd Avenue, Wight Street, and Route 110 to Milan. Fortunately, these designated routes provide access to the downtown area. This provides an opportunity to welcome bicyclists into the downtown, but greater care should be taken to accommodate cyclists safely. A network of bicycle lanes along major roads would greatly enhance rider safety and use, and should serve riders of varying abilities. In the downtown area the bicycle lanes could be incorporated into the existing roadway as a travel lane between the on-street parking area and the motor vehicle travel lane. This will also provide traffic calming benefits in the downtown area. In order to create such a network, the City of Berlin will have to continue to work closely with the NHDOT, which is responsible for the state maintained corridors and the creation of the designated bicycle routes in New Hampshire. Bicycle traffic could also be accommodated on other city streets and multi-use paths through the downtown area.

The placement of bicycle racks or covered bicycle storage within the downtown area, and at retail and employment locations throughout Berlin should be encouraged. There is a need to provide a safe location for bicycles to be secured if the community wishes to encourage this form of transportation and recreation.

Signage and Wayfinding

Berlin's signage and wayfinding systems should direct travelers to their destination safely and efficiently, and contribute to the identity of the community. There are several layers of signage, (including statewide, regional, and local) and multiple layers of wayfinding (e.g., directional, informational, vehicle-oriented). Each of these levels and layers must be well coordinated in order to effectively serve visitors to the community. These signs should be integrated with Berlin's transportation and economic development infrastructure. The following are fundamental objectives of a signage and wayfinding system for Berlin:

- Identify the routes and destinations that travelers need to get to;
- Identify important decision points along each route that will be important to travelers; and
- Provide accurate information, in a legible and consistent format, at key locations along each route.

- Construct attractive signs that are consistent in size, materials, and design depending on character of the area they are located in.

Signage Along Major Routes

Signage along state routes (NH Routes 16 and 110, as well as Route 2 and Interstate 93) provide the necessary information to keep travelers on the routes and to direct travelers to many destinations.

Local Wayfinding

A variety of signage is used in Berlin, including:

- Street signs;
- Welcome/Gateway signs;
- Downtown Berlin signs; and
- Directional signs.

Most of the signs are in fair to good condition, but having effective signage requires a commitment to repairing and replacing signage regularly. The City is currently participating in a Coos County regional effort to coordinate and install wayfinding signage.

Dead-End Roads

The City of Berlin could work to discourage the use of cul-de-sacs in the future unless there is a physical constraint on the site that makes it necessary. Currently there is only a length requirement in the land use regulations, and no requirement for future connections or pedestrian and bicycle connections to adjacent developments.

There are several advantages to having such provisions in the land use regulations, including dispersment of traffic, improvement of emergency access, and the ability to loop utility systems. Provisions should be made in the town's land use regulations to facilitate these connections where feasible through easements for future use or actual construction. Connections should also be encouraged on existing dead-end streets where possible. In order to mitigate this improved access, the city should consider the value of traffic calming design features such as narrower roads, street trees, and speed tables to name a few. These features help control the thru traffic by controlling speeds, and can enhance the character and function of the roadway as a feature of the neighborhood.



Multi-use Trails and Paths

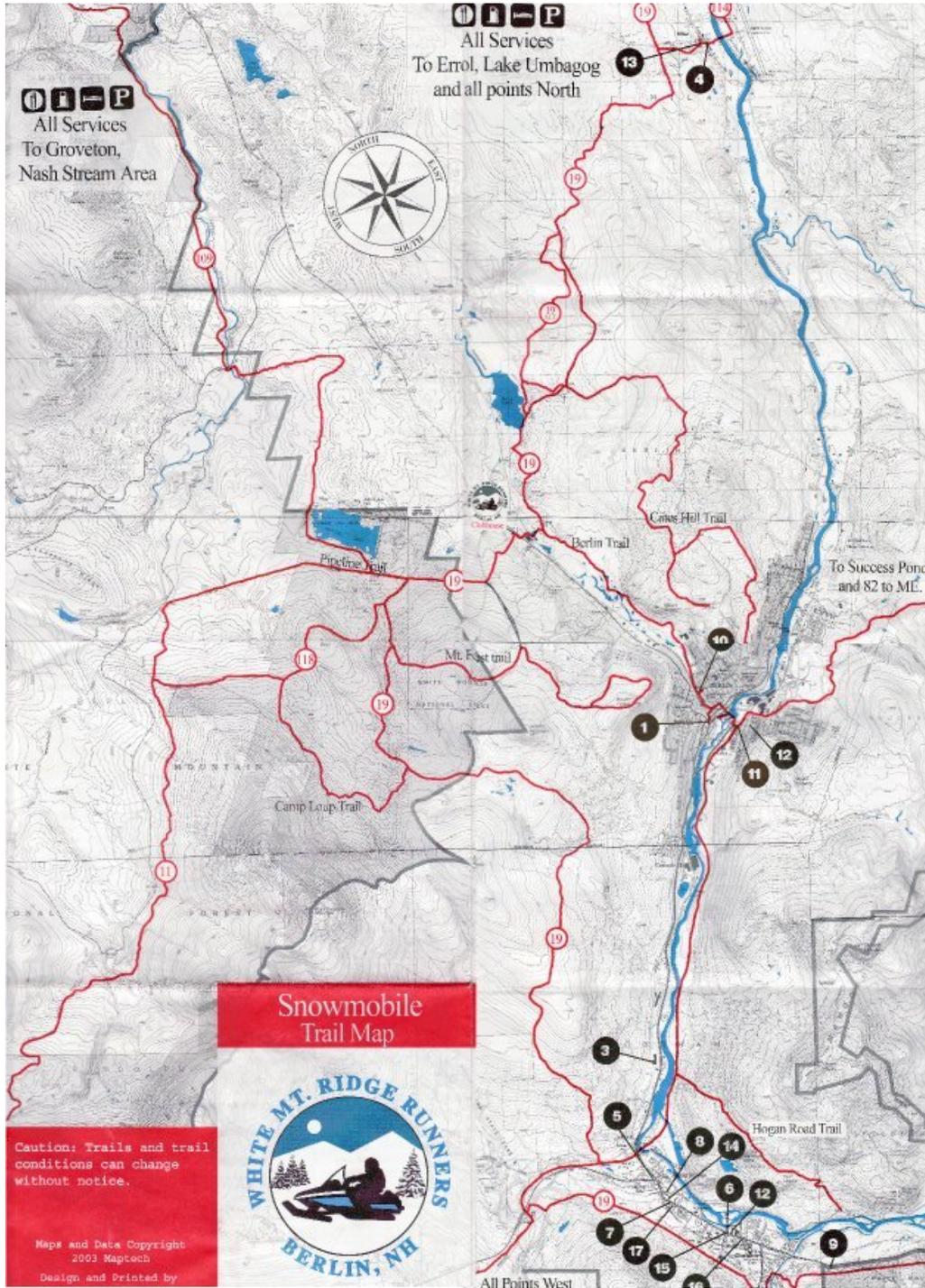
There are a multitude of trails and paths in Berlin serving walkers, hikers, mountain bikers, cross-country skiers, and snowmobilers. Some of this network is within the White Mountain National Forest and State owned parcels, but much of the network is informal and privately owned, with no formal agreements for continued use or signage. The many non-motorized trails and paths in Berlin include paved paths within the downtown area, hiking trails at the edge of the downtown, and wilderness trails.

The formal motorized use trails in Berlin include snowmobile corridors, and the ATV trails within the State owned property around Jericho Lake. The White Mountain Ridge Runners Snowmobile Club manages and maintains the snowmobile trails. The existing trail network (see Figure 1) includes trails parallel to Route 16 and 110, to the east to the Town of Success and on to Maine, across Cates Hill and north to Milan, and throughout the State and Federal lands in the western portion of Berlin.

There are two designated parking areas in Berlin that provide access to the trail network. At Jericho Mt. State Park there is a plowed lot with the capacity for about 50 vehicles and trailers located about 1 mile off of Route 110. The entrance road to this lot is plowed and maintained by the State and the lot itself is plowed by the White Mountain Ridge Runners snowmobile club. Jericho Motorsports located on Route 110 is a privately owned, plowed and maintained lot with capacity for about 15 vehicles and trailers. In addition to these parking lots there are many private trails that intersect with the main trail system to provide direct access from private homes within the City. These trails allow hundreds of Berlin residents to ride from their homes directly onto the trail system.

In the future the Club would like to improve the location and quality of trails through the Downtown. With the demolition of the Berlin paper mill there is now the potential for using the rail spur to provide a link from the two busy North/South corridor trails across downtown Berlin and would increase access to the restaurants and gas stations along this route.

Figure 1 Berlin Snowmobile Trails



Source: White Mountain Ridge Runners

The Androscoggin Valley ATV Club sponsors trails within the Jericho Mountain State Park and on the eastern side of the City toward Success Lake. Both trail systems include trailheads. Looking toward the future the ATV Club would like to identify two trail corridors through the City that could connect these trail systems for year-round use.

Currently these trail systems are only connected during the winter when ATVs can ride on the groomed snowmobile trails.

According to the New Hampshire Bureau of Trails the City could identify a route that utilizes city streets within the urban compact. Such a route will need to consider potential impacts to landowners, wetlands and other natural resources, and should avoid using Route 110 if possible. The length of the route will also be important so every effort should be made to minimize the length of this connector. One possible corridor would leave the Head Pond Trails and pass south of Cates Hill before making use of City streets to cross over to Success Lake.

The State of West Virginia has a regional trail system that includes several corridors that pass through developed portions of their communities on local roads. The designation of the routes for ATVs happens locally, and each community has established a local ordinance that regulates this use. The regulations include the following types of requirements:

- That users be licensed, and hold a valid permit for the Trail System;
- The users must obey all state and city traffic laws;
- That the users be sixteen years of age or older, or under the supervision of someone 21 years of age or older;
- Riders must wear helmets;
- That the corridor be used for trail access and access to local businesses, but not for joy riding;
- That the vehicles be in safe operating condition with the necessary lights and other equipment, and that their headlights be on;
- Speed limits are generally 10 to 15 miles per hour;
- Riders must honor the local noise pollution ordinance;
- No passengers are allowed on any vehicle unless it has been designed to carry passengers and has the appropriate equipment; and
- The corridor is open from sunrise to sunset.

Once a corridor has been identified through Downtown a similar ordinance should be drafted and adopted for Berlin to safely regulate this new use.

Public Transportation Facilities

Public transportation service in Berlin benefits the entire community. Public transportation reduces the number of vehicles on the road, and offers an alternative to individuals that may otherwise not have adequate transportation. Many transportation alternatives assist in reducing energy use while improving the regional air quality and reducing the impacts on climate change by reducing of the number of vehicles on the road.

Buses

Fixed Route and Demand Response Service

Limited fixed route trolley (bus) service is provided within Berlin and Gorham by Tri-County Cap. The trolley service does not attract a great number of riders currently. One suggestion is to subsidize the service so that riders can get on and off for free. Tri-County CAP also operates a limited demand response service for their clients.

Concord Trailways

Berlin is the northern terminus of one of the Concord Trailways routes. There is currently one bus leaving each morning and a return trip each evening. This service provides access to southern New Hampshire, Boston, MA, Logan Airport and points beyond.

Taxis

There is taxi service provided in Berlin and the surrounding area by several companies. Transportation is available on demand and service is provided on a 24-hour-a-day basis to any location in New England.

Rail

There are several rail rights-of-way in Berlin, and one of the rail lines is still active. The St. Lawrence and Atlantic line passes through Berlin from Maine and continues up to Montreal with a spur serving the mills in Berlin. The B&M right-of way is now owned by the State of New Hampshire and the rails have been removed west of NH Route 16. The right-of-way is now used as a year round multi-use trail.

Regional Airports

There is no regularly scheduled air service in Berlin or the North Country Region. The region is limited to private aircraft flying into the Berlin Municipal Airport, Mount Washington Regional Airport, and the Eastern Slope Regional Airport in Fryeburg Village, Maine. The nearest commercial airport is located in Portland, Maine (Portland International Jetport).

Mount Washington Regional Airport

Located in the Town of Whitefield, NH at an elevation of 1,074 feet, the Airport's runway is 3,500 feet long and seventy-four feet wide. Services provided at the Airport include: aircraft maintenance, flight training, storage and hangar space, tie downs for aircraft, fuel, and scenic flights.

Eastern Slope Regional Airport

This municipally owned facility was constructed in 1961, and includes a 3,700-foot long runway, which restricts landing and takeoffs to small jets.

Portland International Jetport

The Portland International Jetport, like many community airports, had its beginnings as a flying fan's private field. Today, the facility serves nearly 1.4 million passengers a year, flying on the most modern equipment of most of the major airlines. The primary runway is 6,800 feet long and 150 feet wide, and the secondary runway is 5,001 feet long and 150 feet wide. The City of Portland recently spearheaded a master planning effort for the Jetport, because of its economic development value for the City and southern Maine that will guide the growth of this facility into the future.

Pease International Tradeport

Pease International Tradeport is located at the former Pease Air Force Base in Portsmouth and Newington, New Hampshire. It encompasses 3,000 acres and has one runway 11,321 feet long and 150 feet wide. The Pease Development Authority operates the Tradeport. The Tradeport handles cargo, corporate, general aviation, and limited passenger service. Pan American Airlines began scheduled passenger service to the Orlando, Florida area from the Tradeport in 1999. The Pease Development Authority is actively seeking to encourage international passenger charter travel, based on its runway length and proximity to recreational and cultural amenities.

Manchester Airport

The Manchester Airport is one of the closest major facilities, with a wide range of airlines operating regularly scheduled flights. This facility has two runways; one is 9,000 feet and 150 feet wide, and the other is 7,700 feet long and 150 feet wide. Both runways were recently extended to these lengths and the facility is growing quickly. Manchester is also one of New England's largest cargo airports, with FedEx, UPS, and Airborne Express facilities on site. The FAA operates a 24-hour Air Traffic Control Tower on site. The Airport is owned by the City of Manchester, and is operated by the City of Manchester Department of Aviation. The airport is currently handling 3.4 million passengers a year, and is projected to handle 6 million passengers annually within ten years' time.

Other Special Transportation Issues

The trends in commuting and transportation that have emerged for the Berlin region reflect many of the transportation trends found nationwide. The number of cars on the road and the vehicle miles traveled have increased at a greater rate than the general population. The cumulative impacts of this increased automobile dependence include: traffic congestion, air pollution, noise pollution, and higher taxes and tolls to pay for new highway projects. Social and aesthetic impacts include: less cohesive neighborhoods, lost open space, and an increase in sprawling strip commercial development. It is important to remember the strong relationship that exists between Berlin's land use and transportation systems. Action within one system will have a direct impact on the other. Focusing on the community's strengths presents opportunities to improve pedestrian and

bicycle connections, coordinate existing bus links, and create new transportation services to points south to further improve how Berlin's existing transportation system functions.

During the NH Route 16 Corridor Study the following topics were considered of great importance to the safety and functionality of the transportation system in the Corridor communities.

Access Management

Access Management is the process of managing the placement of driveways on roadways, especially on those roadways classified as arterials. Arterial highways are similar to limited access freeways in that their primary function is to move people and goods over long distances quickly and efficiently; however, arterials do not have the benefit of strict access controls to adjacent parcels that limited access highways have. The speed, volume, and safety of traffic on an arterial is greatly reduced by vehicles entering and exiting side streets and driveways. In general, access management policies involve the regulation of the number of driveways, the design and placement of driveways, and the design of any roadway improvements needed to accommodate driveway traffic. This is especially important in Berlin where many vehicle trips include Route 16 and 110, and preserving the safety and efficiency of these roadways is important to the city and the region.

Traffic Calming

When traffic congestion reaches a saturation point, usually during the peak hour, motorists often seek alternative routes through neighborhoods. Traffic calming techniques can be utilized to slow down and control traffic on streets where it is necessary for traffic and pedestrians to co-exist. The term traffic calming is often described as the combination of mainly physical measures that reduce the negative effects of motor vehicle use on a roadway. However, the term "traffic calming" also applies to a number of transportation techniques developed to educate the public, and provide awareness to unsafe driver behavior.

Traffic calming techniques often include police enforcement and education, narrow and curved streets, speed humps and other devices, and landscaping. Berlin is already employing a series of traffic calming techniques in the downtown including on-street parking, crosswalks, and narrow back streets. There are still opportunities for traffic calming improvements throughout the downtown, and along many of the rural roads in the community.



Design Standards

Currently Berlin's road design standards are generally appropriate for handling the necessary traffic volumes without excessive pavement. Considering the road classification would serve as the basis for more flexible design standards that are more appropriate to the surroundings and the function of the road. Berlin's existing standards can be found below in Table 6.

Table 6 Berlin's Road Design Standards

Design Specification	Requirements
Right of Way	Local and Collector Streets – 50 feet Arterials – 70 feet
Minimum width of pavement	24 Feet
Maximum grade	Local Residential Street – 10% Collector Street – 8% Arterial Street – 7%
Maximum grade at intersections	Less than 3% preferred, in no case to exceed 6%
Minimum angle of intersection	60 Degrees
Width of shoulders	4 foot minimum (gravel)
Minimum center-line radii on curves	250 feet
Maximum Length of cul-de-sacs	1,000 feet

Generally, roadway standards are established to ensure that new roads are safe in every situation. According to Berlin's Standard Specifications for Road Construction the minimum roadway width of 24 feet may apply to any roadway regardless of its role in the transportation system. In an effort to create safe roads, often an unforeseen result of roadway design standards has been the over-design of rural and lower density residential streets. Typically, over-design of these streets includes elements such as unnecessarily wide pavement widths, as well as sidewalks and curbing which are generally suited for more urban and higher density locales. Wide city streets can easily be structured to accommodate on-street parking, bike lanes, and other features with the addition of painted lines. Below are a set of street design standards created during the US Route 2 Corridor Study in Northern New Hampshire that could serve as a model for future changes to Berlin's standards.

Table 7 Street Design Standards

Standard	Minimum Local Street	Minor Local Street	Major Local Street	Collector Street	Arterial Street
Number of Dwellings	2-6 dwellings	7-40 dwellings	41-150 dwellings	151-500 dwellings	>500 dwellings
ADT	20-60 vehicles	60-400 vehicles	400-1500 vehicles	1500-5000 vehicles	>5000 vehicles
Surface Width	16 feet	18 feet	20 feet	20 feet	varies
Shoulder Width	n.a.	2 feet	2 feet	4 feet	varies
Minimum Right of Way	36 feet	50 feet	50 feet	50 feet	varies
Design Speed	15 mph	15 mph	20 mph	25 mph	varies
Minimum Length of Vertical Curve	80 feet	80 feet	115 feet	155 feet	varies
Minimum Horizontal Curve radii	45 feet	45 feet	90 feet	165 feet	varies
Minimum Grade	0.5%	0.5%	0.5%	0.5%	0.5%
Maximum Grade	12%	10%	10%	8%	8%
Site Distance (both directions)	150 feet	200 feet	200 feet	250 feet	400 feet

FOOTNOTES:

[1] Shall be future anticipated traffic. (Assuming 10 trips per day per dwelling unit).

[2] All cross-section horizontal distances shall be measured perpendicular to straight-line sections and radii to curved sections.

[3] All season safe sight distance is defined as a line which encounters no visual obstruction between two (2) points, each at a height of three feet nine inches (3'-9") above the pavement and allowing for a snow window and /or seasonal vegetation. The line represents the critical line of sight between the operator of a vehicle using the access (point 1, ten feet (10') back from the road pavement) and the operator of a vehicle approaching from either direction (point 2).

Street Lighting

Street lighting should accommodate the needs of motorists and pedestrians. The design will differ depending on the needs you are trying to meet and the characteristics of the area. Guidelines for this type of lighting differ for different roadway classifications, and in many cases the lighting is controlled by the utility company and does not fall under the community's regulations. The City, however, has the right to specify that full cutoff energy efficient sodium lamps be used in street lighting.

Scenic Byways and Roads

Within Berlin there are two Scenic Byway Routes that are part of the National Scenic Byway Program. The Woodland Heritage Trail circumnavigates the Kilkenny District of the White Mountain National Forest, and includes Route 16 from Gorham into Berlin and Route 110 through Berlin to Milan. The route is considered unique because of its wood products heritage. The Moose Path Trail promotes the wilderness and wildlife of the region while highlighting Berlin Berlin as "the city that trees built." The Trail includes Route 16 through Berlin.

The Scenic Roads designation can be applied to paved and gravel roads in the City to provide additional oversight at the local level. The character of the roadway and its roadside attributes can be better protected if this tool is used appropriately. The application of this tool takes a strong commitment by the city boards and departments, and the public. Currently, Cates Hill Road is the only designated Scenic Road in Berlin.

Land Use Implications and Potential Actions

Berlin’s transportation system has a direct impact on the community and the region. Below are the critical items related to transportation in Berlin, and an array of possible actions the City may want to consider pursuing. This section will be used to identify the specific actions for Berlin to take upon completion of the master plan.

Land Use Implications	Potential Actions
<p><i>Transportation Infrastructure</i></p> <p>Berlin’s roadways should be designed and constructed based on the role they fill in both the local road system and the regional system. Roads should provide the necessary access for all modes while controlling the speed of vehicles. If the role of the road changes over time then the design of that roadway should change accordingly. Incorporating Context Sensitive Solutions into roadway projects, to the extent practical, should help preserve some of the scenic, historic, and environmental features within the project areas. Planning for the funding necessary to maintain and improve transportation infrastructure in Berlin has been a challenge, and will most likely continue to be a challenge for the City in the future.</p>	<ul style="list-style-type: none"> • Develop a “transportation improvement plan” to guide future improvements to the City maintained portions of the transportation system. This comprehensive document should include a multi-year framework to prioritize and complete the necessary improvements while eliminating spikes in funding requests. The system should ` control the flow of traffic, to reduce the number of access points to the roadway, and to promote connections between adjacent commercial properties.
<p><i>Modes of Transportation</i></p> <p>An interconnected transportation system provides travelers with options as they navigate between destinations. This allows traffic to disperse, allows alternative transportation modes, and may reduce the number of vehicle miles traveled by area residents. Pedestrian and bicycle trips reduce traffic on the roadways, promote public health, and have less impact on the environment. Local public transportation services are limited and need to be expanded to better meet the needs of residents and visitors. Design guidelines that include provisions for pedestrian circulation and public transportation can effectively enhance the use of alternative</p>	<ul style="list-style-type: none"> • Accommodate walking as a key mode of transportation in the downtown by maintaining and enhancing existing sidewalks, adding new sidewalks to the network, and requiring sidewalks in new developments. Winter maintenance should also be a priority on all sidewalks. • Include required provisions for bicycle and pedestrian facilities in the zoning, site plan review, and subdivision regulations. • Apply for Transportation Enhancement Funds, through the NH Department of Transportation, for the

transportation and reduce the use of single occupant automobiles.

construction of additional sidewalks and multi-use paths along state routes and elsewhere in Berlin.

- **Work with local transit providers to educate the public** on how they can better access public transportation, and all of the economic, social, and environmental benefits of public transportation.
- **Promote the different modes of transportation** including air and rail.

Roadway Design

Berlin's network of roadways form the primary transportation system for the community and most transportation modes rely on this system. Roadways should be designed and constructed based on the role they fill in the local road system. Roads should provide the necessary access while controlling the speed of vehicles.

Traffic calming techniques would provide an option to the community for protecting the safety and congeniality of Berlin's neighborhoods, without excluding traffic.

- **Complete all actions necessary to construct Phase II of the Route 110 improvements.**