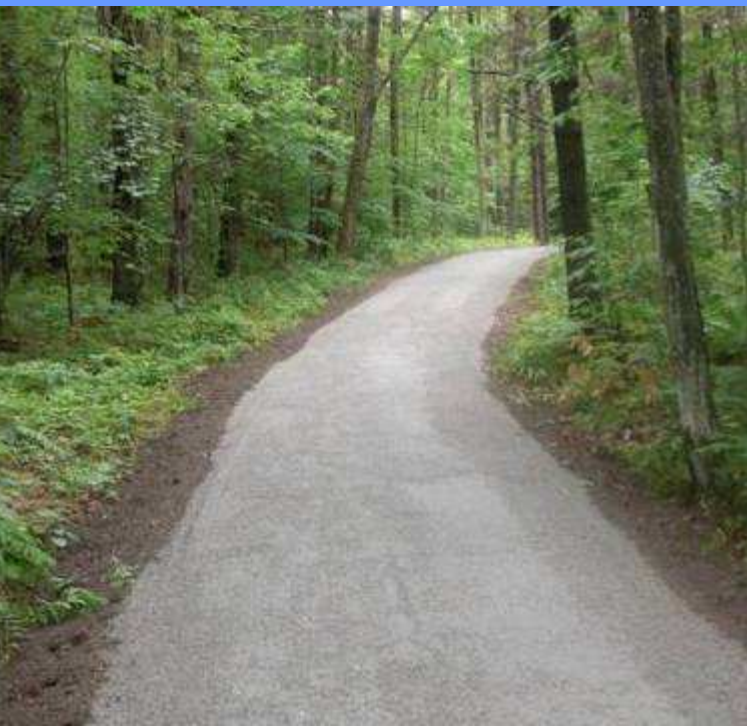




## Bicycling and Walking: Transportation Choices for New Hampshire's Lakes Region



March 2012



Cover: (top) Mural along the WOW Trail painted by Sarah Snow, Jami Harmon and Megan Buckner; (bottom left) Sewall Woods Trail, Wolfeboro; (bottom right) Meredith boardwalk

# Bicycling and Walking: Transportation Choices for New Hampshire's Lakes Region



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## EXECUTIVE SUMMARY

Bicycling and walking are environmentally friendly, healthy, low-cost methods of transportation. The 2012 *Bicycling and Walking: Transportation Choices for New Hampshire's Lakes Region* plan is a comprehensive update to the 2006 *Lakes Region Bicycle and Pedestrian Plan*. It was developed to provide the communities in the Lakes Region with additional information about existing biking and walking infrastructure, and to reinforce local revitalization efforts that desire to make their communities safer and more enjoyable places to live and visit.

The planning process for this report included public participation, development of a new vision statement, a detailed review of existing conditions of the built environment, recommendations, and a design supplement that provides conceptual solutions and strategies.

### The 2012 Vision Statement:

*A purposefully connected network of trails, sidewalks, road shoulders, and markings promoting safe and enjoyable bicycle and pedestrian mobility. Design and maintenance of livable, complete streets that support transportation, recreation, health, and economic interests throughout the Lakes Region.*

Implementation of transportation improvements such as road reconstruction, bike paths, sidewalks, etc. often takes many years, from a project's purpose and need to final construction. The long view is important. The region already has a well-developed transportation plan and process for motorized travel. Frequently, roadway funding and facility decisions are made with little consideration of the needs of bicycling and pedestrians. This plan is an attempt to recognize bicycling and walking as serious transportation modes, and to encourage our communities, and the state, to integrate them into future improvements of the transportation network.

Chapter 1 outlines some of the important reasons to support walking and bicycling opportunities in the Lakes Region:

- ❖ At least ten pedestrians have been killed in collisions with motor vehicles in the Lakes Region between January 2001 and December 2011
- ❖ Most public meeting attendees report that Lakes Region communities do not offer enough safe walking and bicycling opportunities for children, families, and adults.
- ❖ The median age of the Lakes Region is estimated to be 45.3 – eight years older than the US median age and four years older than New Hampshire. Active transportation can support health and mobility, allowing people to age in place and participate in the local economy for as long as possible.
- ❖ Rates of adult and child obesity and type-2 diabetes are continuing to climb in the Lakes Region. More than 25 percent of adults are obese as are nearly 30 percent of 10-17 year olds. About eight percent of adults have diabetes (95% of cases are type-2, which is preventable through healthy body weight and a physically active lifestyle).

- ❖ Based on extrapolation of statistics from the Center for Disease Control and Prevention, an estimated 7,900 people in the Lakes Region have type-2 diabetes and associated annual medical expenses of \$72 million, which largely represents leakage from the regional economy.
- ❖ October 2011 gasoline prices were 143 percent higher than January 2002 prices. Motorized transportation has become increasingly expensive in a time of severe individual and family financial constraints due to the weak economy.

Chapter 2 describes the development of the vision statement and the goals supporting the vision.

Chapter 3 presents public input obtained at five public meetings that were held throughout the Lakes Region in the fall of 2011. The meetings were facilitated to allow people to express needs and concerns related to bicycling and walking, and to present their ideas for solutions. Input was summarized into topical statements of need/concern. This input and the results of the public survey, to which 245 people responded, are included.

The leading reasons (related to the built environment) that respondents report not walking more are:

- ❖ Live too far from destinations
- ❖ Poor sidewalk connectivity
- ❖ Not enough trails/off-street paths
- ❖ Concerns about personal safety in traffic

The leading reasons that respondents report not bicycling more are:

- ❖ Road shoulders are too narrow
- ❖ Concerns about personal safety in traffic
- ❖ Lack of on-street bike lanes

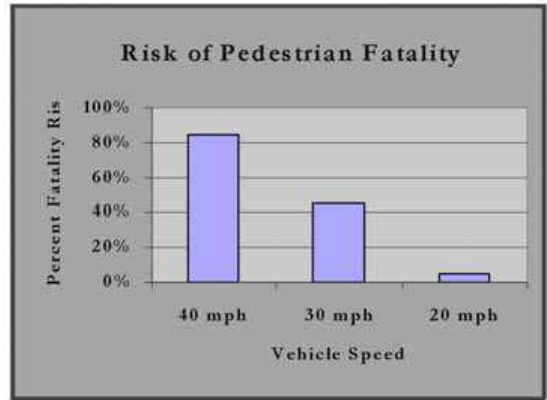
Chapter 4 discusses a brief history of bicycling and pedestrian planning in the Lakes Region.

Chapter 5 examines the existing conditions of the built environment in the Lakes Region as they affect pedestrian and bicycle safety and accessibility, and includes discussion of the potential for improvements to be made. Parking, intersections, crosswalk, trails, sidewalks, travel lanes, shoulder width, pavement conditions, and maps are all discussed. Research on pedestrian and bicycle safety and road design is also presented.

Overall, there are very few examples of best practices in traffic calming street designs in the Lakes Region, though there are some good examples of pedestrian oriented enhancements to local streets, and some exceptional off-street multi-use trail resources throughout the region.

Moderate to high speed rural roads, with fair to poor pavement conditions and minimal shoulder widths, dominate the region. A map of shoulder widths on major roads in the Lakes Region was developed with this plan to provide a visual portrayal. This map is enclosed at the back of this plan. A map of pavement conditions created by the New Hampshire Department of Transportation (NHDOT) also shows pavement conditions in the Lakes Region (p. 35).

Research has shown that vehicle speed is the leading factor in collision rates and pedestrian fatalities. Small reductions in speed yield exponential reductions in crash fatality rates as shown in the adjacent figure. Infrastructure improvements that slow vehicle speeds through design while adding space for pedestrians and bicycles can improve safety and accessibility for all.



Research has also shown that narrower lane widths can accommodate motor vehicle traffic as safely, and in some cases, more safely, than wider lane widths that are so common in the Lakes Region. That research is presented in Chapter 5 along with examples of successful lane allocation modifications that have been supported by NHDOT in recent years. LRPC research also found that on-street parking stalls have been located within 20 feet of crosswalks at intersections in many Lakes Region communities. This practice is hazardous to pedestrians and violates state law that requires on-street parking to be at least 20 feet from crosswalks at intersections.

Site-specific recommendations and conceptual design improvements for 15 locations in the Lakes Region are presented in a supplementary document to this plan titled, *Bicycling and Walking: Design Supplement*, in order to graphically represent the potential for bicycle and pedestrian accessibility and safety improvements that exists throughout the region. The conceptual improvements presented address many of the elements of the built environment that are discussed in Chapter 5. The *Design Supplement* was created to provide informative examples that may be useful in considering how other locations with safety and accessibility challenges may be improved.



***Conceptual rendering of a lane width modification along NH Route 113 in Holderness. Existing 11½ - 12 foot lane is shown above. Proposed improvement with 10½ - 11 foot lanes using existing pavement is shown below, with added ‘Share the Road’ signage.***

Chapter 6 presents research on the economic benefits of walking and bicycling. Recent research on the effects of pedestrian and bicycle infrastructure projects on employment indicates that such projects create 25 percent more jobs per \$1 million in costs than road infrastructure projects, a result of a higher proportion of labor to material costs. It also showed that road projects that include pedestrian or bicycle facilities created 13 percent more jobs per dollar than road projects alone (see table below). A VTrans (Vermont’s transportation agency) study showed that current walking and biking activity is associated with between \$34 and \$84 million in annual costs avoided by replacing driving with active transportation. It concludes that an increase in walking and biking will have a net positive impact on the state’s economy.

*Jobs created within state per \$1 million by infrastructure project type<sup>1</sup>*

Project Type	Number of projects	Direct jobs per \$1 million	Indirect jobs per \$1 million	Induced jobs per \$1 million	Total jobs per \$1 million
Total, all projects	58	4.69	2.12	2.15	8.96
Bicycle infrastructure only	4	6.00	2.40	3.01	11.41
Off-street multi-use trails	9	5.09	2.21	2.27	9.57
On-street bicycle and pedestrian facilities (without road construction)	2	4.20	2.20	2.02	8.42
Pedestrian infrastructure only	10	5.18	2.33	2.40	9.91
Road infrastructure with bicycle and pedestrian facilities	13	4.32	2.21	2.00	8.53
Road infrastructure with pedestrian facilities	9	4.58	1.82	2.01	8.42
Road infrastructure only (no bike or pedestrian facilities)	11	4.06	1.86	1.83	7.75

In fall of 2011, the Belknap County Economic Development Council conducted a study, *Economic Impact Analysis of the WOW Trail*, of the potential economic impacts that the completion of the WOW Trail and its future linkage with the Northern Rail Trail could have for the region. The study determined that completion of all phases of the WOW Trail would create 74 temporary jobs over all phases of construction, including Phase I, which is complete. BCEDC estimated that the WOW Trail, as proposed, would generate \$1.79 million annually in new visitor spending in Belknap County, which would create 31 new permanent jobs paying \$780,000 in annual earnings.

Chapter 7 proposed recommendations that will help LRPC support future bicycling and walking, ultimately through improvements to the built environment that create more complete streets to safely accommodate pedestrians and bicycles.

<sup>1</sup> Heidi Garrett-Peltier “Pedestrian and Bicycle Infrastructure: A National Study of Employment Impacts,” Political Economy Research Institute, University of Massachusetts, Amherst, June 2011

## CHAPTER 1: CONTEXT

*Since January 2001, at least 10 pedestrians have been killed in collisions with motor vehicles in the Lakes Region according to official statistics available through June 2010, and media reporting of additional incidents through December 2011.<sup>2</sup>*

Planning for pedestrians and bicycles is often relegated to the realm of transportation planning, in part because of the implicit mobility of biking and walking. These are, after all, means of getting around. But pedestrian and bicycle transportation (often referred to as *non-motorized, active, or alternative* transportation) is not so easily assessed and planned for within a simple framework of transportation the way motor vehicle travel commonly is. All trips require a pedestrian element (walking at destinations and walking from origins to other modes of transportation.) Walking, or assisted mobility, is such a fundamental aspect of daily life and society that it is typically overlooked as a primary mode of transportation, as evidenced by the common reference to it as *alternative transportation*.

The reason that walking, or assisted mobility, is not so easily addressed under any one topic is that it is an inherent element of economic activity, recreation, physical and mental health, social interaction, and vibrant community. So inherent in fact that it is often not recognized as being foundational to these important societal elements. Consider the common example of the retail owner who is resistant to roadway improvements that reduce on street parking, only to report noticeable increases in visitation as a result of more inviting and comfortable public places. It is people who spend money, not cars. People are what our communities are built around, and providing for ways to bring ourselves and our services together, to work, to school, to the lake or park, library, café, post office or any other place is how we shape and nurture our communities.

To accommodate bicycle and pedestrian needs, we must properly acknowledge the fundamental roles that pedestrians and bicyclists play, regardless of how prominent our motor vehicle needs may be. We must also take seriously the concerns for personal safety that are expressed by many, and the dampening effect that these concerns have on economic activity, recreational opportunity, individual and family physical and mental health, social interaction, and our goals for vibrant communities.

Safe opportunities to move about our communities while not in cars must be provided for and thoughtfully considered. This plan outlines the case for continuation of the many good efforts to enhance pedestrian and bicycle resources that have been underway around the region, and presents the case for more deliberate consideration of our public streets as essential assets for supporting economic, physical, and social health of our communities.

### **Plan Purpose**

The intent of the *2012 Bicycling & Walking: Transportation Choices for NH's Lakes Region* plan is to build on what is presented in the *2006 Regional Bicycle and Pedestrian Plan*, and the achievements of

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<sup>2</sup> National Highway Transportation Safety Administration data through 2009, NH Department of Transportation data through June 2010, and review of regional newspaper reports of pedestrian fatalities through 2010 and 2011, of which two such incidents were found (September 2010 and December 2011).

communities and organizations of the last five years. That plan articulated a vision for bikeable and walkable communities and an inter-connected, off-road regional trail system. Interest in walkable and bikeable communities and non-motorized trail access remains a high priority in the region. This plan will outline regional planning considerations, and describe some of the existing barriers to safe, feasible, and enjoyable walking and biking that residents and visitors to the region encounter every day. This plan will also outline a detailed set of recommendations for achieving the vision.

A purpose of this Plan is to provide the framework to guide the policies of the LRPC related to bicycle and pedestrian planning. This framework will help LRPC develop comprehensive transportation plans that will include non-motorized transportation planning. It will help LRPC assess proposed bicycle and pedestrian projects, and provide input towards their conception, design, implementation, and use. The intent is also to raise awareness among local and state officials of the stated needs and priority interests of residents and visitors to the region related to bicycle and pedestrian safety and accessibility. Moreover, this plan is designed to be used by communities as a resource as they develop their own local bicycle and pedestrian plans. The Design Supplement includes conceptual designs for 15 specific locations in the region.

### **Geographic & Demographic Context**

The thirty (30) municipalities of the Lakes Region comprise a diverse area of land use and activities including many year-round outdoor recreational opportunities. Most of the lakes and ponds are surrounded by a mixture of resorts, summer cottages, second homes, and year-round homes. Many have roads that encircle them close to the shore. This mix of residential development transforms the smaller rural towns into busy and often traffic-congested communities during the peak summer tourist months. Along with the influx of motor vehicles, on-road cyclists can be seen pedaling circum-lake road-routes, and individuals, families and children are out in swollen numbers walking and biking to villages, recreational areas, shorefront destinations, and commercial and service centers.

Squam Lake and Lake Winnepesaukee split the Lakes Region into two parts, with eight (8) towns laying to the north and east of these lakes and the other twenty-two (22) towns to the west and south. The Region also borders the White Mountain National Forest to the north, including the Squam Mountains and the Sandwich Range. The Ossipee Mountains to the northeast of Lake Winnepesaukee, and the Belknap Mountains to the south of Lake Winnepesaukee create additional challenges for transportation through these areas. In the Lakes Region, as is the case throughout much of New Hampshire, north-south travel tends to be much easier than east-west travel, primarily because of natural barriers created by lakes and the orientation of the mountains. Consequently, there are many roads in the region where no convenient alternative exists for bicyclists and pedestrians to travel along safer, lower vehicle-volume routes.

The Lakes Region communities, like much of New Hampshire, are aging. The median age of year-round residents of the Lakes Region in 2010 was 45.2.<sup>3</sup> This is eight years (22.9 percent) older than the national median age of 37.2, and approximately five years older than the Lakes Region median age in 2000. It is also more than four years older than the state median age. The regional median age by town now ranges from over 55 in Hebron to just under 40 in Northfield. In addition to year-round residents, the Lakes Region is home to many thousands of summer seasonal residents, the

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<sup>3</sup> 2010 US Census – Median ages for all thirty communities were weighted by percent of regional population and summed.

majority of which are either families with young children or more elderly, retired people. According to a number of retired residents of a few communities, the Lakes Region is attracting more and more retirees from out of state who are seeking areas to retire to that offer outdoor and active recreational resources. The lack of a state income or sales tax may also be drawing elderly and/or retired people to the state. The number of older residents is significant to consider in this regional bicycle and pedestrian plan because safe and accessible walking and bicycling opportunities can support independent mobility longer than motor vehicle dependence for some, and can provide cumulative physical and mental health benefits and contribute to overall life-satisfaction and productive engagement in communities.

### **Planning History**

The New Hampshire Department of Transportation (NH DOT) developed the first bicycle and pedestrian plan for the state in the 1970s. This plan was updated first in 1995 and later in 2000. The New Hampshire Statewide Bicycle and Pedestrian Plan was developed as an element of the comprehensive *New Hampshire Long Range Statewide Transportation Plan*. Its purpose was to meet the requirements and needs for promoting all modes of transportation as established by the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991, and reaffirmed first by the Transportation Equity Act for the 21st Century (TEA-21) of 1998 and later by the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) of 2005.

The overall goal outlined in the 2000 New Hampshire Statewide Bicycle and Pedestrian Plan states that “The NHDOT recognizes supports and encourages bicycling and walking as alternatives to motorized forms of transportation and as an element of the state’s intermodal transportation system.” Although the Plan is an information resource for regional and local planning, its primary focus is on meeting the needs for bicycle and pedestrian planning at the state level. For example, the Plan discusses the need to connect major destinations throughout the state, and focuses on the ability of the state transportation system to do this. As such, the focus of the state plan is on improvements and strategies related to the numbered and unnumbered state routes throughout New Hampshire.

In spring 2001 the NH DOT released a new map of the “Statewide Bicycle Route System”. This map was developed through the New Hampshire Bicycle and Pedestrian Transportation Advisory Committee, an appointed group of public officials and organized bicyclists. Input from many experienced and locally knowledgeable cyclists was received during the informational meeting process and incorporated into the route map. The purpose of this map was to identify the best highway routes for bicyclists wishing to travel from one major destination to another. These maps do not, however, necessarily reflect the safest routes available. Although safety was a factor, logical transportation routes and distances were the primary considerations in determining these routes. The State and Regional Bicycle Routes Map provides a valuable tool from which to base bicycle planning in the Lakes Region.

The comprehensive transportation policy plan for the *Lakes Region, PLAN 2000*, was adopted by the Lakes Region Planning Commission in September 2000. The overarching principal of PLAN 2000 is “the provision of efficient multi-modal and inter-modal transportation systems which do not negatively impact the surrounding natural, social or historic environments.” Due to its comprehensive nature, PLAN 2000 addressed only improvement needs for the region at a very general level, identifying possible bike routes throughout the Region.



The 2006 plan highlighted the successful ways that communities in the Lakes Region have accommodated and promoted pedestrian and bicycle travel. It also articulated a vision for the successful completion of an inter-connected off-road multi-use pathway spanning the region, outlined a process for local pedestrian and bicycle planning, and discussed some of the important land use planning tools that can support implementation. While the vision and goals of the 2006 Plan are largely still relevant and appropriate, this comprehensive update includes an assessment of bicycle and pedestrian safety, accessibility, and facilities. It also includes an expanded public engagement process targeted at understanding the needs and concerns of residents of the region, and the development of a more comprehensive set of recommendations for the LRPC, communities, and others to consider.

In 2008, LRPC adopted an updated regional transportation plan. It includes a comprehensive set of recommendations, but did not address non-motorized needs in great detail. The *2012 Bicycling & Walking: Transportation Choices for NH's Lakes Region* plan is an important component of the regional transportation program and serves to augment the *2008 Transportation Plan* through consideration of non-motorized modes. See Appendix A for more detailed information on relevant state and regional planning efforts.

### **Why a Bicycle and Pedestrian Plan for the Lakes Region?**

An overarching reason to plan for walking and bicycling is because many people want to feel safer doing so in their communities. Families and individuals, young and old, recreational and utilitarian users across the region have expressed not only a sense of concern for personal safety and the safety of children, but have also expressed a strong desire for more walkable and livable communities. When people feel safe, and perceive walking and bicycling as enjoyable activities, they spend more time in public places, whether shopping, strolling, bicycling for fun or exercise, being with others, or simply enjoying the outdoors. Safe well-designed public places leverage desirable community activity, and they provide opportunities to off-set some other health and environmental impacts created in part by our dependence on motor-vehicles.

A number of compelling conditions have elevated the relevance of pedestrian and bicycle planning in the last five years. The 2006 plan discussed the importance of physical activity in mitigating health risks associated with a sedentary lifestyle. This is as true today as it was then. Obesity rates continued to climb, health insurance costs have increased by 30 percent,<sup>4</sup> and roughly twice as many people in the region are unemployed now (and therefore less likely to have any health insurance) than in 2006.<sup>5</sup> Data from the Center for Disease Control and Prevention in Figure 1 show the percentage of overweight and obese people in New Hampshire has climbed from less than 10 percent in 1987 to 25 percent in 2010 (29.4 percent among 10-17 year olds).<sup>6</sup> Between 1997 and 2010, the percentage of adults with diagnosed diabetes in New Hampshire increased by 75 percent, and between 2004 and 2008, there was been a decline in leisure-time physical activity in Belknap County. Lack of physical activity is the leading risk factor for obesity and diabetes.

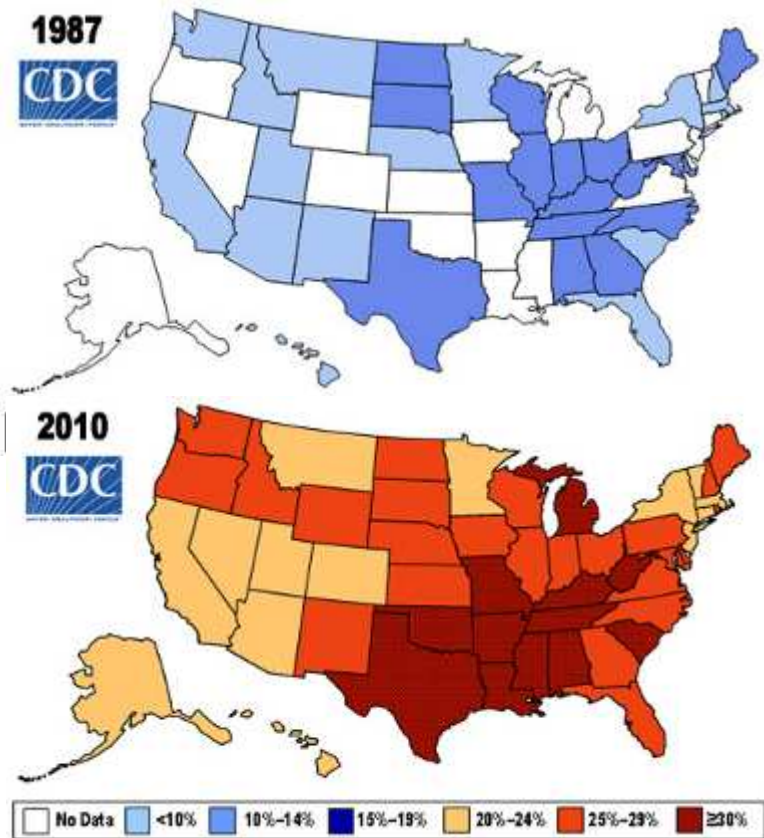
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<sup>4</sup> Kaiser/HRET Survey of Employer-Sponsored Health Benefits, 1999–2010.

<sup>5</sup> Data from NH Economic and Labor Market Information Bureau for the LRPC planning region. Accessed at: <http://nhnetwork.nhes.state.nh.us/nhnetwork/default.aspx>

<sup>6</sup> Data from CDCP. Accessed at: <http://www.cdc.gov/obesity/data/trends.html>

*Fig. 1 – Percent of people who are overweight or obese, by state.<sup>7</sup>*



Retail gasoline prices in October of 2011 were 33 percent higher in real terms than in January of 2006, and 143 percent higher than in January of 2002.<sup>8</sup> The price spike of late 2008 was so severe that transit ridership and bicycling in urban areas increased across the country in response. Nationally, price volatility and sustained high prices, combined with the floundering economy and job market have continued to support walking and bicycling as more affordable means of travel.

The Lakes Region is already a seasonal recreational tourism destination, and if villages of the region can accommodate safe and enjoyable walking and bicycling, local retailers and service providers could stand to benefit. The important concept behind this notion is that even though the majority of trips are by motor vehicle, people are more likely to make those trips if they perceive that they will enjoy the destination, and the pedestrian mode of these trips is more likely to be longer, i.e., more or longer visitation, if the destination is a safe and enjoyable place to walk. Similarly, if multi-use trails are completed between existing sections of trail, whether in active or abandoned rail corridors, or in laterally separated corridors along existing right-of-ways, the economic impacts could be important for multiple reasons. Research suggests that multi-use, non-motorized trails can have statistically significant positive impacts on real estate value,<sup>9</sup> and completion of connections between existing

<sup>7</sup> Obesity trends published by the Center for Disease Control. Available at:

<http://www.cdc.gov/obesity/data/trends.html>

<sup>8</sup> U.S. Energy Information Administration Short Term Energy Outlook Real Prices Viewer. Accessed at :

<http://www.eia.gov/forecasts/steo/realprices/>

trails in the region could yield continuous off-road routes of over 50 miles. Long distance trails in destinations like the Lakes Region can draw visitors from outside the region for day trips, or, due to the addition of recreational resources, can support and enhance longer duration visitation.

Environmental protection is another important benefit to accommodating bicycling and walking in the Lakes Region. Asthma is a serious public health concern in New Hampshire, where rates are among the highest in the nation despite being ranked 21<sup>st</sup> in population density. With 28 percent of all trips in the US less than one mile, and 40 percent less than two miles, the potential for walking and bicycling to replace motor vehicle use for short trips and mitigate local impacts to air quality pollution and public health risks is staggering.

Short trips have a proportionately larger impact on both particulate and greenhouse gas emissions due to the inefficient combustions that occur in cold engines. This vastly skewed mode share of all trips under two miles, nationally, is evident in the table below:

*Table 1 – Mode share of short trips, nationally<sup>10</sup>*

	1 mile or less	2 miles or less
Percent of all trips	28	40
Percent <b>walked</b>	35	2.25
Percent <b>biked</b>	26	2
Percent <b>driven</b>	60	68

The environmental impacts of prioritizing funding for motor vehicles as primary modes of transportation, when so many short trips could be made by bike, assisted device, or by foot are significant.

As an aging population, the residents of the Lakes Region include year-round residents and retirees from elsewhere. The median age of year-round residents has increased from the low to mid 30's in 1980 to over 45 in 2010, and that does not necessarily include seasonal residents who spend winters elsewhere. Safe and accessible transit and walking opportunities can make aging in place a significantly more feasible option for elderly residents. Walking helps preserve health and wellness which can prolong independent mobility. The longer elderly residents can live in communities, the longer they can contribute to the local economy as essential consumers and workers. The aging characteristics of the Lakes Region make pedestrian and bicycle planning an important component of maximizing regional mobility.

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<sup>9</sup> David P. Racca and Amardeep Dhanju. *Project Report for Property Value/Desirability Effects of Bike Paths Adjacent to Residential Areas*. Prepared for Delaware Center For Transportation and The State of Delaware Department of 5 Transportation. Center for Applied Demography & Survey Research, College of Human Services, Education, and Public Policy University of Delaware. November, 2006.

<sup>10</sup> From the 2009 National Household Travel Survey

## CHAPTER 2: A VISION FOR A BIKEABLE & WALKABLE REGION

*“Livability means being able to take your kids to school, go to work, see a doctor, drop by the grocery store or post office, go out to dinner and a movie, and play with your kids in the park—all without having to get in your car.”*

~U.S. Transportation Secretary, Ray LaHood

### **Revising the Vision**

The vision statement of the 2006 Plan was revised based on review and discussion at five public meetings held throughout the region in the Fall of 2011, feedback from the Lakes Region Transportation Advisory Committee, and input from a regional caucus of planners and stakeholders, described in Chapter 3.

The 2006 Vision:

*“Bicycle and pedestrian travel throughout the Lakes Region in an environment where those modes are feasible, convenient, and safe transportation choices.”*

Meeting participants generally agreed with the vision statement from 2006 but wanted it to convey the importance of personal comfort and enjoyment derived from being able to safely and easily walk and bike. Concerns were also expressed with how ‘travel’ and ‘transportation’ were emphasized in the 2006 vision. While biking and walking can always be viewed as travel and transportation, these terms may suggest a purely utilitarian idea of biking and walking. The term ‘mobility’ is considered to be a more inclusive term that does not suggest any one purpose.

Additionally, participants agreed that their vision was of an environment where biking and walking were actively promoted or deliberately supported through design and function, and that the many elements of a non-motorized pathway network be explicitly included as part of the vision. This was mainly a reflection of participants’ perception that the 2006 Plan focused primarily on improving the multi-use trails of the region. Lastly, the majority of participants found the use of the word ‘feasible’ to be confusing, assuming that it implied that the vision was for bicycle and pedestrian accommodation *only where feasible*. While the term ‘feasible’ was used in 2006 to indicate a vision for an environment where biking and walking is a feasible option, most participants who critiqued the 2006 vision felt that a safe and enjoyable network necessarily included feasible options to walk and bike.

### **The 2012 Vision**

***A purposefully connected network of trails, sidewalks, road shoulders, and markings promoting safe and enjoyable bicycle and pedestrian mobility. Design and maintenance of livable, complete streets that support transportation, recreation, health, and economic interests throughout the Lakes Region.***

This plan is designed to achieve the Vision by promoting safe bicycle and pedestrian mobility throughout the Region while supporting the construction of inter and intra-town pathway systems by providing the public and non-public sectors with guidance and data for funding, design concepts, and technical contacts.

### **Clarification of the Vision Statement**

**Safe:** Bicycle and pedestrian travel becomes safe when motor vehicle hazards to non-motorized users have been minimized, when problem areas along the network have been addressed through the provision of adequate space or corrections to design, when built sections have been connected, non-motorized and motorized users have been educated, and enforcement is an on-going process.

**Enjoyable:** Bicycle and pedestrian travel becomes enjoyable when it is safe, and when it is apparent to the user that pedestrian and bicycle needs have been thoughtfully considered in the design, construction and maintenance of the pathway network, particularly with regard to exposure to motor vehicle hazards, and when useful signage and informational materials have been provided that identify routes, hazards, and helpful contextual information.

The Vision is supported by the following goals and objectives. Recommendations in support of the goals and that build on the objectives are included in Chapter 6.

**Goal One:** *Ensure an on-going bicycle and pedestrian education and information program:*

1. Support local and statewide educational and incentive programs that encourage people of all ages to walk and to ride bicycles for health and mobility
2. Educate and encourage Lakes Region communities to construct off-road and on-road bicycle and pedestrian facilities, such as the Lakes Region Connector, and to improve connections to state and regional routes
3. Provide Lakes Region communities with information and materials on land use strategies and regulations which address bicycle safety and usage
4. Provide communities with information and materials on design strategies and standards which address bicycle safety and usage
5. Provide communities and stakeholders with useful regional walking and bicycling maps and information

**Goal Two:** *Ensure a continuous and comprehensive process of Bicycle and Pedestrian data collection:*

1. Communicate with, and assist Lakes Region communities with collecting accident, geographic, trip and other related data
2. Maintain research files on bicycle and pedestrian related information
3. Coordinate data collection with other governmental and non-governmental organizations

**Goal Three:** *Ensure an on-going process for inter-agency (federal, state, local, and non-profit) communication and partnering of bicycle and pedestrian issues:*

1. Participate in the NH DOT statewide Bicycle and Pedestrian Advisory Committee Process
2. Use the Lakes Region Transportation Technical Advisory Committee (TAC) as an opportunity to communicate with local communities about transportation

3. Maintain the Lakes Region Bicycle and Pedestrian Advisory Committee as a standing committee to the Transportation Advisory Committee to monitor plan recommendations on an annual basis, and to update the plan at least every 4-5 years
4. Act as a facilitator to share best practices between communities and state and federal agencies

**Goal Four:** *Ensure that there are opportunities for the safe movement of non-motorized modes of travel, and ensure a continuous, comprehensive program which first addresses the most viable on-road and off-road routes:*

1. Support local programs and education that are designed to reduce the number of bicycle and pedestrian accidents, injuries, and fatalities, particularly those that involve motorists
2. Coordinate with the NH DOT Statewide Advisory Board on Bicycle and Pedestrian Safety to ensure that standards and policies developed at the state level are locally implemented. Support and encourage efforts of the NHDOT Design and Maintenance Departments, and local Public Works Department to increase bicycle infrastructure
3. Support efforts to complete off-road and on-road, bicycle and pedestrian projects
4. Support efforts to make our communities walkable
5. Support a policy of creating usable shoulder widths for bicycles and pedestrians on rural roads

**Goal Five:** *Ensure the preservation and enhancement of local and state enforcement efforts:*

1. Support statewide initiatives to create reasonable and effective enforcement legislation
2. Communicate to state and local enforcement agencies the need to enforce the legal aspects of bicycle and pedestrian issues including driver behavior and safety

## CHAPTER 3: PLAN DEVELOPMENT PROCESS

The development of the *2012 Regional Bicycle and Pedestrian Plan* began in the winter of 2010 when the LRPC convened a caucus of regional stakeholders to review the 2006 plan and provide recommendations on the approach to developing a new plan. The caucus included municipal planning and recreation staff, regional trail organizations, representatives from the Bike/Walk Alliance of NH, a regional public health partnership, a NH legislator, and bicycling advocates.

An update of the 2006 plan was viewed as an important step to enhancing the existing bicycle and pedestrian network and promoting the Lakes Region as a biking and walking destination. LRPC's vision is to have a plan that is used by community leaders, public officials, regional tourism agencies and biking and walking enthusiasts in order to promote walking and biking as viable and healthy mobility options, and to promote the development and preservation of suitable infrastructure for safety and enjoyment.

Caucus attendees assessed the region's strengths and weaknesses with respect to biking and walking and discussed perceived opportunities and threats that could improve or further compromise existing accessibility. Some of the key concepts that emerged from the caucus included:

- ❖ The need for a more informative regional bicycling and walking map
- ❖ Web-based plan information
- ❖ Accurate assessment of biking and walking conditions
- ❖ Prioritization of routes to be addressed in upcoming projects
- ❖ Analysis of the economic impacts of a strong bicycle/pedestrian network
- ❖ A plan that addresses the needs of all types of users
- ❖ Linkages between nodes along appropriate corridors
- ❖ Importance of non-motorized access to transit
- ❖ Wider road shoulders along major routes and around the lakes
- ❖ Support for local bicycle and pedestrian plans
- ❖ Need to address gaps and poorly functioning facilities in the existing network
- ❖ Need for improved signage in communities and along best routes

### **Public Meetings on Needs and Concerns**

The LRPC coordinated a series of sub-regional public meetings in the Fall of 2011 in order to understand priority concerns of residents and community representatives. LRPC partnered with Lakes Region Listens, a local volunteer organization of professionals dedicated to strengthening citizen involvement in public issues. Meetings were publicized through press releases in local and regional newspapers, radio announcements, website postings, and through email distribution to regional organizations, recreational groups, advocacy groups, public health partnerships, bike/walk/run businesses, and municipal recreation, planning, public works, and administrative

staff. Meetings were also announced as part of a separate public survey that was administered for data collection and public input purposes (see below).

Meetings in 2011 were held at:

Wolfeboro Public Library – November 3 @ 6:00 PM  
Cook Memorial Library, Tamworth – November 8 @ 6:00 PM  
Bridgewater Town Hall – November 9 @ 6:30 PM  
Belmont Corner Meeting House – November 10 @ 6:30 PM  
Laconia Athletic and Swim Club – November 14 @ 12:00 PM

Over 70 people attended the five public meetings where facilitators helped summarize the needs and concerns of participants into succinct summary statements. Participants were then asked to affirm whether the summary statements accurately characterized their particular expressed concern. The resulting summary statements are included in Chapter 4, Use Trends, Needs, and Planning Goals.

Once ideas had been shared, checked for accuracy and summarized, facilitators asked participants to review the vision statement of the 2006 Plan and consider whether it adequately characterized a future environment in which their stated needs have been met. The 2012 Vision statement reflects their responses.

### **Public Survey**

An internet based survey was designed to collect data on biking and walking, and to provide an opportunity for those who could not attend the public meetings to be able to provide input on biking and walking in the region. The survey was publicized similarly to the meetings.

The survey was open for six weeks from late October through November. In that time frame, 245 responses were received. Survey questions were designed to understand:

- ❖ What **destinations** people bike and/or walk to
- ❖ For what **purposes** people bike and/or walk
- ❖ The **frequency** people bike and/or walk for those purposes
- ❖ The **time/distance** people bike and/or walk for those purposes
- ❖ What **facilities** people use to bike and/or walk
- ❖ What **prevents** people from biking and/or walking more
- ❖ What would **encourage** people to bike and/or walk more

Specific survey results are discussed in detail in Chapter 4, where they serve to highlight existing conditions and views about walking and bicycling. The complete survey results can be found in Appendix B.



### Design Concepts

In support of a more comprehensive assessment of the existing conditions for bicycling and walking, LRPC solicited nominations from member municipalities for sites throughout the region that were particularly unsafe or poorly accommodate pedestrians and bicycles. The intent was to highlight a number of sites that are representative of different kinds of design problems, and that may share commonalities with many other sites in terms of existing barriers to safe and enjoyable accessibility as well as potential solutions.

Respondents were asked to nominate intersections, road segments, network connectivity gaps, or trail related sites that were either unsafe or presented access challenges. LRPC asked for a descriptive narrative and for supportive documentation that would help describe and characterize the sites. LRPC emphasized that sites that were of regional significance would be prioritized for review.

As part of the effort to characterize existing conditions in the Lakes Region, LRPC engaged Resource Systems Group, Inc., a transportation planning firm with offices in Concord, NH, and Ironwood Design Group, LLC, a landscape architecture, urban design, and environmental planning firm located in Exeter, NH, to assess bicycle and pedestrian access and safety improvements in 15 municipalities in the Lakes Region and provide graphics depicting conceptual solutions at 15 of 36 sites that were nominated. Site selections were made by LRPC transportation staff and were based on the following criteria:

- ❖ Regional importance
- ❖ Geographic distribution
- ❖ Severity of existing conditions
- ❖ Nature of sites (trail, sidewalk, intersection, right-of way constraint, etc.)

Consideration was given to a balanced selection of rural and urban sites when developing a priority list of sites. LRPC staff and consultants teamed with municipal officials in conducting field assessments at each location. The team of engineering and design professionals assessed each of the sites that were selected. Sites were visited over three days with LRPC staff and local representatives familiar with the particular challenges to safe and enjoyable biking and walking. Following site visits, the team met to review findings and discuss conceptual solutions that would address the challenges that were observed and conveyed by local stakeholders.

Detailed site analysis and design improvement recommendations are presented in a special supplement to this report titled, *Bicycling & Walking: Design Supplement*. It contains detailed narrative assessment of existing conditions at each of the 15 sites, and discussion of conceptual design improvements that address the accessibility and safety problems at each site. Existing conditions are depicted with photographs, and conceptual designs are illustrated to show how pedestrian and bicycle safety and access could be improved. The challenges present at these sites are related to many of the topics discussed in Chapter 5 (Existing Conditions – The Built Environment) and help to highlight the conditions that must be addressed in order to be more walkable and bikeable, and livable.

CHAPTER 4:  
USE TRENDS & PUBLIC INPUT

A comprehensive assessment of existing conditions cannot be limited to the built environment alone, but must include existing policies, usage trends, stated needs, and established goals. Together with the built environment, these factors help to illustrate current conditions affecting bicycling and pedestrian accessibility in the Lakes Region. A comprehensive understanding of existing conditions is what informs the recommendations of this plan in Chapter 7.

**NH and US Data and Policies**

1990 and 2000 US Census data show that the proportion of residents who used bicycle or pedestrian transportation as their primary commuting mode of travel was 3.8 percent and 2.9 percent, respectively. Data for commuting modes were not included in the 2010 Census, but the 2010 3-Year American Community Survey (ACS) for Belknap County suggests that bicycling and walking for commuting have not increased in percentage over other travel means. However, exercise walking remains the nation's number one recreational activity, and bicycling is considered to be the seventh behind walking, swimming, camping, fishing, exercising with equipment and bowling. While bicycle sales have been steady since 2003, a much more diverse range of bicycles is being marketed to a much wider range of consumers than ever before. In that sense, a more specialized bicycle market may be setting the stage for growth in users that are now being directly marketed to.

A 2010 report completed by The Alliance for Biking & Walking includes state and national statistics on biking, walking, and allocation of transportation dollars.<sup>11</sup> Some of these data are presented in Table 2.

***Table 2 – NH and US data***

<b>New Hampshire</b>	<b>National</b>
Percent of All Trips by Bicycle or Pedestrian <sup>12</sup>	
<b>7.8 percent</b>	<b>9.6 percent</b>
Percent of all Traffic Fatalities that are Bicyclists or Pedestrians	
<b>7.6 percent</b>	<b>13.0 percent</b>
Percent of Federal Transportation Dollars Spent on Bike/Ped	
<b>3.1 percent</b>	<b>1.2 percent</b>
Percent of Federal Safety Dollars Spent on Bike/Ped <sup>13</sup>	
<b>0.8 percent</b>	<b>0.6 percent</b>
Percent of Safe Routes to School Funding Obligated	
<b>14.1 percent</b>	<b>47.0 percent</b>

<sup>11</sup> The *Bicycling & Walking in the United States 2010 Benchmarking Report*, along with the 2012 report are available at The Alliance for Bicycling & Walking at: [www.peoplepoweredmovement.org/site/index.php/site/memberservices/C529](http://www.peoplepoweredmovement.org/site/index.php/site/memberservices/C529)

<sup>12</sup> 2009 National Household Travel Survey

<sup>13</sup> *Federal Highway Administration (FY08 Highway Safety Improvement Program and FY08 Section 402 Funding)*

These data show a significant gap between the proportion of all fatalities that are pedestrians and bicyclists, and the proportion of funding that is being allocated to pedestrian and bicycle projects and safety improvements in New Hampshire (though it is a higher percentage than is spent nationally). The 2011 NH Highway Safety Agency's Strategic Action Plan for 2011 includes the following safety performance measures. Nine of the ten are fatality-based metrics:

### **Safety Performance Measures – NH Highway Safety Agency's Strategic Action Plan for 2011**

- C-1 *Traffic Fatalities (FARS)*. To decrease traffic fatalities 10 percent from the 2008 calendar base year of 138 to 125 by December 31, 2010.
- C-2 *Serious Traffic Injuries (State Crash Data)*. To decrease serious traffic injuries 5 percent from the 2008 calendar base year of 13,674 to 12,991 by December 31, 2010.
- C-3 a) *Mileage Death Rate (FARS)*. To decrease the mileage death rate from the 2007 calendar base year of .96 to .90 by December 31, 2010.  
b) *Rural Mileage Death Rate (FARS)*. To decrease the rural mileage death rate from the 2007 calendar base year of 1.77 to 1.50 by December 31, 2010.  
c) *Urban Mileage Death Rate (FARS)*. To decrease the urban mileage death rate from the 2007 calendar base year of .32 to .29 by December 31, 2010.
- C-4 *Unrestrained Passenger Vehicle Occupant Fatalities (FARS)*. To decrease unrestrained passenger vehicle occupant fatalities 10 percent from the 2008 calendar base year of 71 to 64 by December 31, 2010.
- C-5 *Alcohol Impaired Driving Fatalities (FARS @ .08 and above)*. To decrease alcohol impaired driving fatalities 10 percent from the 2008 calendar base year of 45 to 40 by December 31, 2010.
- C-6 *Speeding Related Fatalities (FARS)*. To decrease speeding-related fatalities 10 percent from the 2008 calendar base year of 40 to 36 by December 31, 2010.
- C-7 *Motorcyclist Fatalities (FARS)*. To decrease motorcyclist fatalities 10 percent from the 2008 calendar base year of 29 to 26 by December 31, 2010.
- C-8 *Unhelmeted Motorcyclist Fatalities (FARS)*. To decrease unhelmeted motorcyclist fatalities 20 percent from the 2008 calendar base year of 18 to 14 by December 31, 2010.
- C-9 *Driver Age 20 or Younger Involved in Fatal Crashes (FARS)*. To decrease drivers age 20 or younger involved in fatal crashes 10 percent from the 2007 calendar base year of 23 to 20 by December 31, 2010.
- C-10 *Pedestrian Fatalities (FARS)*. To reduce pedestrian fatalities 10 percent from the 2008 calendar base year of 9 to 8 by December 31, 2010.

Despite a stated goal of reducing motor vehicle and pedestrian fatalities by 10 percent *each*, only 3.1 percent of funding is spent on bicycle and pedestrian projects in New Hampshire, though this is well above the national average of 1.2 percent. The state's performance measures include goals for reducing the mileage death rates for vehicles, not for pedestrians and bicyclists. However, on a per mile basis, bicyclists are three times more likely to be killed in collisions with motor vehicles than are drivers of motor vehicles.<sup>14</sup> In New Hampshire, pedestrians are evenly-represented in crash data, with 7.6 percent of fatalities and 7.8 percent of all trips, but there is no reliable source of exposure data to indicate risk of death on a per mile basis—transportation professionals don't have an accurate sense of how many miles people walk each year, or how many minutes or hours people spend walking or crossing the street (and thus how long they are exposed to motor vehicle traffic, for example). However, pedestrians are generally considered to be more at risk than bicyclists because they are less maneuverable and are often traveling perpendicular to motor vehicle traffic.

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<sup>14</sup> *Traffic Safety Facts 1997*, National Highway Transportation Safety Administration

If fatalities are the indicator by which we measure safety, it may make more sense to consider a goal or reducing *collisions* with pedestrians and bicyclists, given the increased odds that such collisions will be fatal. As shown in Table 3, on average, one in 15 pedestrian collisions will be fatal, one in 71 for bicyclists, and one in 108 for motor vehicle drivers.<sup>15</sup> Bicyclists are also more than twice as likely to be killed in collisions than motor vehicle drivers on a per mile basis.

**Table 3 - Odds of death vs. injury for collisions with motor vehicles, 1997**

Vehicle	Deaths	Injuries	Odds
Bus	17	17,000	1 in 1000
Car, Station Wagon	21,969	2,378,000	1 in 108
Pickup, SUV, Van	10,224	768,000	1 in 75
Bicycle	813	58,000	1 in 71
Large Truck	717	31,000	1 in 43
Motorcycle, Motorbike	2,106	54,000	1 in 26
On Foot	5,307	77,000	1 in 15

**Concerns Expressed Through Public Meetings and Survey**

The summary need/concern statements that were generated through the public meeting process are included here. Many of these statements represent expressions of concern that were shared by multiple people at all five meetings. The large set of summary statements provided below, helped to define five broad topical areas to target planning recommendations – Design & Function, Connectivity & Opportunities, Information & Planning, Education & Enforcement, and Funding & Policy.



**Fig. 2 - Sample of notes from public meetings**

Information and Plans

- 1) Economic benefits of trails and walkable communities are poorly understood
- 2) People are unaware of existing trail and walking resources
- 3) Communication with residents about NH DOT paving schedule is poor
- 4) Signage indicating safe routes through regional and village centers for road cycling is poor
- 5) Decision makers need to be better informed about resident priorities and economic benefits of walkable and bikeable communities
- 6) Untapped local knowledge could help

<sup>15</sup> *Traffic Safety Facts 1997*, National Highway Transportation Safety Administration Charts C

- inform route identification and map development
- 7) Selectmen and road agents need information about right-of-way designs that can calm traffic and that will be approved by NHDOT
  - 8) information on what NHDOT is responsible for on state roads
  - 9) Need for examples of model local pedestrian and bicycle plans for reference
  - 10) Need for useful regional maps that show gradation of safe routes to unsafe
  - 11) Need for regional walking resource/destination map
  - 12) Need to identify most dangerous locations/conditions in all thirty communities

### Funding & Policy

- 1) New sources of funding for projects need to be identified
- 2) Municipalities' and NHDOT refusal to agree to maintain new proposed sidewalks is leading to their removal from concept plans
- 3) Snow clearing on sidewalks is poor and unsafe for pedestrians and wheelchairs in most places
- 4) Limited funding due to mis-proportioned/misaligned allocation federal and state allocation
- 5) Maintenance inconsistencies exist between rural areas and Urban Compact Districts
- 6) Competing needs for same pool of funds
- 7) Need for local comprehensive plans as well as regional plans

### Design & Function

- 1) Cycling space is needed for circum-lake routes that are popular and that could draw more visitation and/or events
- 2) Transit routes need shoulder space for safety of demand response service
- 3) Paths and walking routes to schools need adequate lighting
- 4) Existing sidewalk infrastructure does not meet ADA access in urban areas for passing and safe crossing in wheelchairs. Designs are haphazard and inconsistent, with huge curb cuts, and dangerous out-slopes and tip-downs at intersections
- 5) Summer parking demand is creating traffic congestion and hazards for bikes and pedestrians
- 6) Little use of traffic calming measures anywhere in the region
- 7) Recreational events require more police and road closures to mitigate unsafe conditions
- 8) Some routes have severe space constraints and no reasonable alternative route for miles due to geography
- 9) Intersections are designed for cars and are not minimizing pedestrian hazards
- 10) No signed on-street bike lanes anywhere in region
- 11) Travel lane space allocation created by 12-foot or greater lanes promotes excessive speeds
- 12) Pavement conditions are poor for riding in many places
- 13) Crosswalks have poor line-of-sight and have unsafe landings in many places
- 14) Parking stalls have been striped too close to crosswalks and intersections in violation of state law in many communities
- 15) Observed speeds do not align with road conditions and settlement characteristics
- 16) Lack of adequate (or maximized) shoulder space due to pavement width or striping
- 17) Plastic road paint is a hazard to cyclists when wet

### Education/Enforcement

- 1) *Share the Road* signs needed along narrow and busy corridors, but sign requests are evaluated by NHDOT based on road design/function criteria rather than on informational needs

- 2) School-based riding and walking trainings for children and adults are needed
- 3) Landowners need to be educated on the benefits of expanded right-of-way to accommodate bicycles and pedestrians
- 4) Personal safety on trails is a concern for some
- 5) Visitors are surprised by bicycles and pedestrians in the road
- 6) Tourists drive aggressively, trucks and commercial drivers often pass too close, and other drivers are fearful of cyclists and pass too widely
- 7) Wood chip trucks present a hazard for road cyclists
- 8) Pedestrians and bikes often use incorrect side of road

### Connectivity/Opportunities

- 1) Need more transit options to increase mobility
- 2) Connectivity between existing multi-use trails is limited
- 3) Need to identify low-cost, feasible connections as opposed to shortest route infrastructure
- 4) Connectivity to outlying areas is poor but people walk along non-existent road shoulders all the time because it is the only place for them
- 5) Not enough family friendly bike routes through communities
- 6) Connections between trails and transit do not exist but could be made
- 7) Seniors and children are not walking much to schools and within the community but say they would if conditions were safer and if it were possible
- 8) Lack of safe pedestrian connections between neighborhoods and popular destinations
- 9) Poor connectivity of existing sidewalks and trail systems
- 10) Need for additional and improved off-street multi-use trails to support economic development as well as travel options

### **Bicycle and Pedestrian Data Collection**

A stated goal of the 2006 Plan was a comprehensive program of bicycle and pedestrian data collection. LRPC has not collected any such data other than the 2011 survey data on use and attitudes. LRPC recently acquired bicycle/pedestrian counters which will aid municipalities with detailed bicycle and pedestrian counts.

### *Fall 2011 Survey*

Some of the key findings of the Fall 2011 comprehensive public survey on bicycling and walking behavior are as follows:

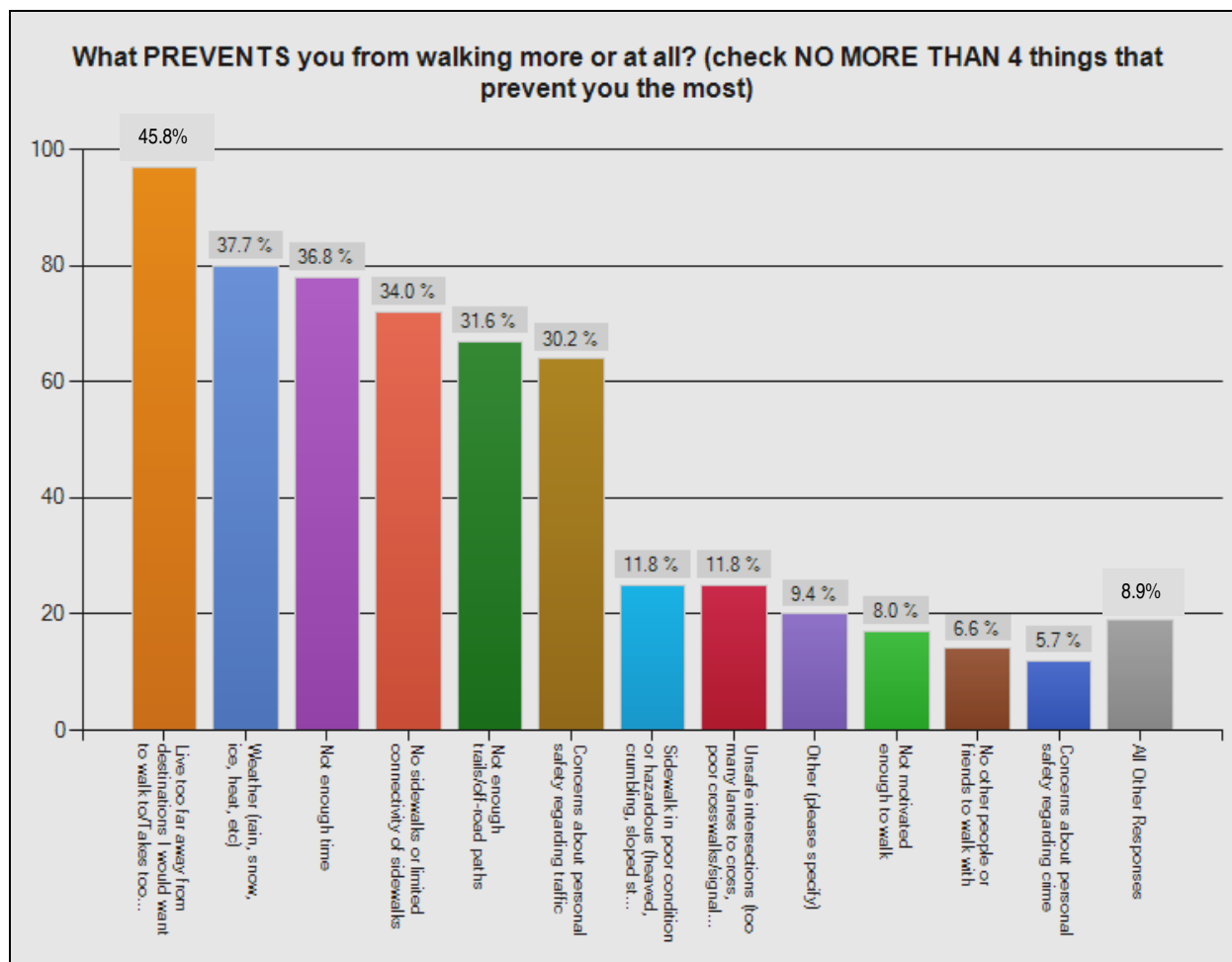
### Respondent Data

- ❖ 245 responses were received
- ❖ 67 percent of respondents were 50 or older
- ❖ No children and only 11 people under age 30 replied
- ❖ 28 percent of respondents were from Laconia or Wolfeboro

### Walking Data

- ❖ The leading factors preventing respondents from walking more were living too far from destinations, weather, and lack of time.

- ❖ The leading infrastructure related factors preventing respondents from walking more were lack of sidewalks (at all or limited connectivity), lack of trails, and concerns about motor vehicle hazards

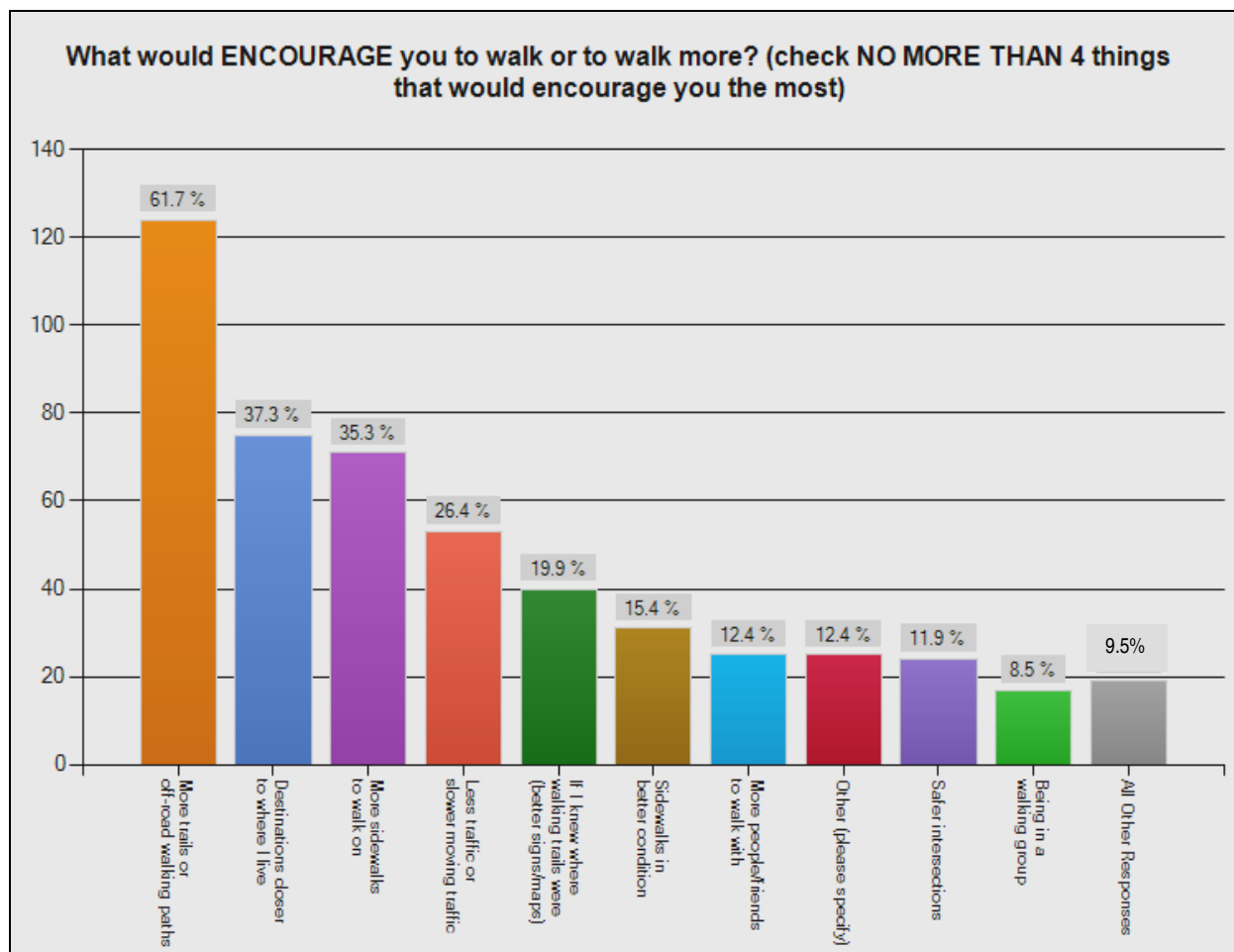


**Fig. 3 – Survey results on barriers to walking**

- ❖ While the frequency of bicycling trips is noticeably lower in winter, there is very little difference between the frequency of walking trips made in winter and summer
- ❖ 70-80 percent of respondents indicate that they walk for recreation or exercise multiple times per week. This is by far the leading purpose for all walking trips.
- ❖ The most common reasons cited for walking were for exercise, to be outdoors, to relieve stress, and to spend time with others
- ❖ The most common destinations people walk to are to a park or the woods, to a multi-use trail, and along a regular walking route
- ❖ The most common type of facility people use for walking is a multi-use trail (67 percent), followed closely by road shoulders (53 percent). However, 28 percent of respondents were from Wolfeboro or Laconia, communities that have multi-use trails connecting to their downtowns. This suggests that in the absence of trail networks, the road shoulder is the most common

pedestrian facility. This makes sense since sidewalks tend to only exist within urbanized settings, and not in outlying areas, many people live.

- ❖ 42 percent of respondents report walking on sidewalks, a figure that is likely skewed by the high percentage of respondents from Laconia and Wolfeboro
- ❖ The leading infrastructure related factors that would encourage respondents to walk more were more off-street trails or multi-use paths (62 percent reporting), more sidewalks (35 percent reporting), and calmer traffic (26 percent reporting)
- ❖ 67 percent of respondents walk two or more miles per average recreational/exercise outing



**Fig. 4 – Survey results on support for walking**

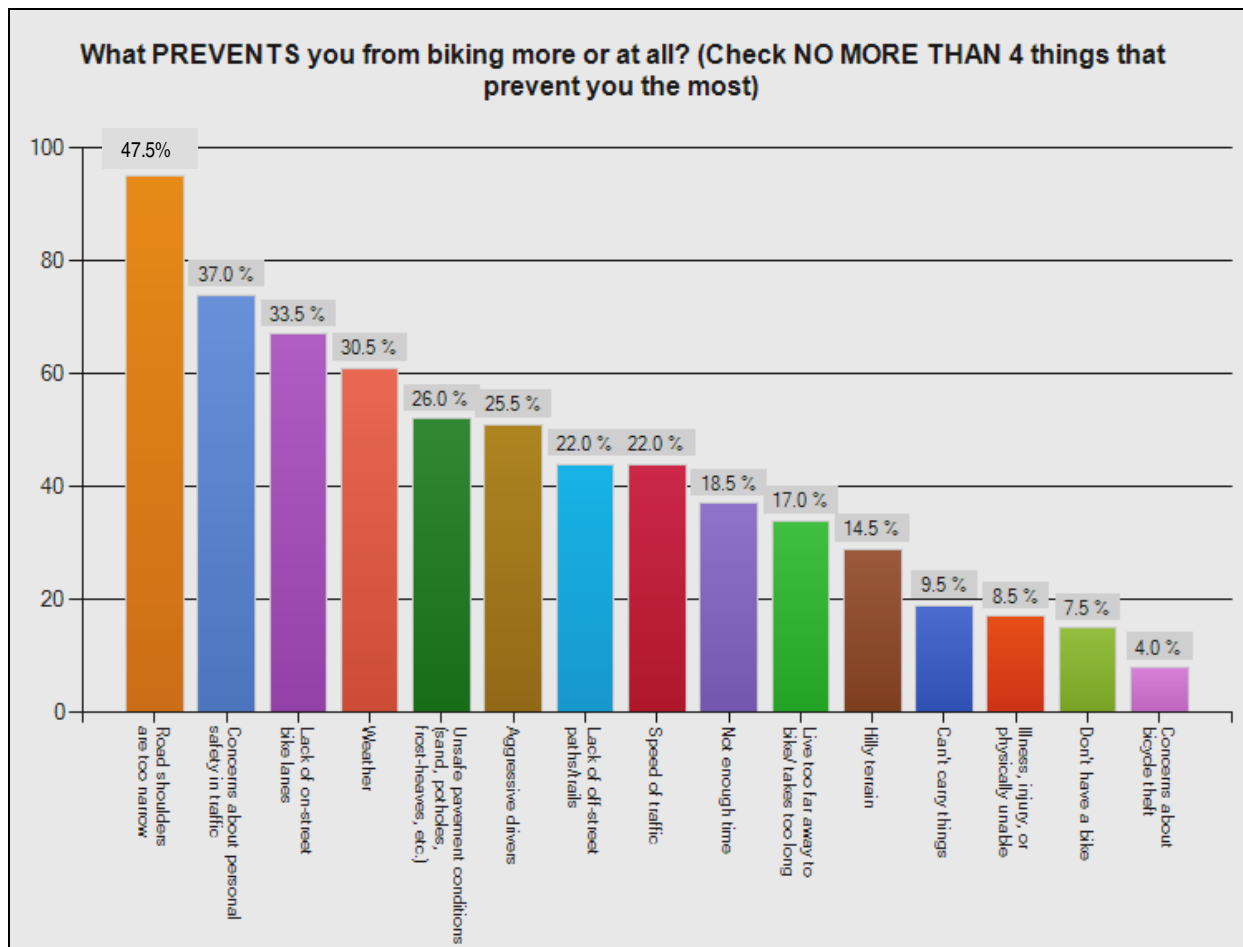
- ❖ The distribution of responses for walking 1/4, 1/2, and 1 mile for commuting or errands was even, at about 25 percent
- ❖ Sidewalk conditions were reported to be ‘poor’ more often than ‘fair’ or ‘good’
- ❖ Trail conditions for walking were reported to be ‘good’ more often than ‘fair’ or ‘poor’
- ❖ Intersections safety for commuting and errands was reported to be ‘poor’ more often than ‘fair’ or ‘good’



- ❖ 57 percent of respondents have a need for additional and/or repaired sidewalks in their community, while 13 percent reported that there was no need

### Bicycling Data

- ❖ 19 percent of respondents report that they do not ride a bicycle
- ❖ Inadequate road shoulders (47.5 percent), concerns about personal safety in traffic (37 percent) and lack of on-street bike lanes (33.5 percent) are the leading factors preventing people from biking more or at all. These factors outweigh distance from destinations and weather, unlike walking.



**Fig. 5 – Survey results on barriers to bicycling**

- ❖ 24 percent of respondents report biking to work or school at least once a week in summer
- ❖ 26 percent of respondents report biking for shopping, errands, or dining at least once a week in summer
- ❖ 68 percent of respondents report biking for recreation or exercise at least once a week in summer
- ❖ 4-foot paved shoulders on busy routes (59.8 percent), on-street bike lanes (53.4 percent), and safer pavement conditions (45.5 percent) were the most reported factors that would encourage people to bike more or at all

- ❖ 43 percent of respondents report biking more than 10 miles on an average recreational outing in summer
- ❖ 8 percent of respondents reported shoulder widths as 'good' where they ride
- ❖ 82.3 percent of respondents would like to see more off-street multi-use paths
- ❖ 80.6 percent of respondents thought local governments should be responsible for improving and maintaining places to walk and bike (58.6 percent State, 49.2 percent non-profit, 30.8 percent federal) Many wrote in that it should be a collaborative effort

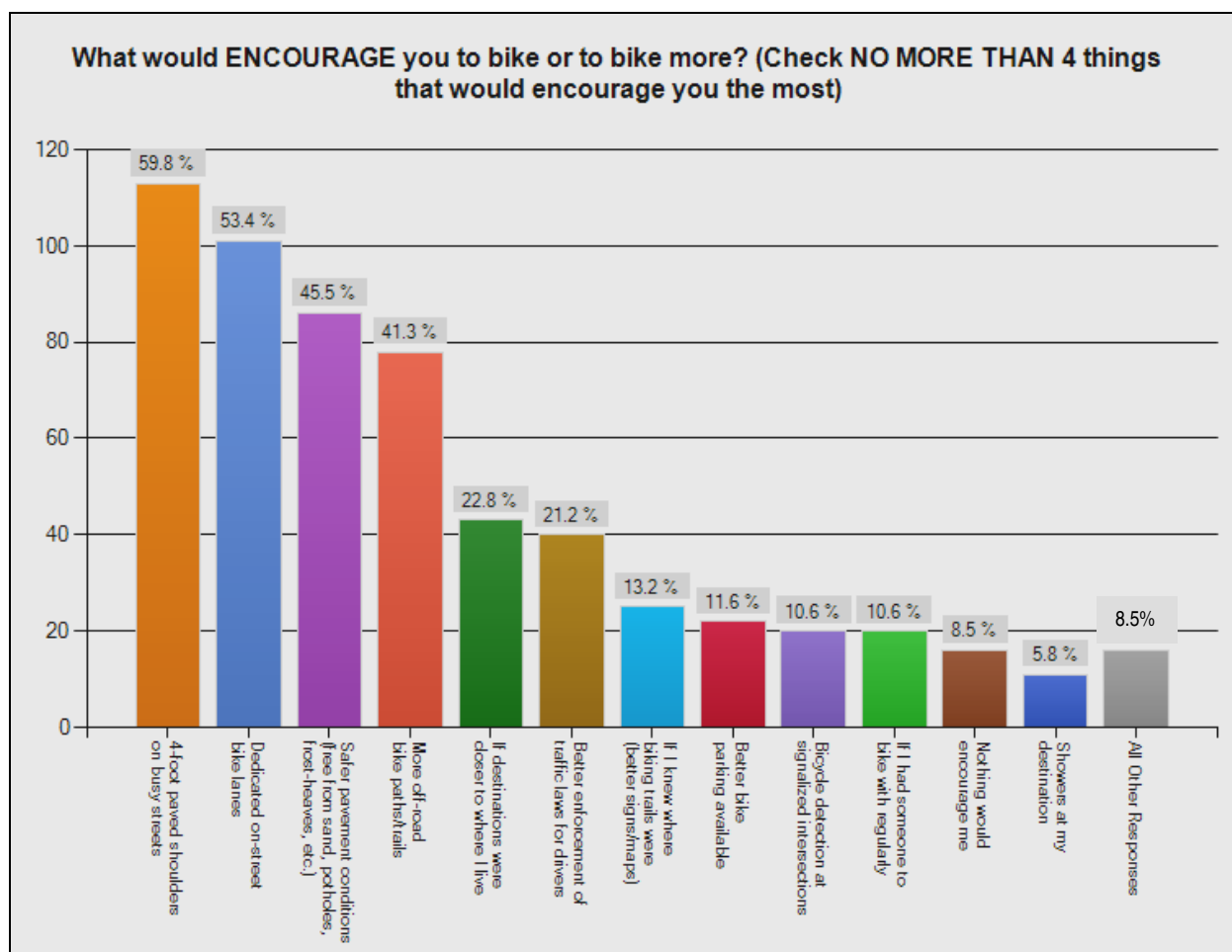


Fig. 6 – Survey results on support for bicycling

### **Municipal Planning Goals**

In addition to assessing priority concerns of residents and walkers and bicycle riders in the region, LRPC reviewed local master plans to identify goals and recommendations related to pedestrian and bicycle mobility, roadway design and maintenance, and recreational resources for pedestrians and bicycles. Summaries of local master plan goals are found in Appendix C.

Our research found all Lakes Region communities lacked a comprehensive pedestrian and/or bicycle plan. The need for local plans that prioritize needs, outline local policy recommendation, and establish improved design and maintenance standards for local projects was voiced at multiple public meetings, and has been echoed by a number of municipal and regional planners in the region.

A comprehensive local plan should assess the current processes informing design and decision making related to local transportation projects.

On the other hand, many communities have made progress on bicycle and/or pedestrian related projects since 2006, including the development of maps and informational material, prioritization of local improvement projects, transportation enhancements to rail-trails and sidewalks, development of Safe Routes to School travel plans, and incorporation of traffic calming and pedestrian accessibility into local and state project plans. Many communities have added to their sidewalk network and invested in high visibility crosswalk bollards as affordable traffic calming measures.

## CHAPTER 5: EXISTING CONDITIONS – THE BUILT ENVIRONMENT

There are many elements of the built environment that affect pedestrians and bicycles, and the policies that determine the design and function of these elements are just as important. This chapter reviews the condition and impacts of many important elements of the built environment in the Lakes Region. Design and policy consideration related to these elements of the built environment are discussed as well.

### **Multi-use Trail Development**

Trail conditions in the region are viewed as good by survey respondents. They generally offer more space than sidewalks, a significantly reduced exposure to motor vehicle hazards, and more intimate access to natural surroundings. More trails and completed connections were prioritized by both survey respondents and public meeting attendees, and are considered to be a priority regional goal. LRPC should continue to work with NHDOT and DRED to support policies that will help build successful trails. LRPC should also continue to work with trail organizations to support economic development studies, planning and design considerations, and federal funding for project completion. Since 2006, sections of multi-use trail have been completed throughout the Lakes Region.

#### *WOW Trail – 1.3 miles*

In Laconia, the first phase of the Winnepesaukee Opechee Winnisquam (WOW) Trail was completed in early 2010. This section of trail connecting Lakeport with Downtown Laconia within the active rail corridor of the Winnepesaukee Scenic Railroad has transformed an underutilized rail corridor into a popular linear park through the heart of the Lakes Region's most densely populated community. Many people now rely on this trail to more easily traverse an otherwise challenging section of the city. Police now use the trail for patrol routes and have reported a reduction in vandalism and vagrancy along the route. The WOW Trail was the most commonly used trail of the survey respondents.

The second phase of the trail, which will extend to the Belmont line, is now being planned. This phase, combined with efforts in Belmont, will connect the trail with the Winnepesaukee River Trail in Tilton, which links up with the Northern Rail Trail, the state's longest multi-use trail at 48 miles. These connections were the concept behind the vision for the Lakes Region Connector, a trail from Meredith to Danbury and water connections via the S.S. Mount Washington to Moultonborough, Center Harbor, and the Cotton Valley Trail in Wolfeboro. The third and fourth phases of the WOW trail will extend along the western shore of Paugus Bay, north to the Meredith town line.

NHDOT rail-with-trail design policy has an important bearing in planning additional phases of the WOW Trail. Phase III will involve a segment of active rail corridor that runs along the west shore of Paugus Bay between the water and residential property, up to Weirs Beach. Phase IV will go from Weirs Beach to the Meredith town line. Current NHDOT policy requires a 4-foot chain link fence (with 6-inch bottom clearance) between trails and active rails. This is considered by many residents to be an aesthetically unacceptable design for shorefront property. Despite many successful examples of alternative fencing designs that have been applied to active rail-with-trail projects in other states, NHDOT has yet to allow for a more aesthetically acceptable barrier. An acceptable

solution to the fencing detail is a critical step for the successful extension of the WOW trail to the Meredith line, if it is to be located in the active rail corridor.



***Fig. 7 - NHDOT officials from the Bureau of Rail and Transit accompany WOW Trail leaders, Laconia and Belmont staff and an LRPC Planner on a corridor assessment walk of the planned Phase II section of the WOW Trail in October 2011. (NHDOT photo)***

Signage is an important part of a successful trail, and current signage at WOW Trail access points is poor. Many people attending public meetings said they were not sure where the WOW Trail is, and 16 percent of the 180 survey respondents who answered a question about trails that they walk on said they were unaware of the name of the trail that they regularly use. Clear signage will attract additional users and will help build a stronger base of support and stewardships for the trail.

Research looking at the impacts of long-distance trails on property values suggests a statistically significant positive correlation<sup>16</sup>, but trails can bring other impacts as well. The WOW Trail may not draw visitors from outside the region who come for the express purpose of a ride (like many Northern Rail Trail users), but people may come from within the region in order to use the trail (like many Cotton Valley Trail and Winnepesaukee River Trail users). When the nine-mile WOW Trail is completed, it may draw regional users and economic activity to Laconia, the Lakes Region's largest community. When the WOW Trail eventually links up to the Northern Rail Trail through Belmont, Tilton, and Northfield, it may begin to draw visitors and economic activity from outside the region.

In December 2011, the Belknap County Economic Development Council (BCEDC) completed a study of the potential economic impacts that the completion of the WOW Trail and its future linkage with the Northern Rail Trail could have for the region. The study determined that completion of all phases of the WOW Trail will create 74 temporary jobs over all phases of

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<sup>16</sup> David P. Racca and Amardeep Dhanju. *Project Report for Property Value/Desirability Effects of Bike Paths Adjacent to Residential Areas*. Prepared for Delaware Center For Transportation and The State of Delaware Department of Transportation. Center for Applied Demography & Survey Research, College of Human Services, Education, and Public Policy

construction, including Phase I, which is complete. BCEDC estimated that the WOW Trail, as proposed, would generate \$1.79 million annually in new visitor spending in Belknap County, which would create 31 new permanent jobs paying \$780,000 in annual earnings.

### Winnisquam Scenic Trail

The Lake Winnisquam Scenic Trail will eventually be 5.2 miles long and will connect the WOW Trail in Laconia and the Winnepesaukee River Trail in Tilton. Belmont has received Transportation Enhancement funds of \$900,000 to construct Phase 1, which will go 2 miles from the Laconia city line to Mosquito Bridge over Lake Winnisquam between Belmont and Sanbornton. While originally envisioned as a rail-with-trail, the trail will deviate from the state railroad right-of-way and will go cross country through the woods on NH DOT conservation land that had originally been purchased to finish the Laconia By-Pass to I-93. The trail will continue along the shore of Lake Winnisquam in the railroad ROW and across private easements before exiting onto US Route 3 above Mosquito Bridge. Phase 2, which had previously been approved, intends to continue 2 miles further south to Jefferson Road in Belmont.



**Fig. 8 - Section of NHDOT rail corridor where a portion of the Winnisquam Scenic Trail will be located in Belmont**

### Winnepesaukee River Trail – 5.1 miles

The Winnepesaukee River Trail provides trail access from the city of Franklin and the Northern Rail Trail, eastward to Tilton, Northfield, and the ongoing trail projects in Belmont and Laconia. It is a completed section of the 2006 vision of the Lakes Region Connector, which would allow for trail travel into throughout the Lakes Region. In 2011, LRPC helped the Winnepesaukee River Trail Association (WRTA) get one step closer to completing a connection across the Winnepesaukee River between Tilton and Northfield. LRPC's Brownfields Program helped fund a comprehensive environmental assessment of a derelict commercial site along the river in Tilton. This helped the town to understand the extent of any site contamination and make an informed decision to purchase the property in partnership with the WRTA. NHDOT funding for a pedestrian bridge across the river has already been approved, but it has been contingent upon the town acquiring access rights on either side of the river. Conceptual plans for the redevelopment of this site have been drawn up (Figure 9), and the town recently applied for a Brownfields grant to clean up the site. The completion of the bridge, which will link a five mile section of isolated trail with another complete section and significantly expand access, is a priority.

A planning consideration for this trail involves the Winnepesaukee Transit Service (WTS) bus route along US Route 3 in Tilton. WTS buses are equipped with bike racks, and through the public meetings, WTS coordinators expressed an interest in the potential for the bus to augment the trail and provide one-way trips along the Winnepesaukee River Trail. Because there are few access points along the trail, people who choose to walk or ride its length often have to turn around to go back to where they started. The bus could provide an alternative and allow people to plan one-way trips at certain times of day.



**Fig. 9 - Conceptual rendering of the reuse plan for the present site of a former service garage in Tilton along the Winnepesaukee River. The site will be the future connection of two portions of the Winnepesaukee River Trail via an NHDOT funded pedestrian bridge.<sup>17</sup>**

Northern Rail Trail – Merrimack County – 26 miles (49 miles overall)

The Northern Rail Trail in Danbury, Andover and Franklin is part of the longest rail trail in the state (49 miles from Lebanon to Franklin). Currently a major focus is on connecting the trail in West Franklin to the Winnepesaukee River Trail. While the shortest route would be along the city streets in Franklin, the preferred route would cross the Pemigewasset River somewhere other than the Central Street Bridge, and then go around downtown along a more pedestrian and bicycle friendly route. However, a safe, signed, on-street connection should be prioritized over the preferred route in the near term in order to connect existing trails.

A key aspect of the Northern Rail Trail is its continuity. It is not crossed by many roads and includes long sections of continuous and unbroken trail. This allows all classes of users to enjoy it without having to worry about motor vehicles, all of which are banned (except snow mobiles).

An important consideration for the future of the Northern Rail Trail is the conversion of grade-separated crossings (Figure 10) to at-grade crossings. Over the past 15 or so years that the State has owned the trail, NHDOT has constructed over 10 breaks in the trail. Some of these have consisted of converting grade-separated crossings into at-grade crossings, and some have replaced open passages under roads with dark, narrow unlit culverts (often with a change in the grade and surface

<sup>17</sup> Photographs and illustration by LRPC's Brownfields assessment consultant, Credere Associates, LLC

of the trail). A list of the breaks in the trail in Merrimack County, and a map showing the location of converted crossings (prepared by NHDOT's Bike/Ped Coordinator) is included in Table 4 and Figure 11.

**Table 4 – List of grade-separated crossings and bridge removals that have been converted to at-grade crossings along the Northern Rail Trail within the Lakes Region**

<b>Bridges Removed</b>			
<i>Location</i>	<i>Town</i>	<i>Remarks</i>	<i>Year</i>
Chance Pond Road	Franklin	Bridge removed with loss of grade separation and trail brought down to grade with steep slopes.	2007
Old Route 11 Connection	Andover	Bridge removed when the Department relocated US 4 and constructed a connector with a net loss of grade separation.	1998
Plains Road	Andover	Bridge removed and trail brought down to grade with loss of grade separation and direction; trail now has two sharp curves and crosses both Route 11 and Plains Road.	1998
Lawrence Street	Andover	Bridge removed and replaced by small arch culvert with loss of trail surface. Culvert is dark, poorly drained and too small for groomers or horseback riders.	2001
<b>Bridges Preserved</b>			
Valley Road	Andover	Original wooden bridge rebuilt in response to local advocates.	
Maple Street	Andover	Original wooden bridge rebuilt in response to local advocates.	
US Route 4	Andover	Bridge removed and replaced with 23-foot horizontal opening.	2010
<b>Bridges Currently Planned for Possible Removal</b>			
US Route 4	Andover	In planning stage for removal; likely to be replaced with large culvert.	
US Route 4	Andover	In planning stage for removal; likely to be replaced with an at-grade crossing.	

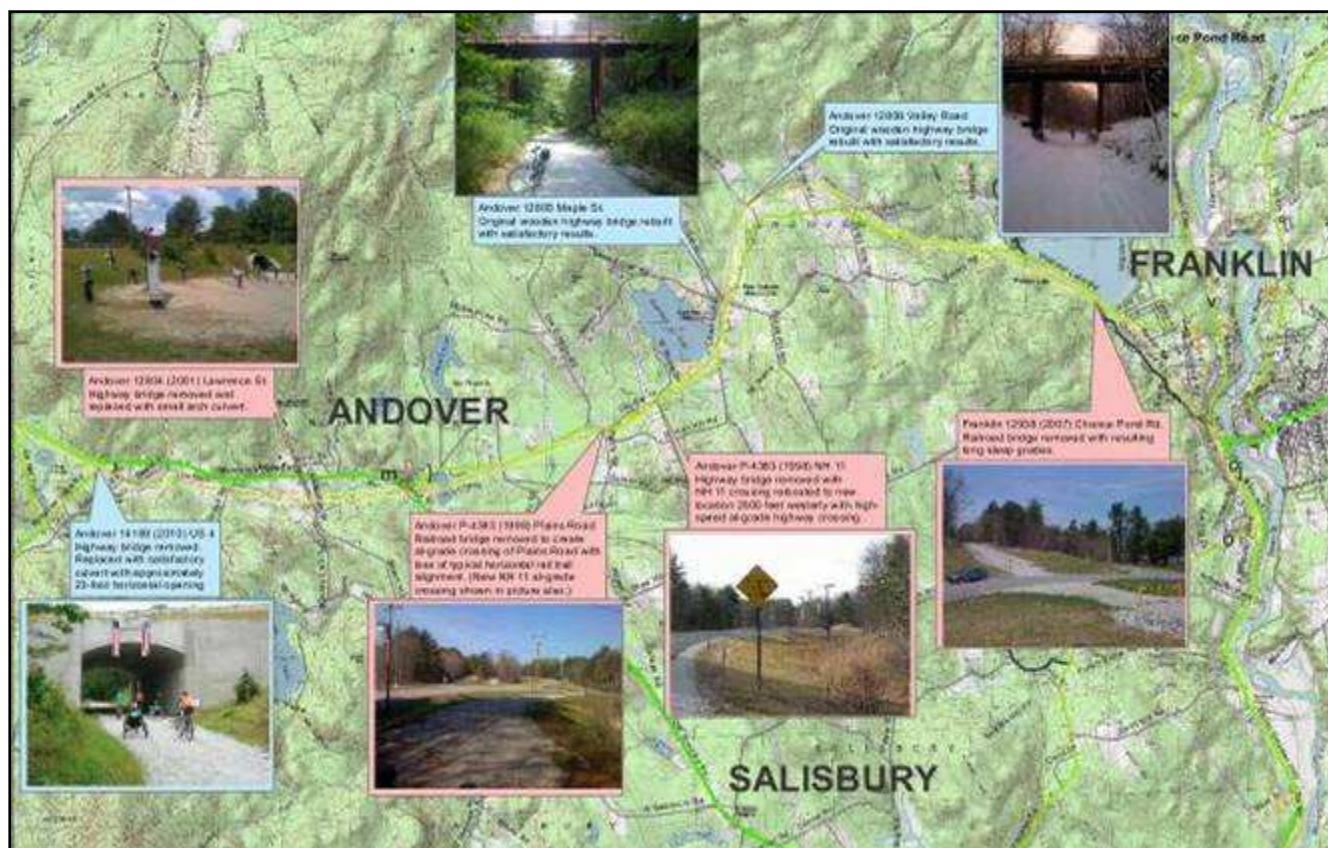
This is a complicated issue that needs thoughtful consideration in order to achieve well-informed outcomes. On the one hand, at-grade crossings are undesirable because they force trail users to contend with traffic hazards, destroy trail continuity, and often create bends in the trail to accommodate safe perpendicular crossings. However, when overpasses need to be replaced, it is much cheaper for NHDOT to remove the bridge and embankments than to replace them.

At-grade crossings can yield more than just cost savings. They can provide important access points which may sometimes be desirable along an isolated segment of trail. They can promote trail awareness among drivers and tourists who may otherwise not be aware of the trail, and they can provide very successful examples of traffic calming and pedestrian oriented design. While some bike/ped advocates believe that an ideal built environment would exclude at-grade crossings, reflecting true prioritization of non-motorized modes, the cost/benefits of grade separated trail crossings need consideration.



**Fig. 10 - A grade-separated crossing along the Northern Rail Trail**





**Fig. 11 - Map showing new at-grade crossings along the Northern Rail Trail in Franklin and Andover.<sup>18</sup>**

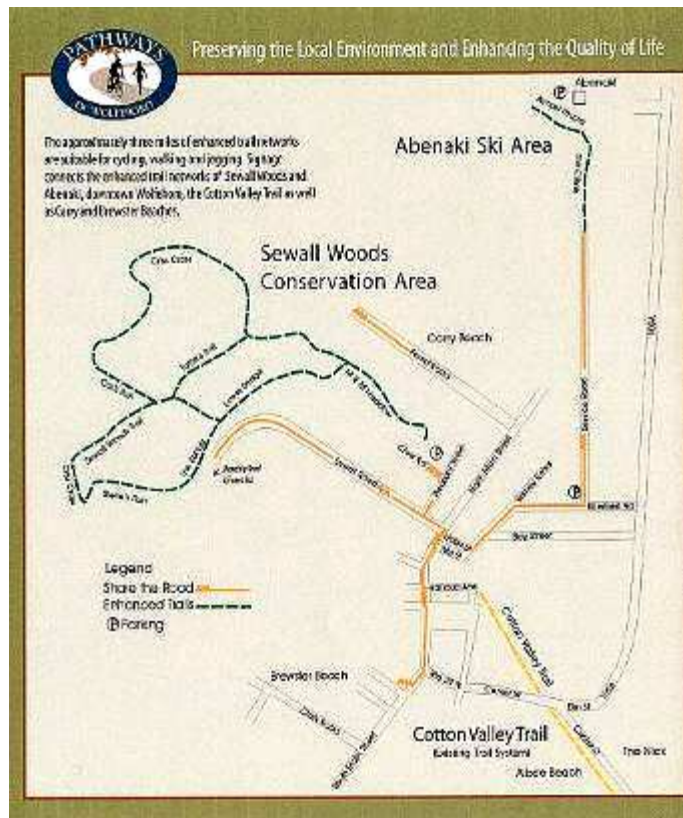
However, Northern Rail Trail users have already accommodated 10 new at-grade crossings or culverts (four in the Lakes Region) along a very natural and rural trail. Two grade-separated crossings in Andover were preserved in response to local advocacy efforts. Removal of additional grade-separated crossings is undesirable for a trail of this nature compared with a more urban trail, and this should be an important piece of contextual information for NHDOT to consider with future decisions. Part of the value of the state's longest rail trail is its beauty and isolation. It is a rare resource where cyclists and pedestrians can travel long distances, and should be considered one of the state's most important recreational assets.

The Northern Rail Trail in Merrimack County makes an important contribution to the Lake Region's transportation and recreation opportunities between Franklin and Danbury. To preserve this role, towns and the state of New Hampshire should act to avoid any further breaks or changes in the Trail, particularly any that would result in additional at grade crossings on the Trail anywhere within the Lake Region's boundaries. LRPC should communicate with NHDOT and NRT stakeholders to evaluate the context of future decisions regarding grade-separated crossings.

<sup>18</sup> Map created by NHDOT Bicycle and Pedestrian Program: [www.nh.gov/dot/programs/bikeped/documents.htm](http://www.nh.gov/dot/programs/bikeped/documents.htm)

Sewall Woods Trails – 3 miles

The Sewall Woods trail system was recently completed and is an example of a local trail project completed with privately raised funds. While close to the Cotton Valley Trail, this trail system is more of a stand-alone recreational resource than a corridor with multiple access points. It is a very popular trail that experiences a lot of use by walkers, and is an example of the kind of trail system that could meet the needs of communities more easily than corridor routes. Corridor trail development must consider infrastructure right-of-way, many adjacent property owners' interests, and conflicts with motor vehicle needs. Additional multi-use trails were one of the leading solutions reported by survey respondents and public meeting attendees for meeting the needs of walking and bicycling. If communities can use public lands adjacent to downtown or village areas, this type of trail development may accommodate the interests of many different users and provide alternative places to walk than the very narrow shoulders along rural roads.



**Fig. 12 – Sewall Woods Trail Map**

Cotton Valley Trail – 12 miles (Sanbornville to Wolfeboro)

The Cotton Valley Trail which connects downtown Wolfeboro with parks, beaches, and points east to Wakefield, is a crushed stone trail that is heavily used year round. It is a great example of how crushed stone trail beds can successfully accommodate multiple users.

Moultonborough Neck Trail

Unfortunately, in places this trail is at a lower grade than the roadway. This has caused drainage problems where debris has washed onto the paved trail. Improvements are needed to this recent addition to the off-road trail network. Users would benefit from an improved and upgraded trail. LRPC can support the development of this trail through data collection and site analysis. Without any nearby trails in surrounding communities, this is an important regional resource to maintain and improve.

Ossipee Lake Trail

The Ossipee Lake Trail is an on-road bicycle route around Ossipee Lake that uses wide road shoulders to accommodate bicycles and pedestrians in an area with dense development of seasonal houses and camps along portions of high volume and high speed routes. Users still face challenges

at narrow bridges, and along segments with many side streets, but NH DOT has integrated two culvert replacements along the route in direct support of the future vision for additional bike lanes.

### Newfound Pathway

This trail has not been built, but the Newfound Pathway Team has created a conceptual plan for the development of a multi-use trail around Newfound Lake and has identified phasing priorities. Priority segments to be worked on in phases. Physical right-of-way constraints are common on the roads around the lake. Citizens of Hebron, on the north end of the lake, have requested lane allocation modifications for the 2012 NHDOT resurfacing program in order to establish more shoulder space along NH Route 3A. The route around the lake is very popular with area cyclists, many who come from Plymouth and points north. The Mooseman Triathlon route goes around the lake, and a completed portion of multi-use trail exists to the south of the lake that carries pedestrians and cyclists into downtown Bristol, which is a hub of activity. Bristol's trail and its sidewalk network link up with the Heritage Trail on the east side of the Pemigewasset River, which connects with the Northern Rail Trail and the Merrimack Valley Trail in Franklin.



*Fig. 13 - Newfound Pathway concept*

Trails generally offer more space than sidewalks, a significantly reduced exposure to motor vehicles, and a more intimate exposure to natural surrounding environments. ‘More trails’ and ‘completion of connections’ were prioritized by both survey respondents and public meeting attendees, and are considered to be a priority regional goal, including the following:

### **Parking**

Parking does not receive as much attention as it should, probably because it is free in every community in the region, and because free parking is often viewed as an important economic development tool. The important factor with parking is availability. When parking is not available, cruising results (vehicles searching for an open spot). This situation can exacerbate traffic congestion significantly. In some dense urban squares in big cities, cruising can amount to 30 percent of the traffic or more. Most of the year, it is not difficult to park in any Lakes Region downtown district or village. However, the Lakes Region’s seasonal population expansion and high summer and weekend visitation rates can place severe constraints on parking availability in some of the most dense commercial locations, such as Meredith, Wolfeboro, Laconia, and Tilton.

Communities can address parking demand and the hazards to pedestrians and bicyclists in a number of ways.

- ❖ Assess peak-demand parking supply. If fewer than 15 percent of on-street and municipal lot stalls are not regularly available, then additional supply or reduced demand is necessary to

help keep spots open to prevent cruising. The first step is to assess the parking problem and understand opportunities and constraints for increasing supply.

- ❖ Assess whether local codes are effective and consider alternatives. Examples include: (a) shorter on-street time regulations, which promote off-street parking; (b) charging for on-street parking during peak demand (summer months, weekends, etc.), and many others. Many parking regulations make Sunday and evenings free, but if demand problem exists during those times, it may be appropriate to charge, e.g., Weirs Beach. Fees not only help with turnover and reduce cruising congestion, they provide a marginal incentive for people to walk or bike if they perceive a monetary cost at their destination. This alone can help promote more walking and biking, and a safer streetscape.

Parking design also affects pedestrian and bicycle safety. Some communities have pull-in angled parking. This parking configuration creates a convenience for drivers and an extreme hazard for pedestrians and bicycles – cars can pull into spaces directly from the travel lane without indication (posing a hazard to cyclists), and by design, back out into traffic. A safer configuration for angled parking is to have reverse-angled parking (Figure 14). This slows driver speeds when backing into spaces and gives them direct line-of-sight to oncoming cyclists when pulling out. Despite being considered a best practice in parking design, no Lakes Region communities have installed reverse-angled parking to date.



*Fig. 14 - Example of reverse angle parking*<sup>19</sup>

In many lakefront communities and in the larger communities of the Lakes Region where parking stalls have been striped on the road, stalls are striped right up to intersection corners, crosswalks, and curb-cuts (see Figure 15). This practice at intersections poses a significant hazard to pedestrians for a number of reasons, and is in violation of state law requiring 20 feet of clearance from crosswalks at intersections.<sup>20</sup> The NH Supplemental Design Criteria supplementing the FHWA *Roundabouts: An Informational Guide (2000)* for roundabout design on New Hampshire state maintained roadways makes clear that for the purposes of the law, roundabouts are considered to be intersections, and no parking is to be allowed within 20 feet of roundabout crosswalks.<sup>21</sup>

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<sup>19</sup> Image from <http://www.streetsblog.org/2008/01/03/the-case-against-pull-in-angle-parking/>

<sup>20</sup> NH RSA 265:69 II.(a)-(f)

<sup>21</sup> NH DOT Supplemental Design Criteria. 6.3.14 Parking. “No parking is to be allowed within 20 feet of a crosswalk per State law.”



***Fig. 15 - Parking within 20 feet of a crosswalk at an intersection (LRPC photo)***

Parked cars adjacent to crosswalks obscure pedestrian visibility to drivers and place pedestrians in close proximity to turning and parking vehicles. By locating parking stalls in violation of state law, municipalities may unintentionally be exposing themselves to personal injury claims from pedestrians, as well as drivers who were parked in illegal locations and whose vehicles contributed to sight distance related to accidents.

Crosswalks and intersections benefit greatly from intersection corner bulb-outs that protect pedestrians from cars pulling out of parking spaces, make pedestrians visible to oncoming traffic, allow pedestrians to see on-coming traffic more easily, reduce crossing distances, and calm traffic approaching intersections. Bulb-outs at intersections and mid-block crossings also allow more parking stalls to be accommodated legally. Bulb outs create additional challenges for snow removal, but this should be a secondary consideration where pedestrian safety is an issue. Figure 16 shows an example of intersection bulb-outs in plan view.



***Fig. 16 - Bristol Village enhancement plan showing bulb-outs that shorten crossings, tighten turning radii, and calm traffic.***

Municipalities should stripe parking stalls in accordance with state law or should install bulb-outs to enhance pedestrian visibility. Bulb-outs also provide an extra level of safety by placing a curb between parked cars and pedestrian crossing points. Municipalities experiencing peak demand parking supply problems may also wish to conduct parking demand analyses in order to evaluate options for ensuring adequate parking supply that do not involve creating serious hazards to pedestrians.

### **Nodal Development Pattern**

Development in the Lakes Region has a nodal pattern where more densely populated villages and downtowns are separated by higher speed corridors with little commercial development, and larger residential, agricultural, and forested parcels. This is a common pattern in northern New England. However, many people live along the rural local roads and state highways throughout the region, evidenced by the number of survey respondents reporting that the most significant barrier to walking more or at all were destinations too far from where they live. While rural local roads and state highways may not be designed with pedestrians in mind, many people have no other walking options than the roads near their homes. LRPC should support municipal and NHDOT striping of narrower lane widths to calm traffic and provide additional safe places where feasible, along roads for pedestrians.

The most common deterrent to biking and walking cited among survey respondents was “I live too far from where I want to walk to.” This may be a result of housing preference of residents who wish to live in rural, quiet areas, with solitude and natural scenery. However, it may also be a result of land use policies which restrict denser nodal development in existing villages and downtowns. It is not uncommon for downtown areas of the Lakes Region to have 2-or-more acre minimum lot sizes. While this reason for not walking does not relate to design of the public right-of-way, it is a direct consequence of housing location, and is a component of the built environment that is central to what successful planning can address.

### **Pavement Conditions**

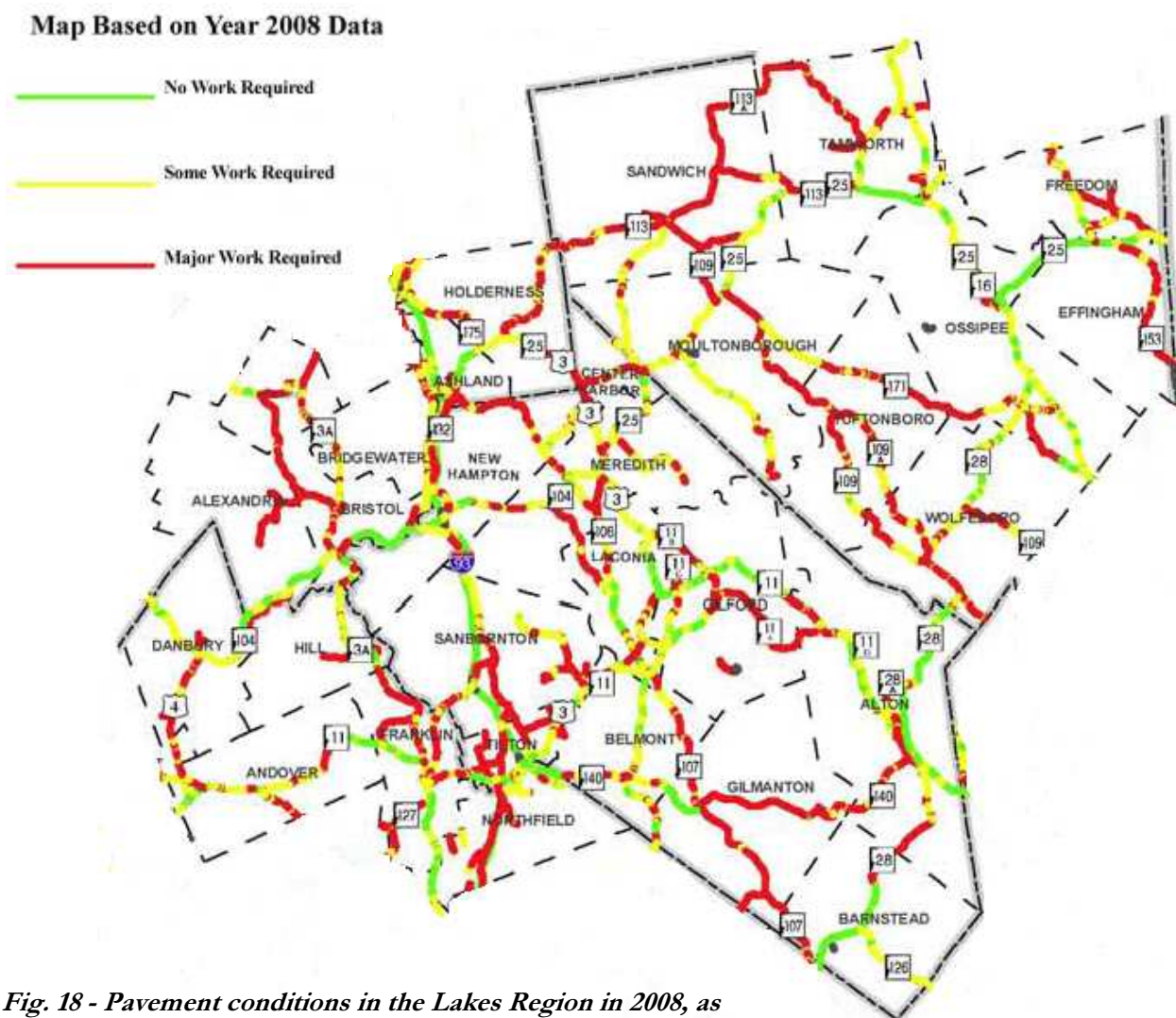
Pavement condition affects bicyclists more than pedestrians. Many cyclists who attended public meetings expressed frustration with the state bicycle map for the Lakes Region for depicting a bicycle route system along roads in such poor condition. Deteriorating roads are often heaved, have potholes that are very hazardous to cyclists, have longitudinal cracking that is equally hazardous, and have inconsistent road edges that can affect the useable shoulder width. All of these conditions also create a source for loose gravel that ends up strewn to the edges of the road where cyclists ride.



*Fig. 17 - Failing pavement along NH 171 in Tuftonboro. Note the heaved cobble, longitudinal cracking, and lack of shoulder space along this route, which is identified as being part of the regional bicycle route system on the NH Regional Bicycle Map (LRPC photo)*

In 2009, NHDOT created a map of road conditions using 2008 data.<sup>22</sup> That map showed roughly 33 percent of depicted roads in the state to be in need of major repair. In the Lakes Region, as shown in Figure 18, many roads in are in exceptionally poor condition.

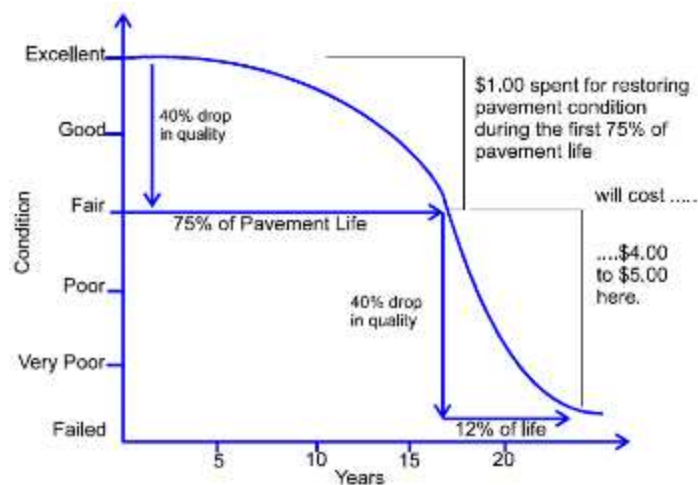
Because of the highly deteriorated condition of many state roads in NH, cyclists would be safer riding on routes with the lowest traffic volumes rather than numbered state highways which are major routes for regional motor vehicle travel. While less traveled routes allow cyclists to ride comfortably in the lane, where edge conditions are less hazardous and road hazards can be avoided, suitable improvements to numbered routes would demonstrate commitment to safety and sustainability principles, and recognize roads as a principle state recreational resource.



*Fig. 18 - Pavement conditions in the Lakes Region in 2008, as reported by NHDOT Bureau of Materials and Research*

<sup>22</sup> The map in Figure 18 was included in NHDOT's "2011-2020 Ten Year Plan," accessed at [http://www.nh.gov/dot/org/projectdevelopment/planning/typ/documents/02\\_PaveCond\\_All\\_11-20.pdf](http://www.nh.gov/dot/org/projectdevelopment/planning/typ/documents/02_PaveCond_All_11-20.pdf)

While there are many construction projects identified in the *NH Ten Year Transportation Plan*, preservation of the existing system is critical to maximizing the effectiveness of limited funding, as expressed in the graph below. In Figure 19, taken from NHDOT's 2009 *Pavement Condition and Performance* report, shows that restoration costs are 300 - 400 percent higher for roads that have been allowed to deteriorate beyond 75 percent of the useful pavement life. While restoring pavement condition is a whole-road investment, obviously targeted at preserving roads for motor vehicles, cyclists would benefit from a policy prioritizing preservation of the existing system.



**Fig. 19 - Pavement restoration cost as a function of condition**

The pavement deterioration curve demonstrates the advantage of spending for preventative maintenance. The curve is representative for a road with a design life of about twenty years. After a roadway has been constructed, a slow decline in pavement condition is observed. As the roadway continues to age due to climate, traffic loading, etc., a much sharper decline is typical. Applying a pavement preservation treatment before year 15 will generally restore the pavement condition. If a treatment is delayed for another 3 years, a more costly rehabilitation treatment will be required to restore the pavement condition. The cost of the rehabilitation treatment is generally 4 to 5 times more than the cost of the preservation treatment.

### **Shoulder Space**

Lack of available paved shoulder space for cycling or level shoulder space for walking, are leading concerns among survey respondents. In 2009, the NH Legislature adopted special road rules for bicyclists (NH RSA 265:143-a). The law requires drivers to exercise caution when approaching bicyclists by leaving a prudent distance between the vehicle and bicycle. A prudent distance is considered to be at least three (3) feet when the vehicle is traveling at 30 miles per hour or slower, with an additional foot of clearance for every 10 mph.

After multi-use trails, rural road shoulders are also the most common places where survey respondents report walking. Availability of shoulder space is dependent upon multiple factors, including pavement width, lane width, number of lanes or striped medians, right of way width, and physical constraints. For example, West Shore Road along Newfound Lake is severely constrained by near vertical bedrock along sections on the west side of the road and by the lake on the east. Safe accommodation of pedestrians and cyclists along this popular route is a challenge that will require a creative solution.



In the Netherlands, roads like this have a configuration that accommodates all users within the existing space. For example, an 18-foot segment of pavement would have two 4-foot paved shoulder lanes, and one 10-foot center lane. The road legally accommodates two-way motor vehicle traffic – cars drive along either side of the road, straddling the striped shoulder lane. When a car encounters a cyclist (there are many in the Netherlands) it moves to the center of the road and slows down considerably. If two vehicles encounter each other in the center of the road while heading in different directions, they are moving so slowly that they are no danger to each other. Once the vehicle has passed the cyclist, the car moves back to the right and resumes a reasonable speed.

While this traffic configuration is essentially non-existent in the United States, it is a successful example of serious pedestrian and bicycle prioritization that still manages to accommodate motor vehicles along lower volume roads. This traffic configuration is successful for three important reasons: (1) slow vehicle speeds; (2) high maneuverability of cars at no physical cost to the driver; and (3) the significant physical protections for drivers traveling inside of motor vehicles. Configurations like this offer the kind of simple design solutions that gives the Netherlands the distinction as a country with the highest non-motorized mode share, as well as being a destination that draws tourists eager to cycle the country's regional trails and cities.

While the road configuration example from the Netherlands is illustrative of a creative and unorthodox approach, the reasons for its success are important considerations that should inform all transportation planning and design. Traffic calming is possible for many projects where safe separation cannot be achieved within available space, and where cultural travel norms insist on equal accommodation of travel modes.

In New Hampshire, many segments of local and state roads have lane widths that are in excess of the maximum FHWA recommended width of 12 feet. LRPC has produced a map using May 2011 NHDOT data showing available road shoulder space on all road segments classified as minor collectors or higher. The map, included in Appendix E, shows road shoulder space in three categories, based on available data:<sup>23</sup> 0-2 feet, 3 feet, and 4 feet or greater. It also indicates road segments where paved shoulder width could be increased from the lowest category to a higher category through the striping of lane widths at 10 feet, within the American Association of State Highway Officials' (AASHTO) recommended width range for arterial routes. The analysis of the NHDOT data indicate that over 30 miles of road shoulder along state routes in the Lakes Region could be improved from the worst category (0-2 feet) to at least three feet by striping 10 foot lanes.

Many road segments also have center turning lanes that accommodate only a small number of turns at the expense of shoulder width (two travel lanes and a turning lane with minimal shoulders as opposed to no turning lane and wider shoulders). Center turning lanes should be very carefully considered, and should only be included in transportation project plans where significant delays would be likely to result from turning activity. These lanes not only consume existing pavement that could otherwise be shoulder space, they promote higher speeds due to reductions in visible and physical constraints within the right-of-way without necessarily increasing vehicle throughput. Such lanes can be avoided by utilizing parallel access roads internal to adjacent development, and by accepting a certain amount of delay that does not result in overall congestion. Their visual impact on the streetscape is substantial, and they cost more to build and maintain.

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<sup>23</sup> NHDOT shoulder width data are rounded to the nearest foot, based on interpretation of aerial photography and field observation and measurement.

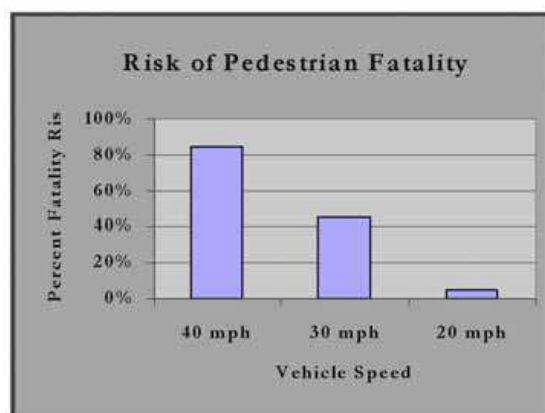
### Lane Widths

The AASHTO “Green Book” is commonly referred to as the traffic design bible (the most recent edition is officially titled *Geometric Design of Highways and Streets, 6<sup>th</sup> Edition, 2011*). The Green Book calls itself a “guide” – meaning that it contains suggestions – but many states and municipalities treat AASHTO recommendations as required standards. Even so, while AASHTO publications tend to suggest ranges for key road dimensions, with the exact size to be chosen dependent on the particular context of each project, professional practice is to use the maximum size whenever possible. This is partly because of the tendency to “overbuild” by designing roads to handle faster speeds, heavier traffic, and bigger vehicles than officially anticipated – partly to provide an extra margin of safety, partly to prepare for possible growth, and partly because of the “cars are the future” attitude that has dominated American planning and culture for much of the past century.

For lane widths, AASHTO suggests that “local” roads should be constructed with 9 to 12-foot lane widths, that “collectors” have 10 to 12-foot lane widths, and that “arterials” have 10 to 12-foot lane widths. The Federal Highway Administration’s publication, *Mitigation Strategies for Design Exceptions* (July 2007, chapter 3) states: “Narrower lane widths may be chosen to manage or reduce speed and shorten crossing distances for pedestrians. Lane widths may be adjusted to incorporate other cross-sectional elements, such as medians for access control, bike lanes, on-street parking, transit stops, and landscaping. The adopted ranges for lane width in the urban, low-speed environment normally provide adequate flexibility to achieve a desirable urban cross section without a design exception.”

However, NHDOT policy is to stripe lanes at 12 feet or to the pavement edge if 12 feet cannot be accommodated with available pavement. Given the narrow and unchanging distance between buildings on many urban streets, maximum traffic lane widths often leave no room for widening sidewalks, installing bicycle lanes, center medians, or intersection bulb-outs, replacing storm sewers with more environmentally-friendly stormwater treatment, adding street furniture, trees or other aesthetic improvements, and much else that would make streets more attractive and useful.

Practice of this policy is evident along many of the numbered routes in the Lakes Region where pavement is too narrow to accommodate 12-foot lanes. Striping often follows the pavement edge, yielding variable lane widths along many segments. Other sections of road have been striped at widths much greater than 12 feet. In some places this is driven in part by intersection design and other factors, and may be somewhat defensible, but wide travel lanes promote higher speeds which are exponentially associated with higher risk of pedestrian fatality, as shown in Figure 20.<sup>24</sup>



**Fig. 20 - Pedestrian injury severity as a function of vehicle speed**

<sup>24</sup> Chart data from FHWA Traffic Advisory Unit, 1993

Fortunately, recent research has proven that narrower lane widths neither reduce safety nor lower through-put. In fact, they may even be safer. Unfortunately, while NHDOT policy is slowly beginning to recognize these facts, road design practice still uses 12 feet as a default. As a result, too many roads are being built or rebuilt absent due consideration, or promotion of other travel modes.

### Research Results Concerning Safety of Narrower Lanes:<sup>25</sup>

Boston's *Livable Streets Alliance*, an advocacy group for safer more inclusive design, has conducted a literature review on lane widths. Some of their findings are included here.

“Wider traffic lanes provide vehicles more room to avoid collisions, but they increase traffic speeds, which increases crash risk and severity. Annual crash rates per vehicle-mile tend to be lowest for relatively narrow (about 10-foot) lane widths, and are highest on wider, lower volume, straight streets with higher traffic speeds.” (Swift, 1998; Zegeer, et al, 1994; CTRE, 2006).

“For multilane urban arterials and multilane rural arterials, the expected difference in substantive safety for variations in lane width is much less, on the order of a few percentage points, when comparing lane widths of 10 to 12 feet.” (*FHWA, Mitigation Strategies for Design Exceptions – July 2007, Chapter 3*)

“All projects evaluated during the study that consisted exclusively of lane widths of 10 feet or more resulted in accident rates that were either reduced or unchanged.” (NCHRP 330, *Effective Utilization of Street Width on Urban Arterials*, Transportation Research Board, 1990.)

“A safety evaluation of lane widths for arterial roadway segments found no indication, except in limited cases, that the use of narrower lanes increases crash frequencies. The lane width effects in the analyses conducted were generally either not statistically significant or indicated that narrower lanes were associated with *lower* rather than higher crash frequencies... There is no consistent, statistically significant relationship between lane width and safety for midblock sections of urban and suburban arterials. There is no indication that the use of 10- or 11-ft lanes, rather than 12-ft lanes, for arterial midblock segments leads to increases in accident frequency... There is no consistent, statistically significant relationship between lane width and safety for approaches to intersections on urban and suburban arterials. There is no indication that the use of 10- or 11-ft lanes, rather than 12-ft lanes, for arterial intersection approaches leads to increases in accident frequency.” [emphasis added] (Ingred B. Potts, Harwood, D., Richard, K., *Relationship of Lane Width to Safety for Urban and Suburban Arterials*, Transportation Research Board, 2007 Annual Meeting.)

“As more arterial and collector lane widths are increased up to 12 feet or more, traffic fatalities and injuries increase... These results are quite stunning as it is general practice to ‘improve’ the safety of roads by increasing lane widths.” (research presented by Dr. Robert B. Noland at the Transportation Research Board’s annual meeting in 2008.)

### Research Results Concerning Capacity of Narrower Lanes:<sup>26</sup>

The “official” *Highway Capacity Manual* issued by the Transportation Research Board in 2000 claims that the capacity (saturation flow rate) of a lane at a signalized intersection is reduced by 3.33 percent for each foot of lane width less than 12 feet. A 10 foot lane should only be able to carry 93 percent of the traffic of a 12 foot lane.

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<sup>25</sup> From Steve Miller's Blog THE PUBLIC WAY: transportation, health, and livable communities. *The Magic Bullet of Road Design: Narrower Lane Widths* posted on September 28, 2009 at [www.blog.livablestreets.info](http://www.blog.livablestreets.info)

<sup>26</sup> Same as 24

However, the city of Cambridge, Massachusetts put the Central Square section of Massachusetts Avenue, the city's heaviest travelled street, on a "road diet" cutting it from 4-5 lanes down to 2-3 (width varies along the length), reprioritizing the space for pedestrians, bicyclists, and transit. Despite this drastic reduction of official capacity, by carefully synchronizing traffic lights the city was able to maintain throughput at about 21,000 vehicles per day ADT. In other words, allowing cars to go fast merely speeds up their arrival at the next red light while maintaining a steady, even if slow, forward motion ends up moving just as many cars while increasing safety for everyone.

In the Lakes Region, much of the statewide bicycle route system and regional route system follow roads that have shoulders of two feet or less. While pavement widths and available funds may not allow for consistently designed state and rural roads with respect to travel lane and shoulder widths, there is great potential to achieve some marginal gains in available shoulder space by striping lanes at 11-feet or less along these routes, as can be seen in Figure 21.



**Fig. 21 - Conceptual rendering of a lane width modification along NH Route 113 in Holderness. Existing 11½ - 12 foot lane is shown above. Proposed solution with 10½ - 11 foot lane using existing pavement is shown below, with added Share the Road signage.**

The costs of striping narrower lanes would be minimal compared to the often cited high costs of designing and building pedestrian and bicycle facilities, but the benefits would be very high including safer options to comply with the "3 foot rule". Cyclists and pedestrians use these roads despite their hazardous conditions, and while 4-foot shoulders may not be achievable everywhere, an extra foot or 18 inches of space provides a lot of additional comfort to riders and walkers who are traveling along debris strewn edges and sometimes inches away from precipitous pavement drop-offs.

Narrower lanes would also create visual constraints for motor vehicles and would likely reduce vehicle speeds by a small, yet meaningful amount, creating safer rural corridors for all users. Table 5 below shows the impact that reduced speeds have on collision rates.<sup>27</sup>

**Table 5 – Decline in collisions as a function of speed reduction**

Speed Drop	Collision Drop
1 mph	5 percent
3 mph	15 percent
6 mph	42 percent

Many public meeting attendees voiced strong interest in striping narrower travel lanes to provide marginal gains in shoulder space. Many also acknowledged that this was a low cost solution, as well as an understanding that it is not easy or economically feasible to construct all roads to more pedestrian and bicycle friendly standards. Narrower lane widths are viewed as the low hanging fruit for designing more livable streets.

Lane Width Modifications:

In 2009 a few towns in New Hampshire made lane allocation modification requests to NHDOT that resulted in narrower lane widths and striping configurations that are more pedestrian and bicycle friendly:

- ❖ Pembroke – a four mile section of NH 106 in Pembroke was planned to be re-striped with three 12-ft lanes but was retained in its existing configuration of two 12-ft lanes with two 6-ft shoulders upon local review
- ❖ Hopkinton – lane widths through the village were reduced to 10 feet upon request
- ❖ New London – moved yellow line one foot closer to curbed median to gain additional shoulder space

According to NHDOT's Intermodal Facilities Engineer:

*“Municipal requests for lane allocation modifications of re-surfaced highways will be granted. Without a community driven effort to reallocate space, the Department lays out the lane allocation similar to whatever it was prior to the resurfacing. This usually means 12-foot or wider travel lanes wherever the total pavement width can support white lines at 12 feet or more from the centerline.”<sup>28</sup>*

This is a very important and somewhat obscure state policy that bicycle and pedestrian proponents and local leaders may be unaware. In essence, this policy provides an opportunity for residents to

<sup>27</sup> A.J. McLean, et al., “Vehicle Travel Speeds and the Incidence of Fatal Pedestrian Collisions,” *Accident Analysis and Prevention*, Vol. 29, No. 5, 1997, pp. 667-674.

<sup>28</sup> Email correspondence with Larry Keniston, NHDOT Intermodal Facilities Engineer, on December 1, 2011

inform their local leaders on the impacts of default road designs and ask them to request alternative designs.

Hebron citizens, through Newfound Lake Pathway, have already expressed interest in lane space reallocation along NH Route 3A for the 2012 resurfacing program. Nearly 4.6 miles of NH Route 3A is now on the preliminary list for resurfacing in 2012, though this list has not been finalized. Some other striping alternatives that communities may consider include:

- ❖ Stripe offset from center median. 2-foot spacing is standard, but 1-foot spacing can be achieved, yielding extra room on the outboard edge of the road. This was successfully employed in New London
- ❖ Removal of center turning lane to provide shoulder space. For example, there are many intersections in the region where a turning lane has been installed to serve one business, but many school driveways that do not have an associated turning lane. These schools experience dependable morning and afternoon congestion.

NH DOT provides a **Repaving Schedule** and map on their website at:

<http://www.nh.gov/dot/org/projectdevelopment/materials/documents.htm>

Often, requests are made at the last minute after resurfacing signs are posted along sections of roadway. Residents and municipal officials should consult this repaving schedule and determine in advance if striping plans need to be revised to meet the needs of the community.

### **Bicycle Routes and Maps**

The 2006 Bicycle and Pedestrian Plan included a map titled, *The Lakes Region Connector and On-Road Bicycle System*. This map showed the statewide bike routes in the region and the regional bike routes, along with the proposed Lakes Region Connector and other Multi-Use Trails. It did not include any information on road conditions for cycling and did not distinguish between completed and proposed sections of multi-use trails. Similarly, the state bicycle routes map for the Lakes Region, prepared by the NHDOT in 2002, does not provide any information on conditions or safest routes. Frustration with the usefulness of these maps was a leading concern expressed at public meetings. While local riders tend to have established routes, chambers of commerce, bike shops, and tourism boards need useful information to provide. Proprietors of lodging and local economic development groups expressed a strong interest in maps that depict safer routes, and completed sections of trail. Many also suggested that regional walking destinations (hiking trails, parks, and conservation areas) be included on a map along with bike shop locations.

LRPC has developed a new map in an attempt to provide more useful information that addresses some of these concerns. The map shows paved shoulder width as reported in NHDOT data released in May 2011. Whether the shoulder width data were updated in 2011 or represents older data remains unclear. Initial review by the Lakes Region Transportation Advisory Committee suggests that the data do not seem to fully represent true road conditions.

The purpose of the map is to show road shoulder width on both sides of major roads in three categories; 0-2 feet, 3 feet, and 4 feet or greater. The map also shows roads segments with 0-2 foot shoulders that *could* have larger shoulders if existing lane widths were reduced to 10 feet. The purpose of this analysis is to highlight the potential of the existing road system to better accommodate on-road cycling through the consistent application of 10-foot lane widths – a dimension referenced in the “Green Book” as appropriate. The methodology for this analysis of NHDOT road data is included with the map in Appendix E. Please contact LRPC with questions or suggestions regarding this map.

While this represents an assessment of existing infrastructure, it does not identify popular or preferred routes of users. For example, many of the lakes provide natural loop routes, and cyclists ride these routes regardless of conditions. In other places, local cyclists have identified safe, comfortable alternative routes that they prefer, but these are not publically available.

### **Sidewalks**

Sidewalks in the Lakes Region mostly exist in the downtowns of the larger communities. A few of the smaller and more rural communities of the region still have no sidewalks at all. Some attendees of public meetings expressed an aesthetic preference for no sidewalks as a way of maintaining the character of their villages. Many of the existing sidewalks are in fair to poor condition and do not meet American Disabilities Act (ADA) requirements, especially at intersections with respect to the outward slope of sidewalks, and the design of ramps connecting sidewalks to crosswalks. The crosswalk in Figure 22 at the intersection of NH Route 25 and NH Route 25B in Center Harbor is an extreme example of an inadequate sidewalk “ramp” connecting to a crosswalk on a busy route.

Many new sidewalks have been designed and installed to higher standards in some of the larger communities, but not all of the region's schools are accessible by sidewalk, even along high volume roads. A leading concern voiced at public meetings regarding pedestrian safety was improved connectivity between reasonable community destinations. Many parents in attendance expressed dismay and dissatisfaction with the safety of community streets, partly due to the lack of sidewalks to schools and village destinations. Many felt that the lack of safe walking and biking areas for children and families was one of the few things that made the Lakes Region a poor place to raise a family.

Sidewalks should have a buffer where possible, providing additional separation from the road. Curb cuts should be kept as small as possible, and sidewalks should not cross driveway slopes but should be level at the top of driveway slopes. Sometimes space constraints make this difficult, but where possible better sidewalk design should be



***Fig. 22 – Storm drain and gravel in NH Route 25 crosswalk where safe sidewalk ramp should be located.***

employed. There are far too many corner lot businesses in the Lakes Region where the entire perimeter of the lot is driveway access.

One particularly vexing dilemma regarding new sidewalk construction hinges on maintenance responsibilities. Towns are rejecting NHDOT concept plans that include new sidewalks because they are required to sign a maintenance agreement in order for federal funding to be applied to the project. Because of this, sidewalks are being viewed as fiscal liabilities first, and community resources second. Many towns feel that NHDOT should bear the responsibility of maintaining sidewalks if they build them in their own right-of-way, but the department doesn't have the resources to do this.

Consequently, opportunities for new sidewalks are being passed up by communities that cannot commit to maintaining them. Incidentally, of 191 survey respondents, 81 percent thought local governments should be responsible for maintaining and improving places to walk and bike, while 59 percent thought the state should be responsible. This is an over-simplified perspective on a complicated issue, but it does suggest that people expect local decision makers to contribute to providing safe places to walk and cycle.

### **Lakes as Destinations for Cycling**

It is not uncommon to hear people refer to the lakes of the region as the engines of economic development. Simply put, the lakes are a primary driver of residential settlement, tourism, and commercial activity. Newfound, Winnepesaukee, Winnisquam, Squam, Webster, and Ossipee Lakes are all popular destinations for cyclists seeking loop rides. Conditions being equal (which they are not), there is a draw to encircling a natural feature that can elevate these routes over more arbitrary routes. Lake routes also provide convenient access to water for multi-sport events like triathlons. There are many notable triathlon events in the Lakes Region each year, and many feel that with the attraction of the natural resources of the region, there could be more or bigger events if the routes were more easily rideable for training and recreation. The Mooseman Triathlon includes a route around Newfound Lake, and the Timberman Triathlon events that are stationed in Ellacoya State Park in Gilford utilize routes that have the widest shoulders. Wolfeboro hosts a triathlon each year known as the Granite Man.

Survey respondents indicated that recreation and exercise are top reasons for cycling, and more than 42 percent indicated that they ride further than 10 miles on average outings. This interest combined with lakes of different size suggest that improvement to lake routes should be considered where feasible. While there is no route around Lake Winnepesaukee offering comfortable conditions the whole way, many bike around the state's largest lake every season since it is such an attractive destination and convenient distance for event training, offering hill climbs, descents, and rewarding vistas.

### **Intersections and Crosswalks**

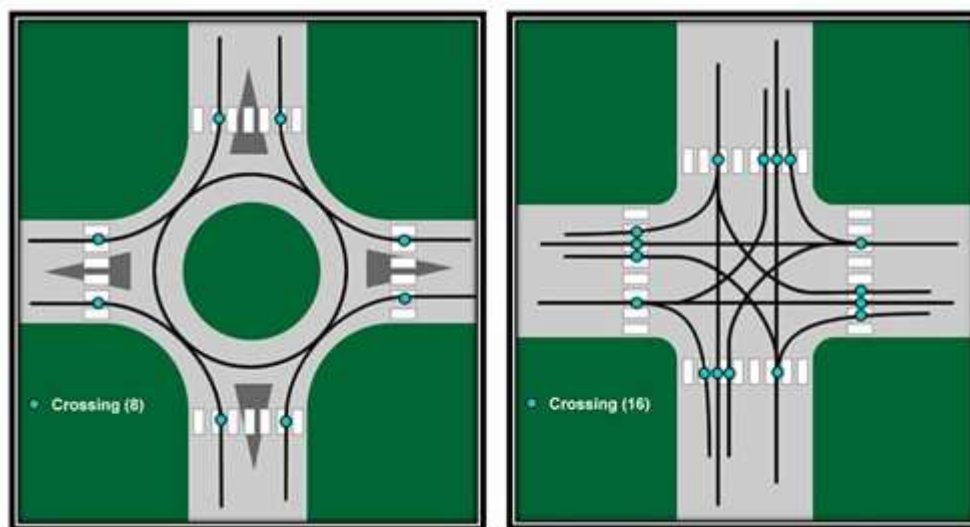
Intersections provide excellent opportunities to calm traffic speeds without reducing vehicle throughput, whether at small urban intersections or larger state highway intersections like US Route 3 and NH Route 106, in Meredith, where a modern roundabout smoothes flow and calms traffic. Because pedestrian crossings are most common at intersections, where speeds are slower, opportunities to reduce pedestrian exposure should be maximized. This can be done through reducing crossing distances, minimizing the number of potential conflicts with vehicles, improving pedestrian visibility, and calming traffic through design. Some examples of traffic calming measures



at intersections are included in figures 23-26. The Lakes Region has a few good examples of traffic calming through street design, but the majority of crossings have not been augmented other than through the use of various crosswalk striping, and many of those are adjacent to parking that obscures pedestrian visibility.

While pedestrian traffic calming devices have great potential for improving the pedestrian environment, they do not guarantee that motorists will slow down or yield to pedestrians. The best way to ensure for safe vehicle speeds is through design that limits effective speeds.

Roundabouts reduce the number of potential conflicts that pedestrians have with motor vehicles, as can be seen in Figure 23, and calm traffic significantly as a result of the raised center island and offset approach lanes in some instances.



*Fig. 23 - Potential pedestrian crossing conflicts with moving vehicles*<sup>29</sup>

Intersections should be built with bulb-outs as a way of more safely and legally accommodating on-street parking near crosswalks, and to reduce pedestrian exposure time. Bulb-outs (see Figure 24) can also help to address sight distance problems associated with historic road alignments and corner building locations by moving the stop line further into the intersection. They allow cars improved line of sight, and place the pedestrian in a more conspicuous position. The intersection of High Street with Main Street in downtown Meredith is a good example of a high volume pedestrian intersection with poor visibility and multiple conflicting vehicle movements associated with offset intersections to either side, and on-street parking with high turnover rates. This intersection is at the corner of a library and post office, with high foot traffic and has sight distance constraints related to the buildings, utility poles, and parking.

<sup>29</sup> [http://safety.fhwa.dot.gov/intersection/roundabouts/presentations/safety\\_aspects/short.cfm](http://safety.fhwa.dot.gov/intersection/roundabouts/presentations/safety_aspects/short.cfm)

Speed tables, like the one shown in Figure 25, consist of elevated crosswalks or entire intersections. They improve visibility and create a visual obstacle that reduces vehicle speeds. They can be especially effective in slip lane crossings with high pedestrian volumes, where vehicle speeds may increase in anticipation of an easy right turn.



*Fig. 24 – Intersection in Meredith where corner bulb-outs could improve pedestrian and driver visibility.*



*Fig. 25 – Mid-block speed tables can be a good solution for high volume boulevards with high pedestrian volumes, like US Route 3 in Meredith*

Clearly striped crosswalks with reflective white paint are more visible to drivers than colored stamped asphalt or solid painted colors. Mid-block crossings, like the one pictured in Figure 26 should utilize high visibility cross-walks and bump-outs for the same reasons as at intersections.



*Fig. 26 – Mid-block crossing with bump-outs and a high visibility bollard*

Intersections that are controlled with a pedestrian signal should include a leading pedestrian phase so that pedestrians can get out into the road before turning traffic has a green light. This gives

pedestrians a start across the road and makes them more visible to drivers. Pedestrian crossings with a leading signal are associated with fewer pedestrian injuries and reduced injury severity.

Intersections should minimize delay to pedestrians in order to avoid riskier crossings. They should minimize exposure through short crossing distances, leading signals, and use of protective refuges like center medians or islands. Intersections should elevate both car and pedestrian visibility, and should calm traffic through the use of visual and physical constraints. While some of these traffic calming measures make snow removal more difficult, snow removal considerations needs to be weighed against the broad community health and economic benefits of walkable streets.

## CHAPTER 6: ECONOMIC BENEFITS OF WALKABLE & BIKEABLE COMMUNITIES

*“An aging population; rising fuel costs; congestion, health, and environmental concerns; and changing consumer preferences are all increasing demand for walking, cycling, and public transit.<sup>30</sup> These trends indicate that an integrated multi modal transportation system is required if we are to meet future travel demands.”*

*~America Needs Complete Streets, by Dan Burden and Todd Litman<sup>31</sup>*

The total estimated cost for improvements identified in the Design Supplement to this report, as developed by the consulting firm, Resource Systems Group, Inc. (RSG) is approximately \$10,000,000. During the development of this plan, and in reviewing these conceptual improvements and estimated costs, town officials often expressed skepticism about investing in bicycle and pedestrian improvements at this time. Many public meeting attendees also expressed this concern, regardless of their interest in the improvements. In challenging economic times, with severely constrained local and state government budgets, every public expense is scrutinized. This chapter highlights some of the meaningful economic and employment benefits of walkable and bikeable communities.<sup>32</sup>

### **Employment Impacts**

Research on in-state employment impacts of pedestrian and bicycle infrastructure investments in 11 US cities in 11 states, including Concord, NH, was conducted by the Political Economy Research Institute (PERI) of the University of Massachusetts, Amherst in 2011. The study looked at 58 projects and estimated the direct, indirect, and induced employment created through the design, construction, and materials procurement of bicycle, pedestrian, and road infrastructure.

This study was a follow-up to a 2009 study of the needs and job creation effects of public investments in a wide variety of infrastructure projects. The 2009 study did not look at bicycle and pedestrian infrastructure projects, and the authors discovered that no such studies had ever been completed. The 2011 study by UMASS PERI was the first of its kind.

The 58 projects in 11 cities evaluated seven different project categories for the number of jobs created within each state, per \$1 million in project cost. The results of the analysis showed that bicycle-only projects in the study created the most jobs per dollar, and that road-only projects created the fewest jobs per dollar. Spill-over employment created in other states through the supply chain adds on average 3 additional jobs per \$1 million.

For the five projects in Concord, NH, three pedestrian-only projects created 28 percent more jobs than two road-only projects studied. This is a small sample but the results in Concord are consistent with the job creation rates of the national study which are summarized in Table 6.

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<sup>30</sup> Todd Litman. “Changing Travel Demand: Implications for Transportation Planning,” *ITE Journal*, September, 2006.

<sup>31</sup> Dan Burden and Todd Litman. “America Needs Complete Streets,” *ITE Journal*, April 2011

<sup>32</sup> It is important to consider that the costs of repairing and retrofitting existing facilities are much greater than designing and engineering more complete streets from the beginning. The legacy impacts of infrastructure designed primarily for cars are significant, and it will take time to design and build better facilities.

**Table 6 – Jobs created within state per \$1 million by infrastructure project type<sup>33</sup>**

Project Type	Number of projects	Direct jobs per \$1 million	Indirect jobs per \$1 million	Induced jobs per \$1 million	Total jobs per \$1 million
Total, all projects	58	4.69	2.12	2.15	8.96
Bicycle infrastructure only	4	6.00	2.40	3.01	11.41
Off-street multi-use trails	9	5.09	2.21	2.27	9.57
On-street bicycle and pedestrian facilities (without road construction)	2	4.20	2.20	2.02	8.42
Pedestrian infrastructure only	10	5.18	2.33	2.40	9.91
Road infrastructure with bicycle and pedestrian facilities	13	4.32	2.21	2.00	8.53
Road infrastructure with pedestrian facilities	9	4.58	1.82	2.01	8.42
Road infrastructure only (no bike or pedestrian facilities)	11	4.06	1.86	1.83	7.75

The main reasons why employment impacts of pedestrian and bike projects appear to be greater than for road projects is variation in labor intensity. Labor intensive industries like construction and engineering spend a proportionally greater amount on salaries and wages than capital intensive industries like cement manufacturing, where more money is spent on materials. Bicycle and pedestrian projects have a greater proportion of costs associated with engineering and construction than with materials.

The employment impacts estimated by the PERI study are limited to design and construction related jobs, but revenue and jobs for local bike shops, other businesses and jobs associated with maintenance of these facilities are excluded. Anecdotal evidence from within the Lakes Region indicates that these additional local economic multipliers are reasonable (p.47).

These findings should be used to inform state decision-makers on the merits of preserving federally apportioned Transportation Enhancement (TE) funds for pedestrian and bicycle projects. While adequate road maintenance must also remain a priority, the PERI study suggests that diminishing the state's available federal TE dollars, as some may advocate, would weaken in-state employment opportunities associated with investing in bicycle and pedestrian projects. While TE funds can be applied to a number of different programs, the lion's share of these funds have gone to bicycle and pedestrian projects in New Hampshire.

<sup>33</sup> Heidi Garrett-Peltier "Pedestrian and Bicycle Infrastructure: A National Study of Employment Impacts," Political Economy Research Institute, University of Massachusetts, Amherst, June 2011

In 2011, VTTrans (Vermont's State Transportation Agency) and a consultant team comprised of Resource Systems Group, Inc., Economic & Policy Resources, and Local Motion published a working paper, titled, *Economic Impact Study of Bicycling and Walking in Vermont*. The study included a comprehensive assessment of the direct and indirect costs (i.e., consumer out-of-pocket costs and travel time costs, as well as external public impact costs associated with health, congestion, crashes, parking, land value, air pollution, road facilities, etc.) of bicycling and walking in Vermont.

The VTTrans study modeled the transportation system cost savings of avoided automobile travel (consumer and public costs), and the added consumer and public costs of walking and biking, based on the assumption that all existing walking and biking trips replace automobile trips. While the modeling has inherent limitations, such as the over-simplified assumption that all walking and biking currently replaces vehicle trips, it shows a substantial net benefit of walking and biking in Vermont, on the order of \$34 million to \$84 million, annually, depending on how travel time is evaluated. Either way, the result on the state's economy appears to be strongly positive, and the findings suggest that larger mode shares for walking and bicycling would have net positive impacts on employment and wages.

The study estimated that 14.9 direct and indirect jobs were created per \$1 million spent on pedestrian and bicycle facilities in the state, with an average wage of \$42,500 per job. It estimated that 235 jobs were a direct result of the \$15.8 million spent on pedestrian and bicycle facilities. It also showed that there were approximately 24 direct or indirect jobs created per \$1 million in spending associated with over 40 biking and walking events in the state, for which most participants came from out of state.

### **Impacts on Real Estate Sales**

The VTRANS study also compared the popular Walk Score® walkability index with 18,500 residential real estate closings over a three year period. Walk Score® is a rating from 0-100 of the walkability of a certain area based on proximity to services and businesses (cafes, grocery stores, banks, parks, schools, shopping, restaurants, entertainment, library, etc.).<sup>34</sup> The study showed that the effect of walkability on real estate value is a function of job density, and that walkability has a significant positive effect on property values in areas with job densities of 110 jobs per square mile or more. In the Lakes Region, this would likely include downtown areas of Laconia, Franklin, Tilton, Wolfeboro, and Meredith, and possibly others. The study showed that walkability scores of 50-100 were estimated to increase the value of residential property by \$4,400 to \$7,600 in job-dense areas.

Walk Score® does not evaluate accessibility or safety, but does provide an indication of the potential for walkability, given safe and accessible pedestrian and bicycle accommodation. It has been used in a number of real estate impact studies for larger metropolitan areas, but the Vermont study has identified a relevant metric in job density, applicable to New Hampshire and to the Lakes Region. Table 7 lists the WalkScore® of eight locations in the Lakes Region. Locations with high job densities may be able to support property values through investment in resources and services that contribute to WalkScore® and through investments in pedestrian accessibility.

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<sup>34</sup> [www.walkscore.com](http://www.walkscore.com)

**Table 7 – The Walk Score® of a few of the more densely settled areas of the Lakes Region**

Location	Walk Score
Main Street, Laconia	83
Lakeport, Laconia	54
Weirs Beach, Laconia	38
Downtown Wolfeboro	85
Downtown Meredith	74
Downtown Tilton	62
Downtown Franklin	68
Central Square, Bristol	69

Many studies have shown that bicycle and pedestrian paths also have small but significant positive impacts on property values. In many cases, as was the case with the Cotton Valley Trail in Wolfeboro at the time, new initiatives for the creation of walking and biking paths can meet resistance from abutters and nearby property owners who worry that property values may be negatively impacted, that there will be loss of privacy, and a potential increase in crime in their neighborhood. Successful support for trail projects depends partly on proponents understanding and effectively communicating what is known about the positive impacts of bicycle and walking trails. Many studies on this topic have shown a slight, though statistically significant<sup>35</sup> increase in both sale value and ease of sale (reduced days-on-market) for properties close to trails. Some of the findings of these studies include:

- ❖ A study of the perceived impacts of a recreational trail in Midland County, MI showed that 80 percent of nearby businesses felt that the trail had very positive impacts on their business. Twenty-eight percent of nearby residents felt that the trail would reduce the selling time of their home, while most others felt it had no effect.<sup>36</sup>
- ❖ A study of the impact of two rail-trails on nearby residential property in Massachusetts found that homes near trails were on the market for 42 percent fewer days than more distant homes, and that homes near trails sold 1.3 percent closer to the list price than more distant homes.<sup>37</sup>
- ❖ A study of property value and desirability effects of bike paths in Delaware found that proximity to bike paths was related to a slight increase in sale prices, of about \$8,800.<sup>38</sup>

<sup>35</sup> With property values, increases of 1-2 percent are small on a percentage basis but statistically significant in the studies that have analyzed them (see 36 and 37 below) Small percentage gains can be significant on a dollar basis as well. A \$300,000 property that increases in value by 1¼ % will increase by \$7,500.

<sup>36</sup> C. Vogt, A. Van der Woud, et al. *Midland County Nearby Businesses and Adjacent Residential Landowners' Attitudes Towards and Use of the Pere Marquette Rail-Trail in Michigan*. Michigan State University Department of Park, Recreation and Tourism Resources, 2002

<sup>37</sup> *Home Sales near Two Massachusetts Rail Trails*, Craig Della Penna, The Murphys Realtors, Inc. Northampton, MA 2006

<sup>38</sup> David P. Racca and Amardeep Dhanju *Property Value/Desirability Effects of Bike Paths Adjacent to Residential Areas*. Prepared for Delaware Center For Transportation and The State of Delaware Department of Transportation. Center for Applied Demography & Survey Research, University of Delaware, 2006

### **Evidence of Positive Impacts in the Lakes Region**

The Nordic Skier bike and ski shop in Wolfeboro experienced a tremendous increase in business in response to the mere publicity of the planned completion of the Cotton Valley Trail, many years ago. The planned completion of this trail was publicized nationally and received so much attention that people came to the region to ride the trail and stay for the weekend in local lodging, only to find out that it had yet to be completed. It is still a major draw as a local recreational option for weekenders who mix lake recreation and area exploration as part of their visits. It is a core element of the set of activities people do in the Wolfeboro area. In the summer the Cotton Valley Trail sees 400-600 daily users in addition to the local traffic.<sup>39</sup> It is so busy now that many locals avoid it in the summer. According to employees of the Nordic Skier, bike rental business in Wolfeboro has boomed. They now predominantly rent cruisers and hybrid bikes to recreational and fitness riders, young and old.

There has been a natural shift from mountain biking back to road and trail interest over the last decade, and local bike shop owners have indicated that there is now a significant demand for recreational road cycling options that the region's current road conditions do not support. The Nordic Skier shop reports that cyclists from out of town frequently bring in just their pedals and rent road bikes for regional rides. Nordic Skier employees simply twist them on and send their clients off on roads they wish were safer and more accommodating.

In Laconia, the owners of MC Cycles and Chain Line Cycles both report a local 'buzz' generated by the first phase of the WOW Trail. MC Cycles reports that every summer week people come in looking for trails and places to ride. Both of these businesses anticipate the expansion of The WOW Trail and the construction of the Winnisquam Scenic Trail to correlate with an expansion of their businesses, providing enough demand to support a rental fleet and associated insurance policies.

According to the Wolfeboro town planner and Wolfeboro Pathways leaders, the Sewall Woods and Abenaki cinder dust trails have been a huge local draw. Sewall Woods used to be a backwoods, sleeping giant of a recreational resource - a place to tromp in the muck in solitude. Now it is much busier, with dog walkers, orienteering groups, summer fun run events on weekends, and kids and older folks on bikes and in wheelchairs.

### **Scenic Byways and Economic Development**

It is not hard to imagine that the same people who may be renting bikes and visiting to use trails are also eating lunch, cooling off with cold drinks in air conditioned shops and restaurants, and spending time visiting the areas of the Lakes Region on foot. This kind of visitation, whether from tourists or local residents, is particularly important in the Lakes Region, where the lakes and recreational resources are the engine of the seasonal tourist economy, and where a State Scenic Byway exists around Lake Winnepesaukee.

Scenic Byways, if marketed effectively, have the potential to draw visitors from outside the region, to drive the roads between village centers, or to cycle the scenic routes with rewards of exceptional vistas. Attractive and walkable destinations along a scenic byway are one key to successful marketing and to creating a positive experience for visitors. LRPC recently secured funding from the Federal Highway Administration (FHWA) to develop a Lakes Region Scenic Byway Corridor Management

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<sup>39</sup> According to Wolfeboro town planner, Rob Houseman, December 2011.



Plan, over the next two years. Walking and cycling fits right in with the goals of successfully stewarding the byway as an economic development resource.

In 2008 the Adirondack North Country Association (ANCA) completed the *Adirondack North Country Scenic Byways Market Trend Assessment*. The main goal of the assessment was to identify visitation trends that have the greatest potential for future success of regional scenic byway tourism and that maximize return on marketing investments for ANCA, the scenic byway communities and for the many businesses serving travelers within those communities.

While not necessarily representative of visitation trends in the Lakes Region, survey results from a comparable recreational destination in the northeast show the economic development potential of a popular scenic byway, and the role for pedestrian and bicycle planning to support this kind of regional tourism resource. Key survey findings included:

- ❖ 32 percent of respondents said it was their first visit to the region

Importance – Successful scenic byways can draw significant visitation and spending from out of state

- ❖ Visitors have strong emotional connections to the region. Many respondents mentioned first coming when they were children and wanting to relive those experiences. Others were in the area to attend weddings, reunions, for honeymoons and anniversaries, and to fulfill annual traditions.

Importance – Positive emotions, including nostalgia, play key roles in ways consumers make decisions on experiential products, including vacations. The built environment can facilitate positive experiences in return visitation.

- ❖ After the importance of scenery and views, the next most important category visitors identified related to outdoor activities were recreation (gentle activities), wildlife viewing and adventure.

Importance - These nature based and outdoor activities—walking, bicycling, paddling, camping, hunting and fishing, winter activities, and wildlife viewing—contribute \$38 billion to the Northeast U.S. economy annually. Numerous low-cost, diverse, and easy-access opportunities for outdoor recreation are provided by the many trailheads, wildlife viewing areas, and water access sites that are readily available along the Scenic Byways in the Adirondacks. Much of that valuable infrastructure exists because of, and is maintained by, local governments or the state.

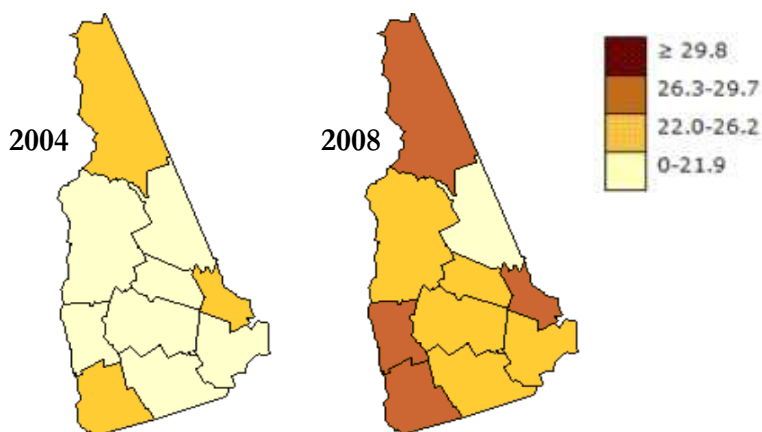
- ❖ The vast majority of responses to questions about enjoyable, surprising, and disappointing memories had to do with experiences within communities, at destinations, and within or while viewing the natural environment, rather than experiences within motor vehicles.

Importance – Byways can draw visitors, but their experiences, which influence their likelihood of return visitation and recommendation to others, are shaped largely by interactions with places, businesses, people and their surroundings, not by the roadway itself.

**External Costs Avoided**

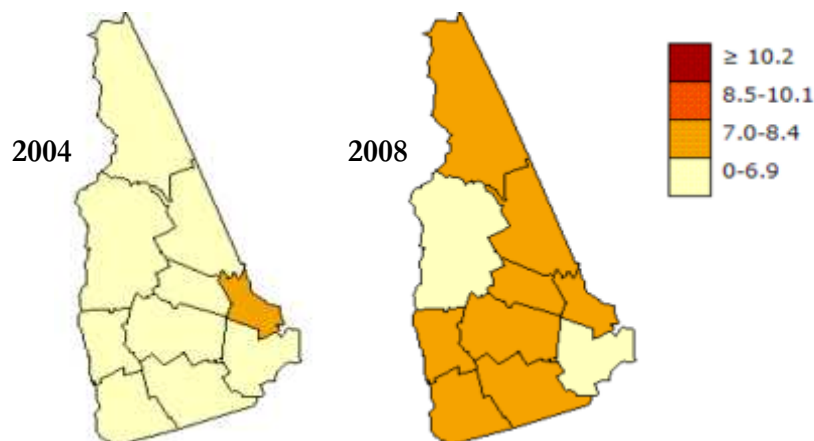
A public health crisis is driving diabetes and obesity rates up in New Hampshire and in the Lakes Region. From 2004 to 2008 observable increases in the rates of obesity and diabetes have occurred in the Lakes Region, according to data from the Center for Disease Control and Prevention (CDCP). During the same time, there has been a decrease in leisure-time physical activity in Belknap and Grafton Counties. Since the mid-1990s rates of obesity and diabetes in New Hampshire have more than doubled. Obesity and lack of leisure-time physical activity are *the* two leading risk factors for diabetes. These data squarely indicate that the physical health of Lakes Region residents is declining, and that the health risks and associated costs could be mitigated by increasing leisure-time physical activity. (Refer to Fig. 27)

*Fig. 27– Adult obesity rates by NH county, as a percentage, as reported by the CDCP*



Diabetes is the leading cause of kidney failure, non-traumatic lower-limb amputations, and new cases of blindness among adults in the United States. It is also the seventh leading cause of death. In 2007, the estimated costs related to the 25.8 million cases of diabetes in the US were \$218 billion, or \$8,449 per person. If 7 percent of Lakes Region residents (roughly 7,900 people) have Type 2 diabetes, which the 2008 data indicate is a reasonable assumption (see Figure 28), then extrapolation of the national data, adjusted for inflation, suggest that the annual cost of diabetes in the Lakes Region would be approximately \$72 million. National data also indicate that medical expenses for people with diabetes are 2.3 times greater than for people without diabetes.

*Fig. 28 – Adult diabetes rates by NH county as a percentage, as reported by the CDCP*



While employer sponsored shares of health insurance premiums are attributable to national cost and health trends, individual costs are more directly a result of individual health and age. As a result of ongoing large increases in health insurance premiums, employers have sometimes needed to downsize jobs or ask employees to contribute more to the premiums. Better health outcomes, facilitated by a complete streets agenda, may contribute to reduced need for medical care, while resulting in improved individual and community health.

While not all diabetes cases can be prevented, the majority can be. Ninety-five percent of all diabetes cases are Type 2 diabetes. The Diabetes Prevention Program (DPP), a large prevention study of people at high risk for diabetes, showed that lifestyle intervention to lose weight and increase physical activity reduced the development of Type 2 diabetes by 58% during a 3-year period. The reduction was even greater, 71%, among adults aged 60 years or older.<sup>40</sup> Research has also shown that lifestyle interventions are more cost effective than medical interventions.

### **Conclusion**

Considerable scientific and qualitative research shows that there is a significant, positive direct and indirect relationship between bicycle and pedestrian facilities, and employment, economy, and health. While compelling reasons exist to maintain and support these facilities in general, they fit exceptionally well with current and future demographic trends in the Lakes Region. The associated employment and economic benefits of doing so and promoting the region as a destination for bicycle and pedestrian supported tourism are additional benefits of promoting walking and bicycling through the improvements to the built environment. The accommodation of safe and enjoyable walking and bicycling will not only help to meet expressed needs and support economic vitality, it will effectively provide a preventative measure against health decline, and support the future health and productivity of communities in the Lakes Region

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<sup>40</sup> Centers for Disease Control and Prevention. National diabetes fact sheet: national estimates and general information on diabetes and prediabetes in the United States, 2011. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2011.

CHAPTER 7:  
REGIONAL PLANNING RECOMMENDATIONS TO SUPPORT THE VISION

***A purposefully connected network of trails, sidewalks, road shoulders, and markings promoting safe and enjoyable bicycle and pedestrian mobility. Design and maintenance of livable, complete streets that support transportation, recreation, health, and economic interests throughout the Lakes Region.***

The following recommendations will help guide the Lakes Region Planning Commission's efforts to support the vision for livable streets and walkable communities. In order to foster active transportation and recreation in the Lakes Region and make substantial progress toward achieving the vision, state and municipal governments will need to commit to a culture of purposeful design and maintenance of streets that prioritizes safety for all modes. State agency leaders will also need to acknowledge that our streets and rail corridors are some of our most important and valuable recreational resources. They will need to collaborate and demonstrate that in addition to transportation, these assets can support statewide goals related to physical and mental health, public safety, and economic development. With state, regional, and local commitment to livable streets and walkable communities, the vision can be achieved.

Recommendations

- 1) Help communities articulate active transportation/recreation goals in master planning and identify opportunities to amend local road standards, land use regulations and zoning to foster appropriate bicycle and pedestrian connections.
- 2) Support community efforts to request lane allocation modifications (e.g. striping narrower lanes, etc.) from NH DOT on state roads in order to calm traffic speeds and provide wider shoulders for bicycles and pedestrians.
- 3) Continue to explore opportunities for "Share the Road" signs and other informational aids that help publicize reasonable clearance distances between vehicles and bicycles.
- 4) Continue to assist with development of Transportation Enhancement grant applications, Highway Safety Improvement Planning requests, and development of Safe Routes to School travel plans.
- 5) Incorporate review of local transportation plans for bicycle and pedestrian design elements into standard municipal technical assistance services.
- 6) Review and update regional bicycling and pedestrian plans on a regular basis.
- 7) Develop a process to disseminate useful bicycling and walking information and data on a regular basis. Examples may include a web component created and maintained for this purpose.
- 8) Pursue opportunities to develop an enhanced regional bicycle map showing useful information (related to conditions and safety, locations of bike shops, and completed and proposed sections of multi-use pathways) that can be distributed or made available to regional economic development and tourism organizations, municipalities, and other stakeholders.

- 9) Work with the NH DOT and local communities to support a process to identify the safest existing on-road bicycle routes and prioritize regional on-road routes needing improvement.
- 10) Promote walking, cycling, and complete streets in local context sensitive solutions for design and re-construction of state and local routes.
- 11) Provide assistance with pedestrian and bicycle data collection on off-street trails and paths throughout the region.
- 12) Encourage local and state officials to maintain a database of regional pedestrian and bicycle collision related injuries and fatalities.
- 13) Encourage municipalities to study the impacts of peak-parking demand to help communities more effectively manage parking through the promotion of techniques including shared parking allocation and maximum parking limits. One goal of this effort will be to identify underutilized parking space for potential re-use as pedestrian and bicycle connections.
- 14) Support the reestablishment of the NH DOT Statewide Advisory Board on Bicycle and Pedestrian Safety to ensure that standards and policies developed at the state level are implemented.
- 15) Support a state policy of creating usable shoulder width for bicycles and pedestrians through reduced lane widths and increased pavement widths along priority routes
- 16) Support efforts to connect off-road pathways with on-road bicycle and pedestrian routes.
- 17) Provide trail developers with corridor/route assessment assistance and information.
- 18) Encourage Brownfields assessment work at sites with potential to enhance existing pedestrian and bicycle accessibility.
- 19) Support regional transit providers and the Regional Coordinating Councils with bicycling and walking data and analysis to enhance transit service planning.
- 20) Coordinate with Lakes Region communities for increased participation in Bike/Walk to Work Week, and other programs that encourage active transportation.
- 21) Encourage NH DOT to support an economic impacts study of bikeable/walkable communities in order to support community decisions about constructing and maintaining infrastructure.
- 22) Integrate active recreation in the Scenic Byway Corridor Management Plan.
- 23) Continue to participate in the Safe Routes to School State Advisory Committee.
- 24) Promote and participate in educating the public on the value of active communities and healthy lives.
- 25) Communicate with railroad owners to identify opportunities for future trails.
- 26) Support an effort to work with cyclists familiar to the region, bike shop and chamber of commerce representatives, and other stakeholders to identify safe existing routes, and priority routes of regional importance (triathlon routes, long distance bike race routes, and circum-lake routes, for example) to be included with future maps.
- 27) Work with the Federal delegation, State legislators, and NHDOT staff to preserve or increase funding for NHDOT's Transportation Enhancement program

## APPENDIX A: HISTORIC PLANS RELATED TO BIKING AND WALKING IN THE LAKES REGION

### *Lakes Region, NH Bikeway System: Background Report (1982):*

In April 1982 the Lakes Region Planning Commission (LRPC), working in cooperation with the city of Laconia Planning Department, completed the *Lakes Region, NH Bikeway System: Background Report*. Funded by the US Department of Transportation, Federal Highway Administration, this report examined the opportunity to develop a 27-mile bikeway through 6 communities – Meredith, Laconia, Belmont, Northfield, Tilton, and Franklin. The purpose of the bikeway was to provide a safe and convenient alternative to automobile transportation, while at the same time providing economic benefits to the Lakes Region in the form of tourism and recreation. Although only covering a small portion of the area, this was arguably the Lakes Region’s first foray into regional bicycle and pedestrian planning, and serves as a major foundation for this 2011 planning effort, 29 years later.

### *Vacation Travel Background Report: Lakes Region, New Hampshire (1983):*

In 1983, the LRPC released a comprehensive report that examined the existing conditions, challenges and opportunities, and recommendations for future action regarding travel and tourism in the Lakes Region. The report established specific long-term goals for the Region, which included the preservation of scenic and rural qualities, the promotion of historic and cultural activities, continued promotion of tourism, recreation, and improvements of resort, commercial, and downtown facilities. The report also examined the barriers and challenges to transportation within the Region, recognizing that increased traffic congestion would have negative impacts on the travel and tourism industry, and recommended that the use of bicycles and bicycle touring through the Region be encouraged.

Of perhaps greater significance however, was the attention the report gave to linking the major natural resources of the region (scenic views, lakes, rivers, etc.) with future tourist development. Specifically, the report recommended that recreational activities such as bicycling and walking be encouraged to provide residents and visitors both “exercise and the quiet enjoyment of the region’s natural heritage”. The report identified that adequate bicycle and pedestrian facilities were sorely lacking throughout the Region.

Some of the major recommendations of the report related to bicycle and pedestrian planning included the following:

- Encourage communities to reinvest local tax revenues generated from tourism in the construction of recreation facilities such as jogging and bicycling trails.
- Recognize that tourists use several modes of travel while visiting the Region, and to expand the transportation network to include roads and highways, sidewalks, pathways, railroad tracks, boating facilities, and airport facilities.
- Make public improvements to bicycle and pedestrian travel. Pedestrian improvements could include the construction or widening of sidewalks, trees or other plantings, benches, curb ramps, crosswalks, signals, and signage. Bicycle improvements could include bicycle racks, road shoulder improvements, signage, and the creation of bike routes and pathways

- Recognize that downtowns and village centers play an integral role in the tourism industry in the Lakes Region, and that efforts need to be made to enhance pedestrian circulation so that after finding a place to park, tourists can walk to the businesses they intend to visit. Barriers should be removed, crosswalks should be safe, pathways should be well landscaped, and benches should be provided for both residents and tourists of the Lakes Region

*Lakes Region Transportation: Baseline Report (1986):*

In 1985 the LRPC, responding to a request by the New Hampshire Department of Public Works and Highways (now Department of Transportation) agreed to develop a comprehensive Lakes Region Transportation Program. The LRPC assumed the role of coordinating and furthering the activities of a newly created Regional Transportation Committee (now referred to as the Transportation Technical Advisory Committee or TAC). The first responsibility of the Regional Transportation Committee was to develop goals and objectives for the new Lakes Region Transportation Program. From those goals and objectives the Committee established specific transportation related tasks to be undertaken in the Program. One of the early tasks, funded through a grant from the State, was for the Committee and LRPC staff to collect data and develop an inventory of the existing regional transportation network. Because the ultimate purpose was to develop a comprehensive transportation plan for the Lakes Region, the focus of the data collection and inventory was on streets and highways, bridges, railroads, airports, and public transportation.

The body of the “*Lakes Region Transportation: Baseline Report*” presented no information regarding bicycle or pedestrian transportation. However, an appendix to that report contained a list of the goals and objectives originally identified for the first ever Lakes Region Transportation Program, which included the following:

- To encourage and support a multi-modal transportation system in the Lakes Region by:
  - Assisting and encouraging pedestrian movement with a sidewalk construction program with crosswalks in highly developed areas.
  - Encouraging the development and maintenance of transportation related facilities for recreation such as bikeways and jogging trails
- To give special attention to the natural environment and scenic qualities of the Lakes Region when considering transportation improvements by:
  - Promoting accessibility by a variety of modes to existing and future recreational facilities and open space in a way that enhances recreational pursuits
- To ensure the transportation system is compatible with energy conservation programs, clean air standards, and the enhancement of environmental quality and safety by:
  - Encouraging the development and use of safe bicycle facilities

*A Regional Transportation Plan for the Lakes Region (1991):*

The first Regional Transportation Plan for the Lakes Region was released in 1991, and built upon the data collected and presented in the 1986 Baseline Report. The 1991 Plan reaffirmed the goals and objectives contained in the 1986 document, with only one minor change that was unrelated to bicycle and pedestrian planning. The 1991 Plan was developed to continue the process to create a comprehensive transportation plan for the Lakes Region. The focus, however, remained on roads

and highways, and bicycle and pedestrian transportation was again not integrated in the planning process. , again,

*Lakes Region Tourism Profile (1995 and 2002):*

In 1995 the LRPC released a profile of tourism in the Region which would supersede the 1983 Background Report discussed earlier. This report was a significantly scaled back report, primarily focused on presenting data and existing trends in tourism throughout the nation, but most specifically in the Lakes Region of New Hampshire. As recognized in the 1983 report, the lakes and the natural resources of the Region are the primary reason for the strength in the tourism industry. The report also recognized the potential for heritage-and history-based tourism to play a larger role, and that biking and walking could play a part. For example, bicycle tours connecting historic places, or local heritage walking tours could all play a part in promoting tourism in the Lakes Region in the future.

The 1995 Tourism Profile also discusses the current trends in transportation in the state and Region. Unfortunately, the trends discussed are specifically focused on the automobile and its relationship to highways and roads, and goes as far as to indicate that “Once in the Lakes Region, a number of connecting highways offer nearly unimpeded automobile travel within and between the many municipalities and villages”. So again, although bicycle and pedestrian transportation is recognized as an important opportunity in the Lakes Region, little is flushed out regarding how future facilities and improvements should be planned. The 1995 report was updated with new information and data in 2002, and remained much the same as its 1995 predecessor.

*A Regional Transportation Plan for the Lakes Region Update (1997):*

In 1997 the LRPC developed and approved the first transportation plan for the Lakes Region that fell under the auspices of the Intermodal Surface Transportation Efficiency Act (ISTEA) legislation which authorized federal transportation programs for fiscal years 1992 through 1997. This important legislation provided the focus on future transportation efforts at the federal and state levels by providing for “intermodal” transportation which purposefully included non-motorized transportation such as bicycle and pedestrian.

The 1997 LRPC Plan recognized that the automobile was still the predominant mode of transportation, and that highways were the principal, almost exclusive, means of travel in and around the Lakes Region. However, the 1997 Plan represented for the first time an emphasis on transitioning the Region towards a more multi-modal transportation system without a near total dependence on privately operated motorized vehicles. Intermodal planning to include bicycle and pedestrian transportation became a clear goal of the LRPC as articulated in the 1997 Regional Transportation Plan, although the Plan provided significantly more focus on bicycle, as opposed to pedestrian transportation.

Of perhaps most notable importance was the Plan’s recognition that transportation planning needed to be integrated with local and regional economic development, housing, environmental, historic, and land use planning. It was noted that bicycle facilities can support this integrated approach to planning. As such, the plan attempted to identify the existing conditions in the region related to bicycle infrastructure. Based on an examination of existing and planned on-road bike routes and off-road multi-use pathways, the Plan identified recommendations and strategies to improve the bicycle transportation infrastructure in the future. These recommendations were based on the identified major benefits of bicycle transportation, including:



- The reduction of motorized vehicle traffic on the highway system
- The reduction in air pollution as a result of reduced motor vehicle travel
- Benefits to the tourism and recreation industry in the Lakes Region
- Other quality of life benefits to the residents of the Region

The 1997 Plan concludes by identifying three specific strategies, and four recommendations related to bicycle and pedestrian transportation in the Lakes Region:

Strategies:

- Perform community out-reach, data collecting, and research to produce a comprehensive bikeway and pedestrian map for the next updated Regional Transportation Plan
- Review proposed projects and comment on those locations that are considered existing or proposed bike or sidewalk locations
- Provide technical assistance to communities or civic groups considering multi-use trails

Recommendations:

- The Bikeway system (Map V-2 in the 1997 Plan) will be completed prior to the year 2017
- All enhancement projects currently in the NH DOT's Ten Year Plan will remain at their assigned construction date
- All those multi-use trails shown on Map V-2 and defined as being planned, designed, or constructed by active groups will be completed by the year 2007
- All highways as shown on Map V-2 as having wide shoulders will be signed and striped for bicycle safety by the year 2007

*Lakes Region Tour Scenic Byway Corridor Management Plan (1999):*

In 1974 the State Scenic Byway system identified 67 miles of roadway, through ten communities in the Lakes Region Planning Commission's area, as the Lakes Tour. The underlying purpose of the *Lakes Tour Scenic Byway* is to promote the enjoyment of its scenic, natural, historic, cultural, and recreational attributes. In 1997 the LRPC began work on a Management Plan for the Lakes Region Scenic Byway Tour. The overall goals of the Management Plan emerged as follows:

- To enhance and protect the livability of the Corridor
- To protect the unique character of all the individual communities
- To ensure that the scenic, environmental and cultural qualities of the Corridor are protected, enhanced and managed appropriately in the future
- To identify traditional and innovative strategies that reduces traffic on the roadways of the Byway
- To improve the multi-modal and inter-modal considerations
- To increase awareness of the cultural, environmental and historical attributes of the Corridor for the residents and the visitors
- To promote sustainable low impact tourism with an emphasis on cultural, environmental, and heritage tours

All of the above goals have a direct relationship to both bicycle and pedestrian transportation, and the contents of the *Lakes Tour Management Plan* emphasize this relationship. Chapter 5 of the Management Plan is dedicated to transportation, and discusses such issues as roadway shoulders, traffic calming, and an assessment of bicycle and pedestrian transportation. In fact, the Management Plan states that “bicycle and pedestrian use and safety are at the heart of good byway planning”. It can be argued that bicycle and pedestrian use and safety is at the heart of all transportation planning efforts, and this understanding led to the development of this first-ever bicycle and pedestrian plan for the Lakes Region.

*PLAN 2000: A Lakes Region Transportation Plan Update for the Year 2000 (2000)*

“To maintain, enhance, and manage infrastructure that facilitates, encourages, and supports viable pedestrian and bicycling transportation.”

PLAN 2000 is the most recent update to the 1997 Regional Transportation Plan for the Lakes Region. The focus of this plan is “the provision of efficient multi-modal and inter-modal transportation systems which do not negatively impact the surrounding natural, social or historic environments.” The Plan identifies several goals and objectives aimed at addressing this focus, including:

- To encourage that transportation planning recognizes the value of sustainable economic development, including tourism and recreation, in the Lakes Region
- To maintain, enhance, and manage infrastructure that facilitates, encourages, and supports viable pedestrian and bicycling transportation

PLAN 2000 then goes further, and identified specific implementation strategies related to bicycle and pedestrian transportation, including:

- Promote alternate modes of transportation as a means of providing congestion and air quality relief, and as an important component of recreation and tourism
- Provide technical assistance to communities that are planning multi-purpose trails
- Maintain an inventory of existing facilities
- Work with towns to develop plans that compliment regional and statewide bicycle plans

*New Hampshire State Rail Plan (2001)*

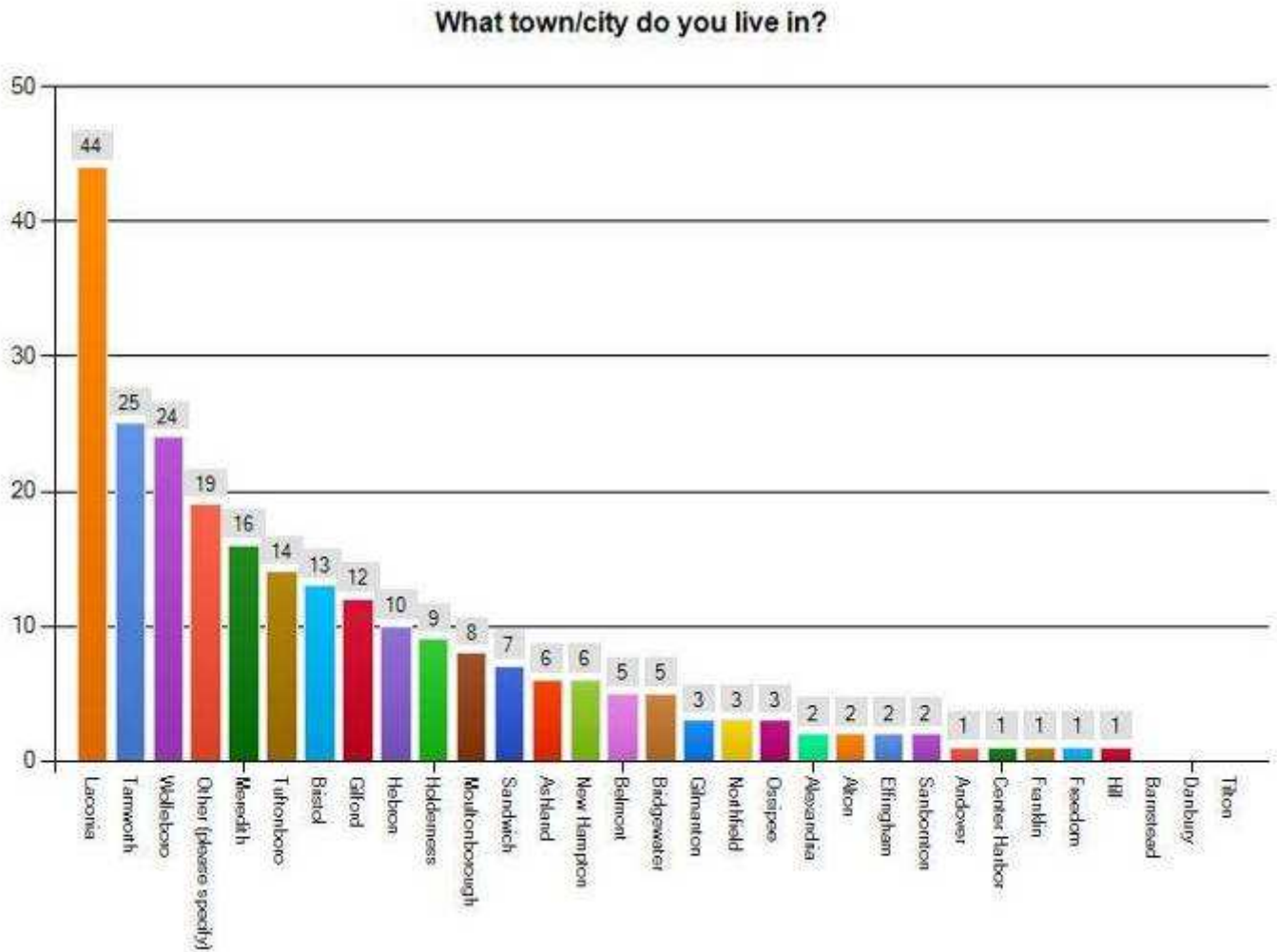
The 2001 New Hampshire State Rail Plan identifies both the active and the abandoned rail lines in New Hampshire. While there is some discussion of possibly upgrading the rail system in the Lakes Region, no definitive plans are currently available. It is helpful to know the possible uses for the railroad right of way for planning purposes. It is a stated goal in this plan that abandoned railroad rights of way that are owned by the state should be preserved and eventually put to a public use such as trails.

*New Hampshire State Trails Plan (2005)*

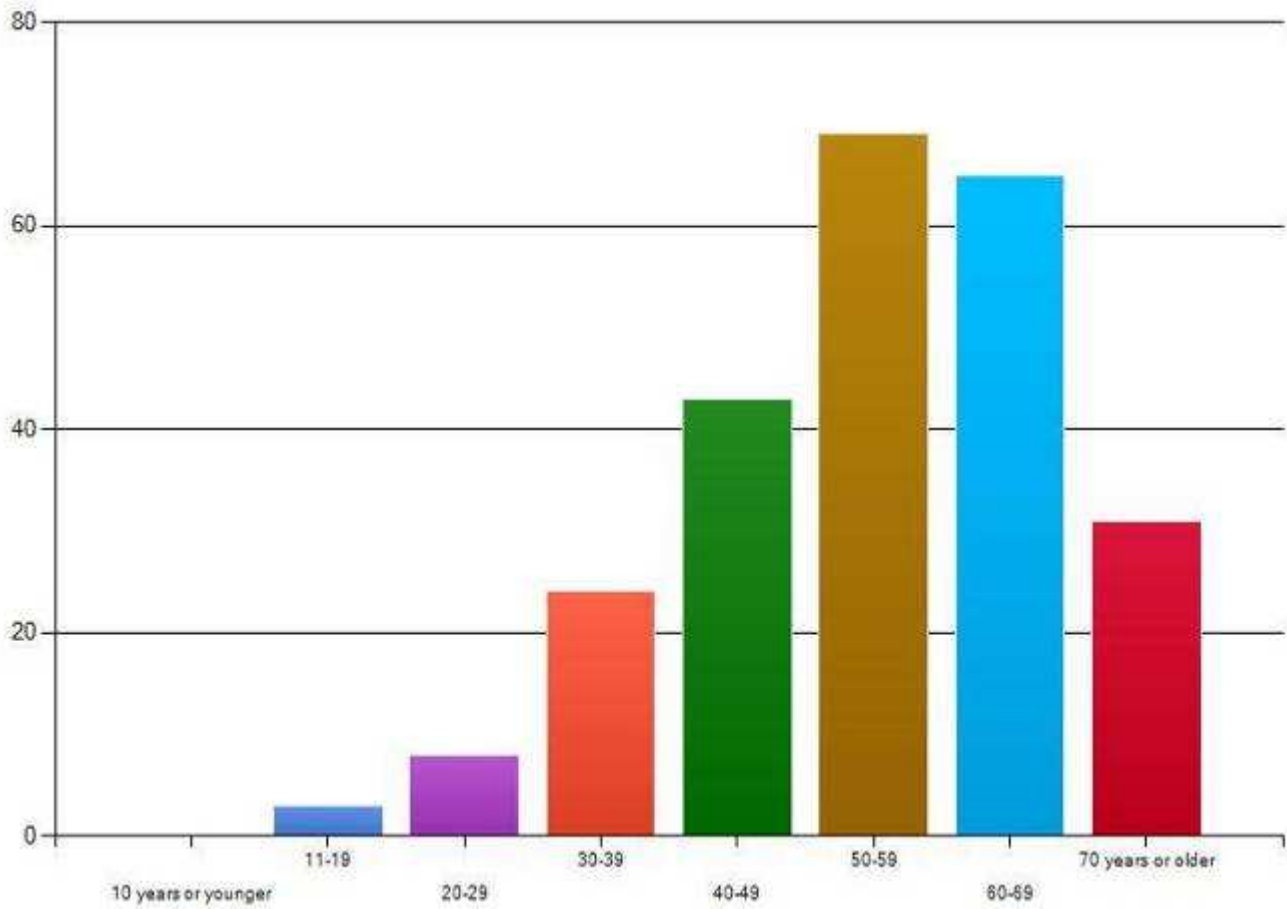
This plan is intended to; identify existing multi-use trails and corridors with the potential to be developed or improved as multi-use trails, describe the conditions and potential of these trails and corridors for future trail use, and propose guidance for trail development. It identifies and describes abandoned railroad corridors owned by the state, catalogs other non-railroad off-street trails and bike/ped oriented projects throughout the state, summarizes planning studies and documents that address off-street trails, pedestrian accommodations, and bicycle features, and provides guidelines for developing trails.

## APPENDIX B: SURVEY QUESTIONS AND RESULTS

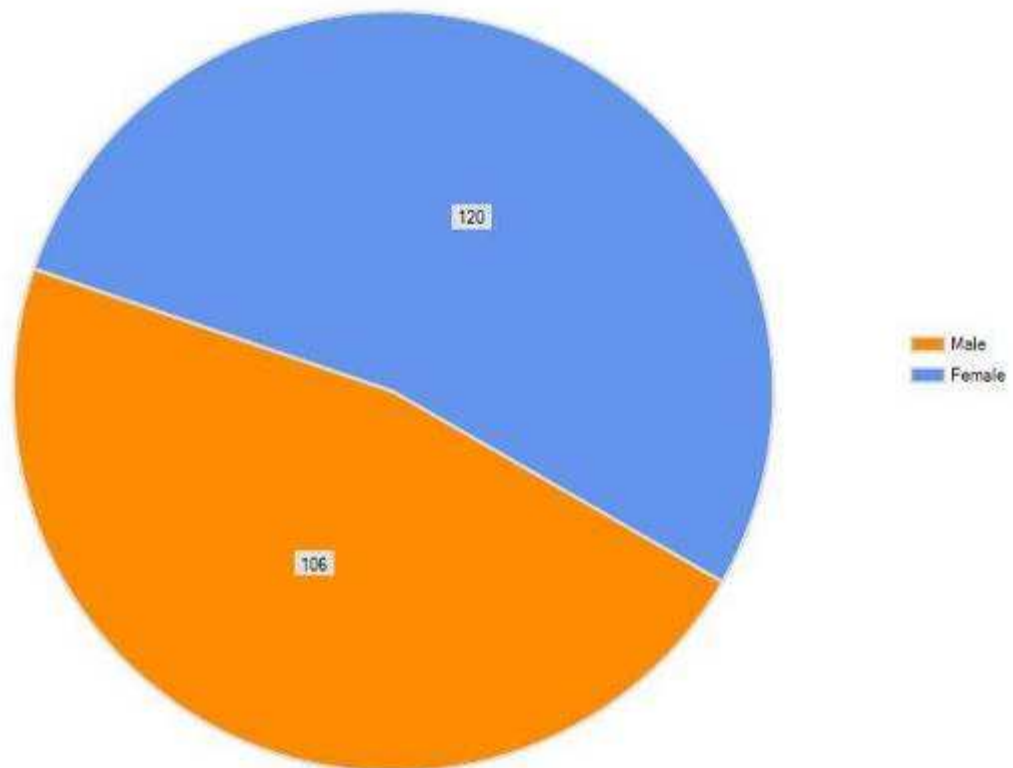
This appendix contains the results of the online survey that was conducted in October and November of 2011, to which 245 people responded. The results are displayed with charts. The vertical axis indicates the *number* of responses to the question, not the percentage. The horizontal axis contains the set of answers to each question. Not all respondents answered all questions. Many questions allowed for multiple answers.



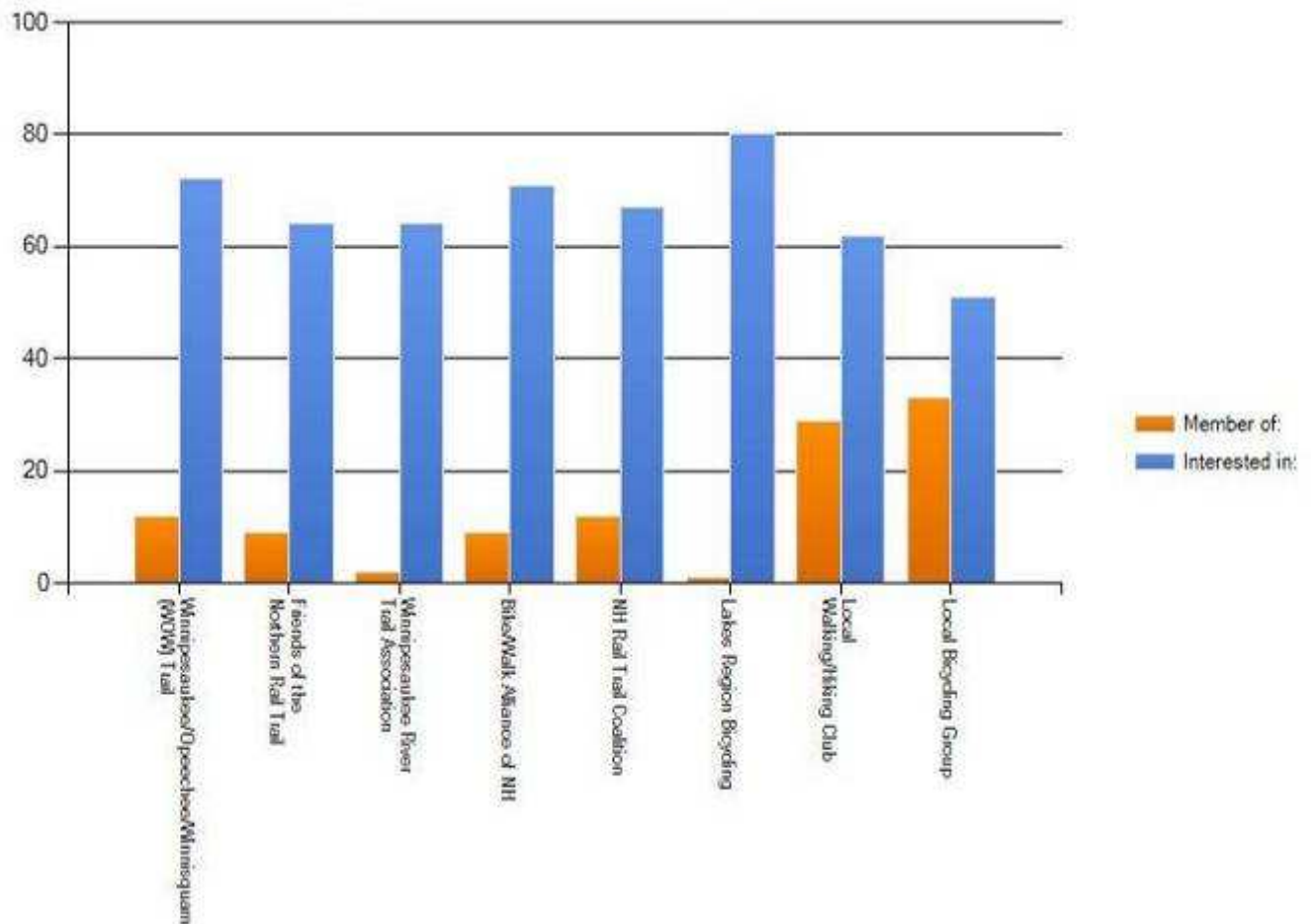
What is your age?



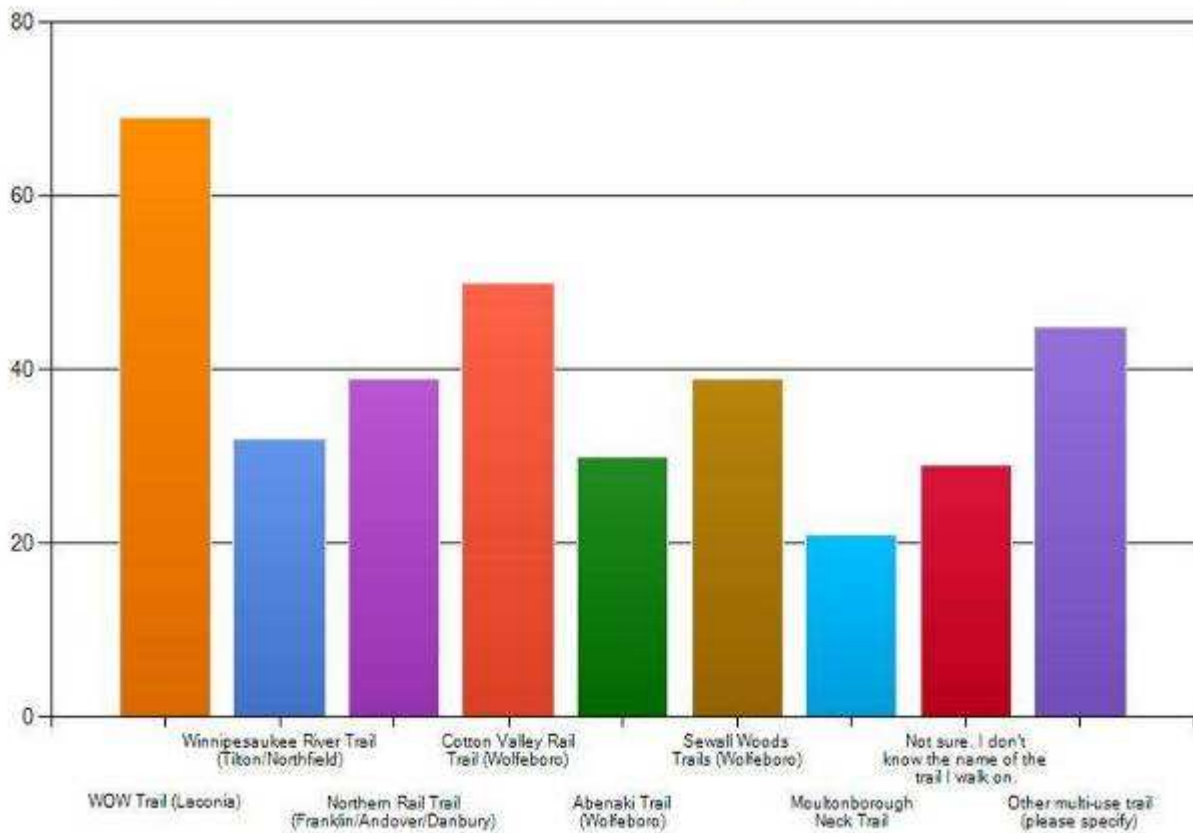
What is your gender?



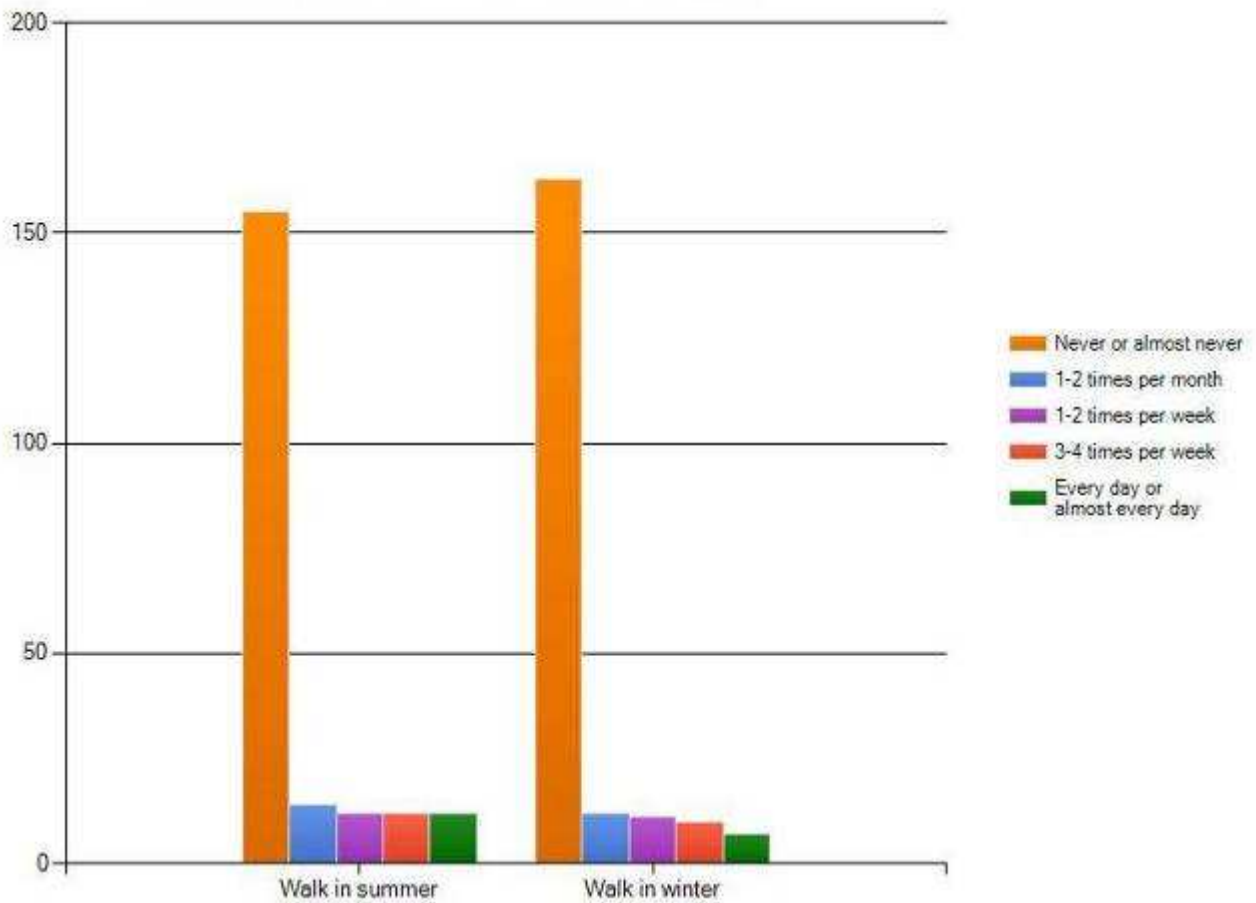
### What are you a member of or interested in?



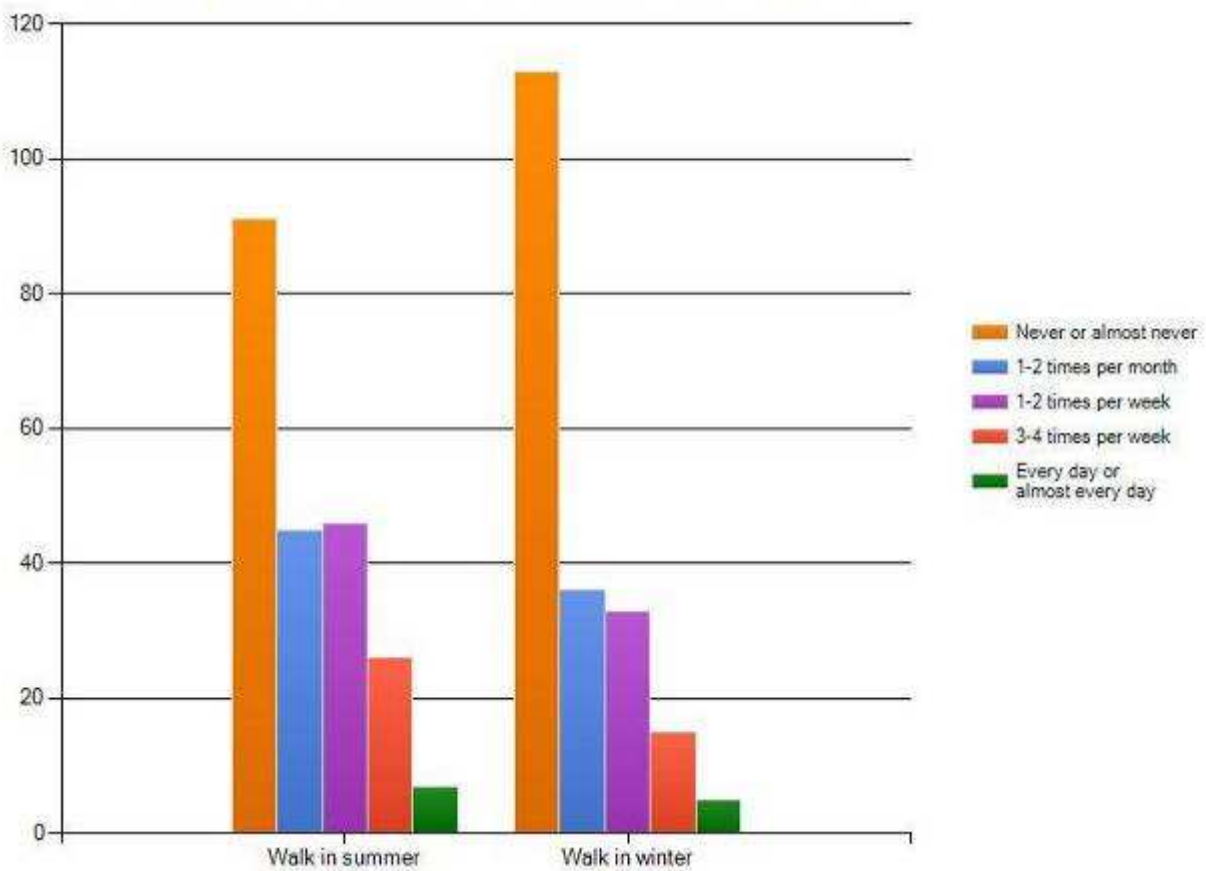
### Do you do WALK or BIKE on any of the following off-street multi-use paths?



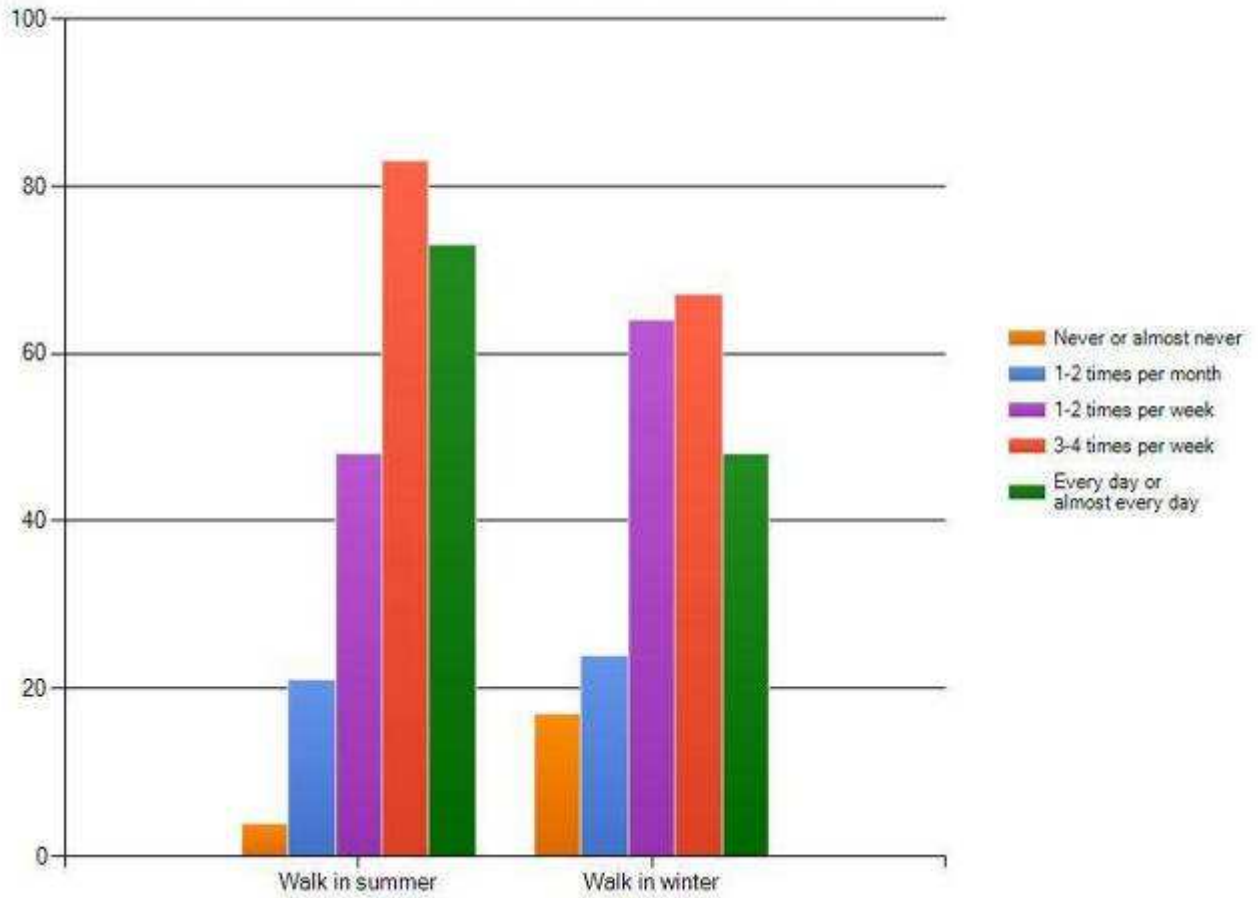
### How often do you walk to WORK or SCHOOL?



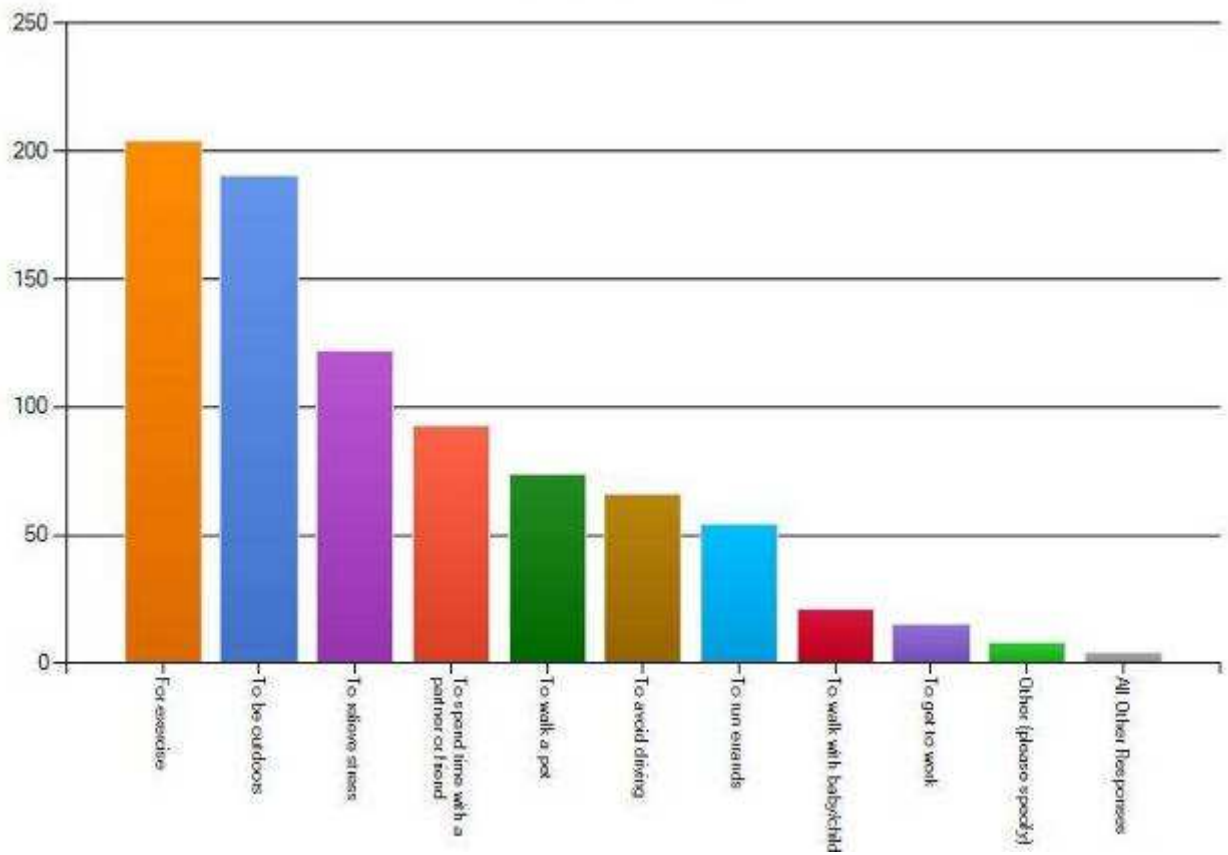
### How often do you walk to do ERRANDS/SHOPPING/LUNCH, etc.?



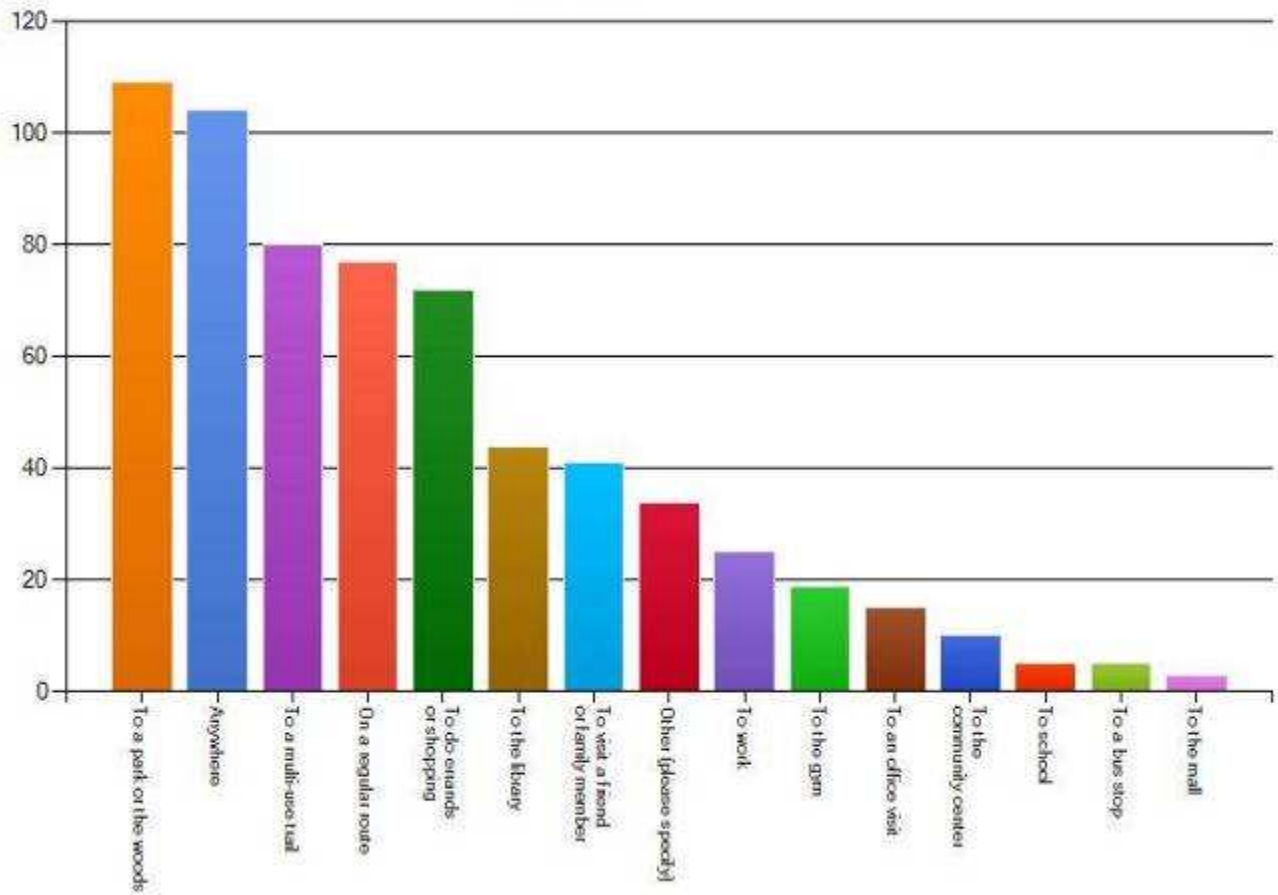
### How often do you walk for RECREATION or EXERCISE?



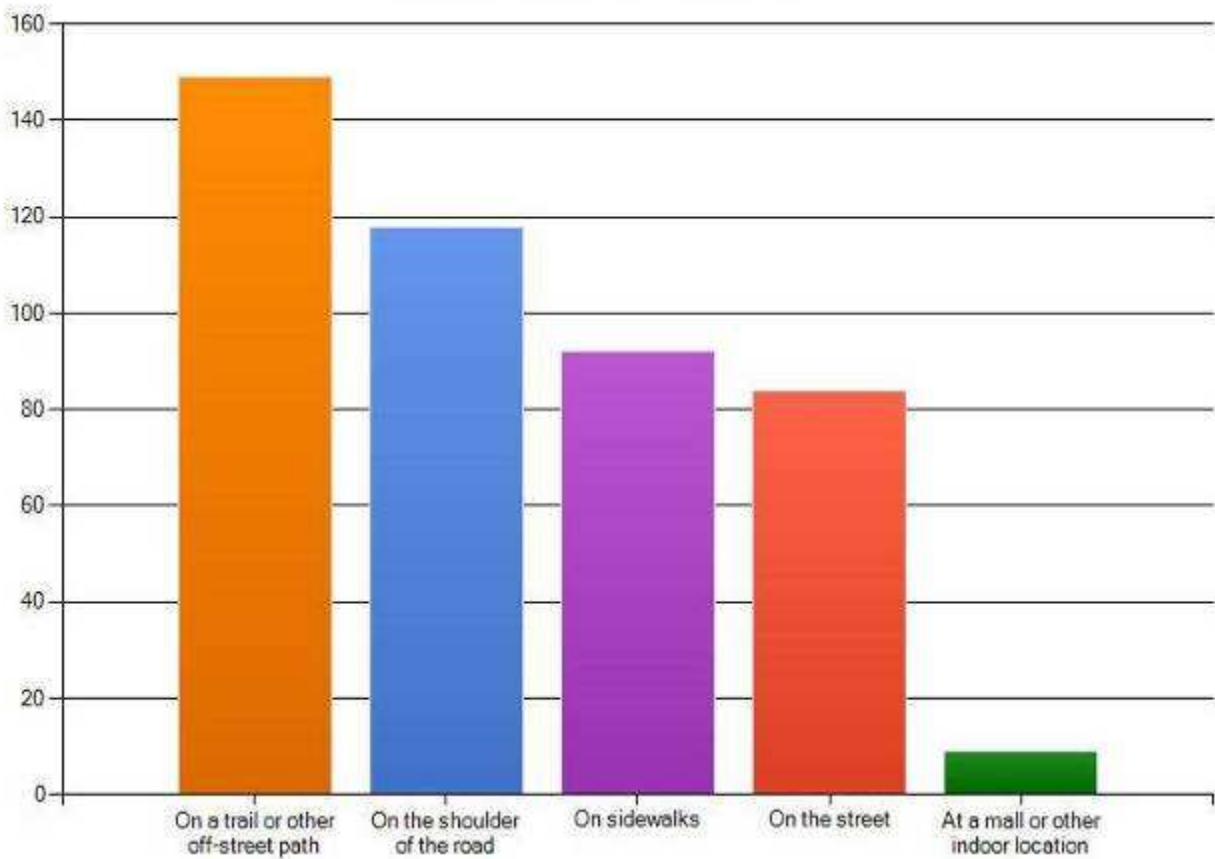
### Why do you walk?



### Where do you go when you walk?

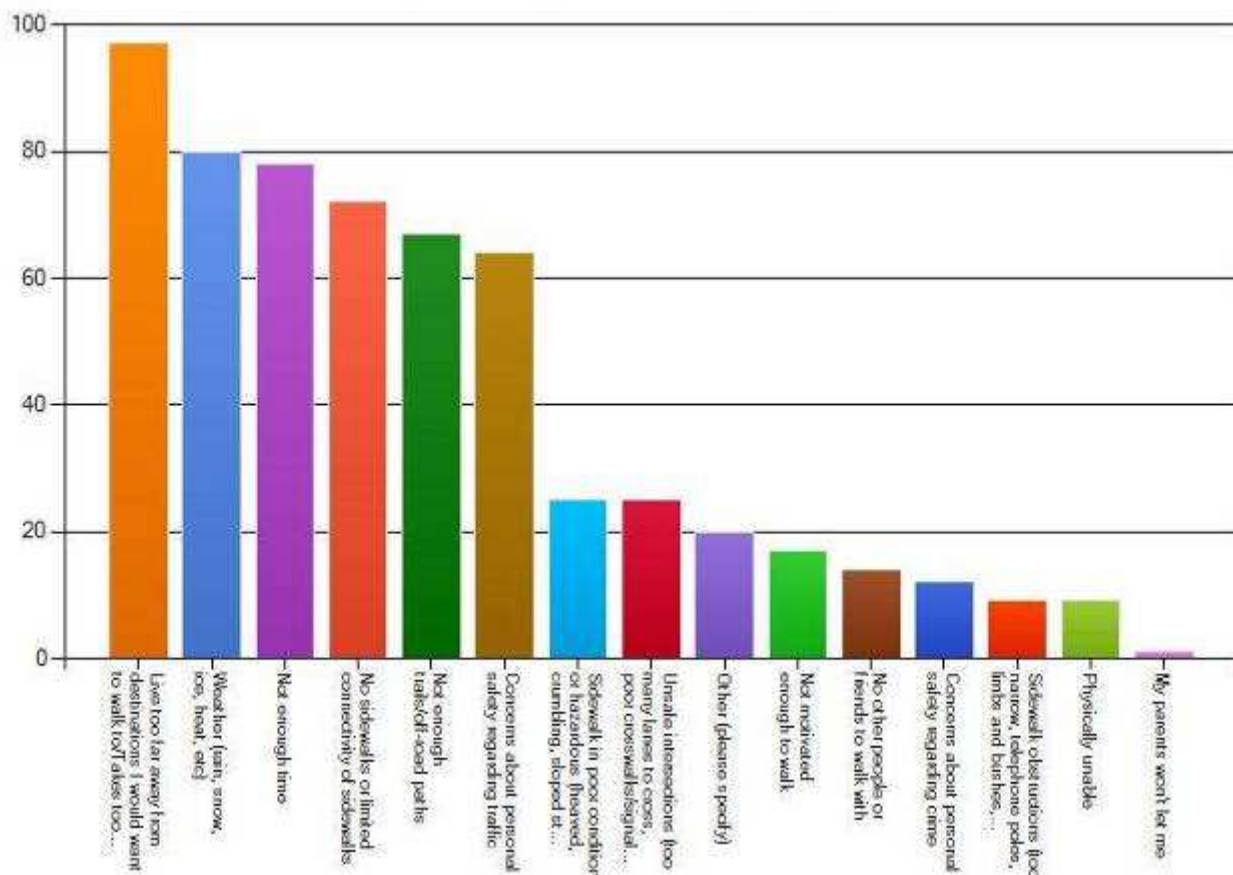


### Where do you PRIMARILY walk?

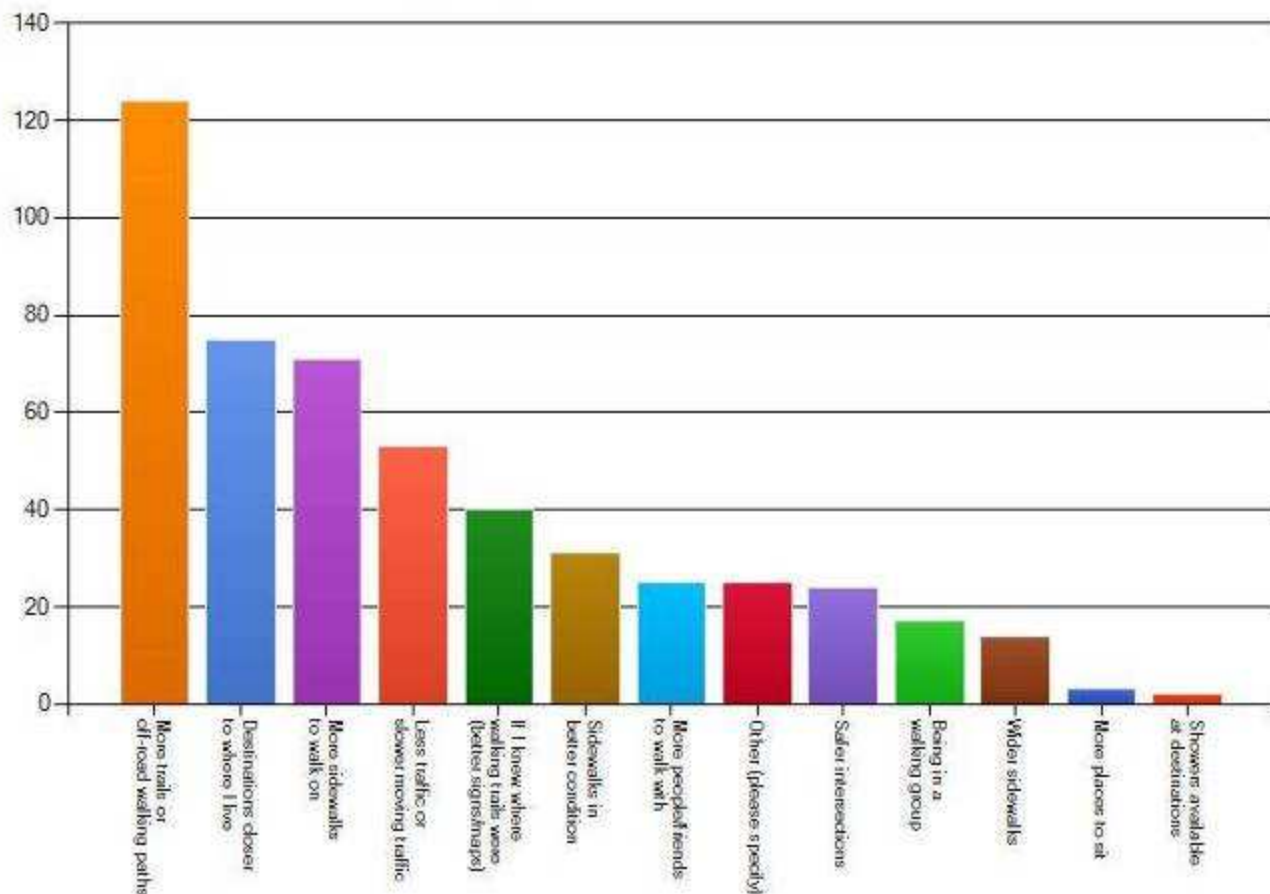




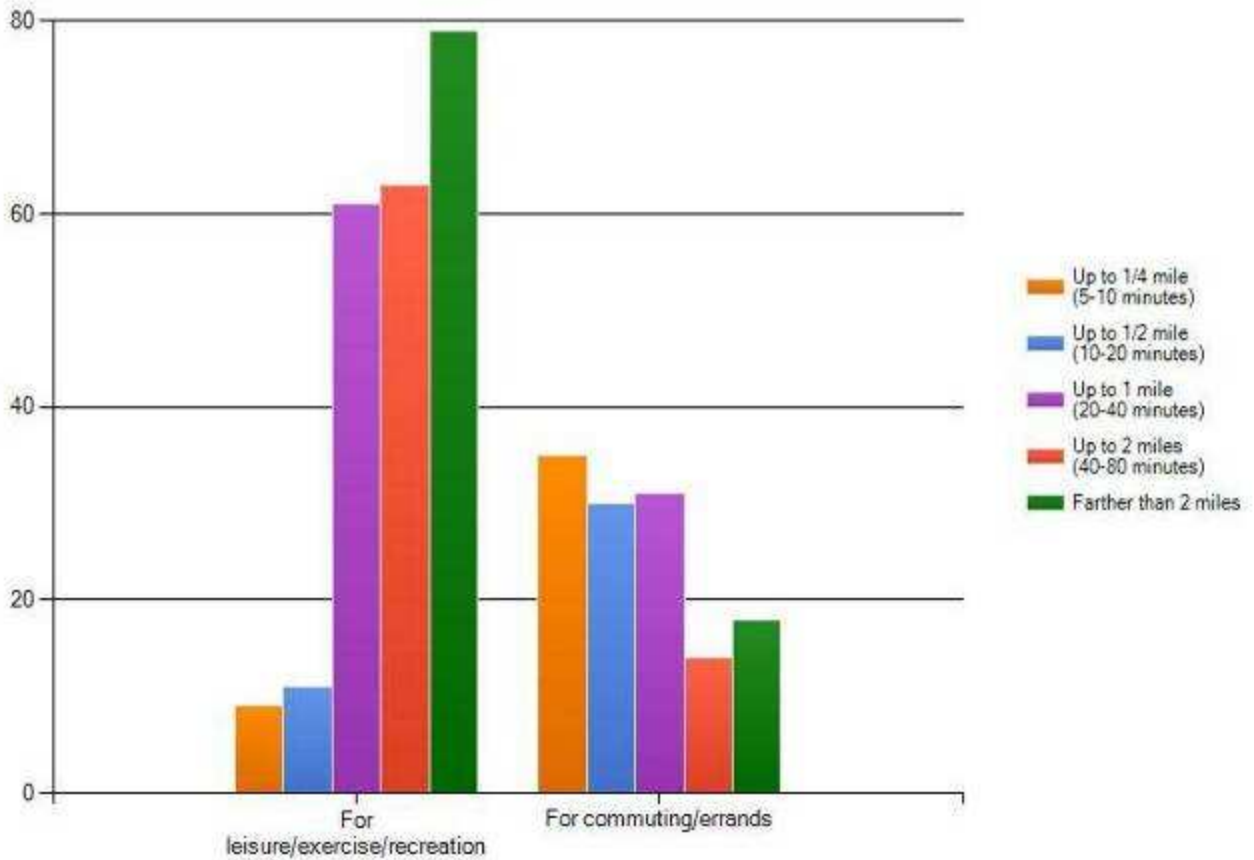
### What PREVENTS you from walking more or at all?



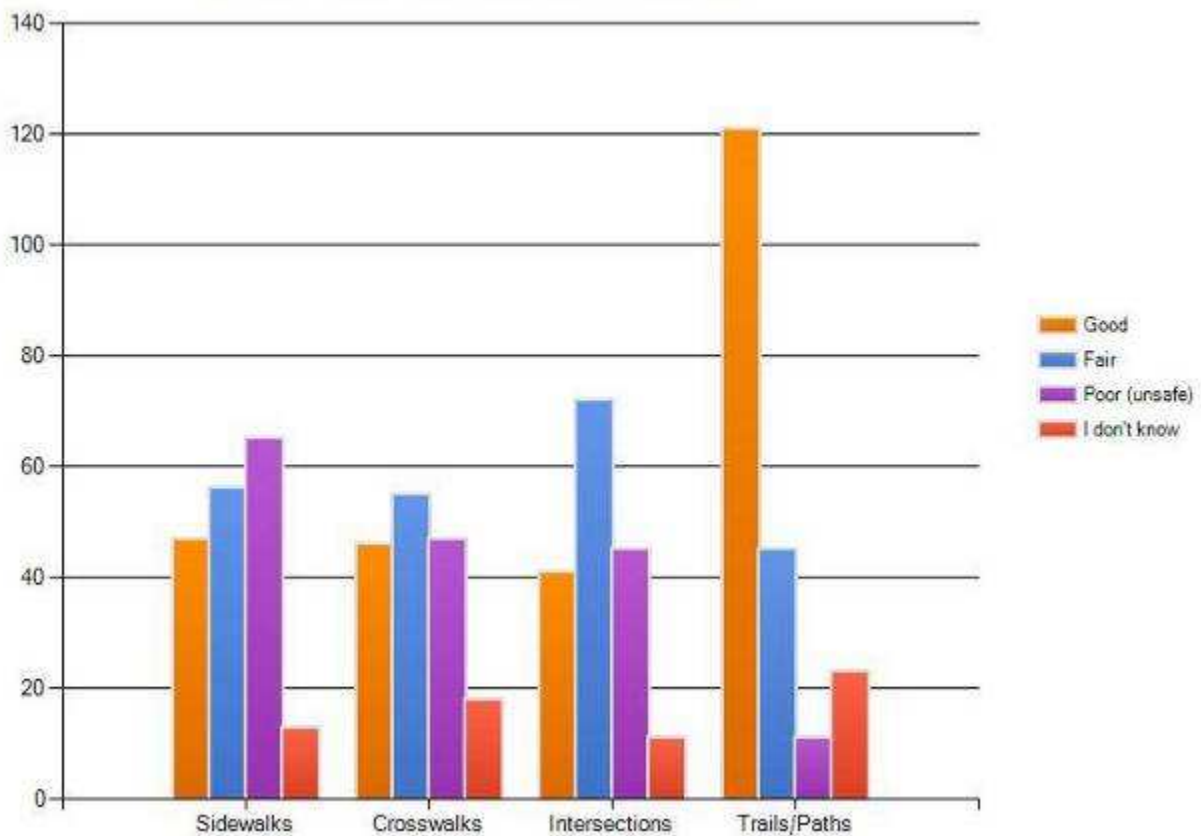
### What would ENCOURAGE you to walk or to walk more?



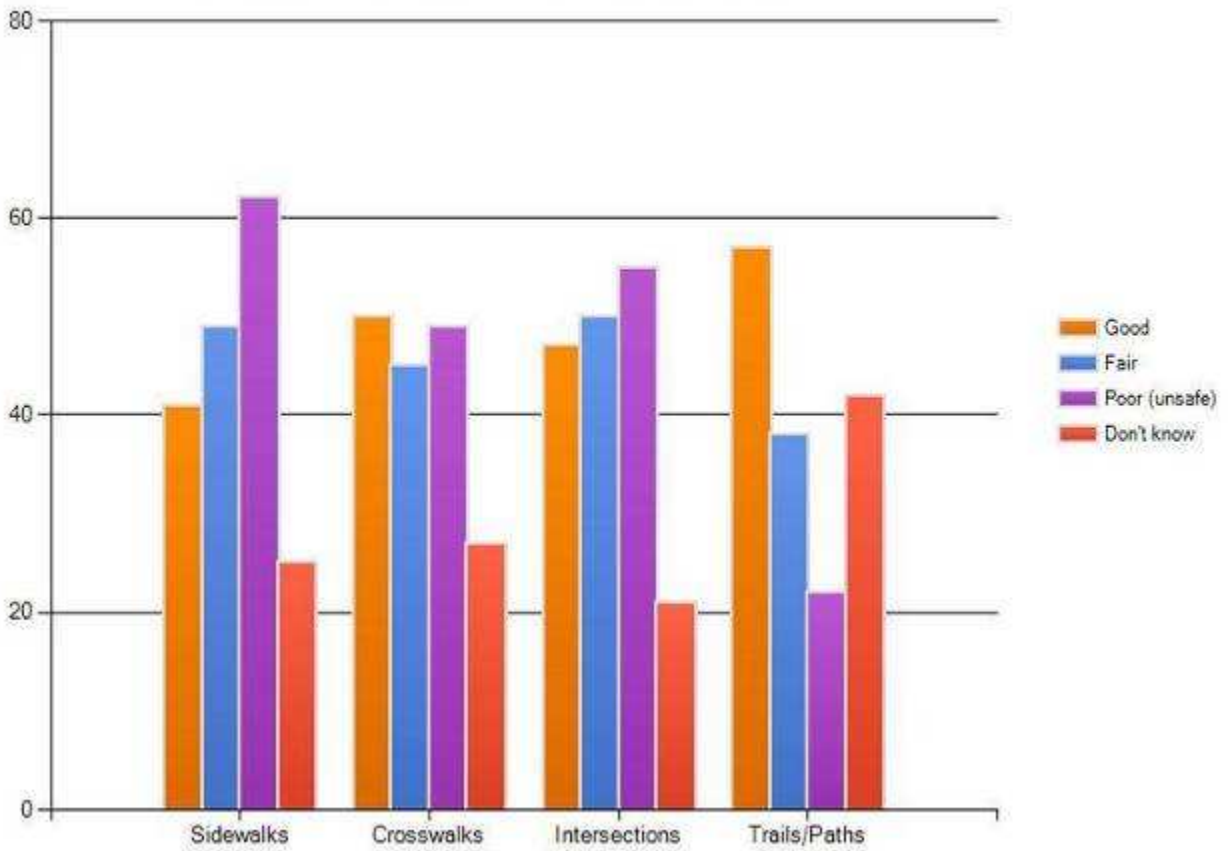
**How FAR or for how much TIME do you usually walk on an average outing?**



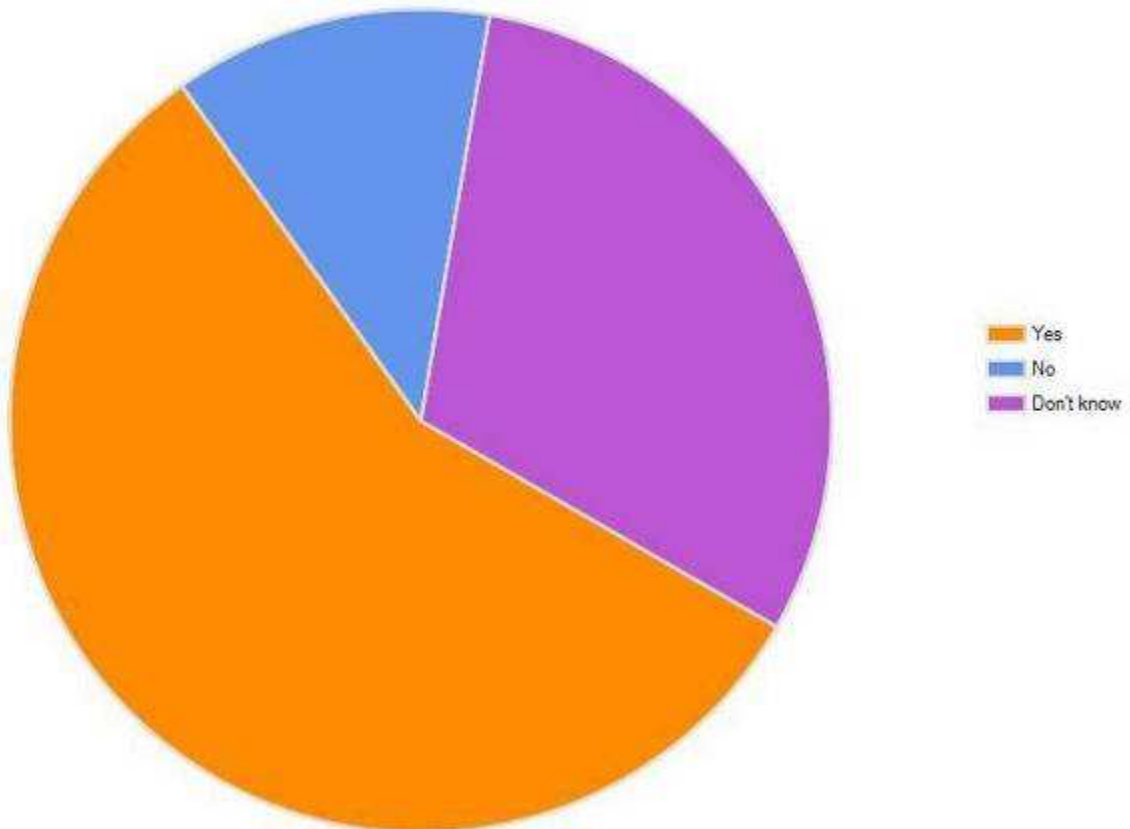
**How would you rate the conditions for RECREATIONAL WALKING or WALKING FOR EXERCISE where you walk?**



**How would you rate the conditions for walking to SCHOOL/WORK/ERRANDS where you walk?**

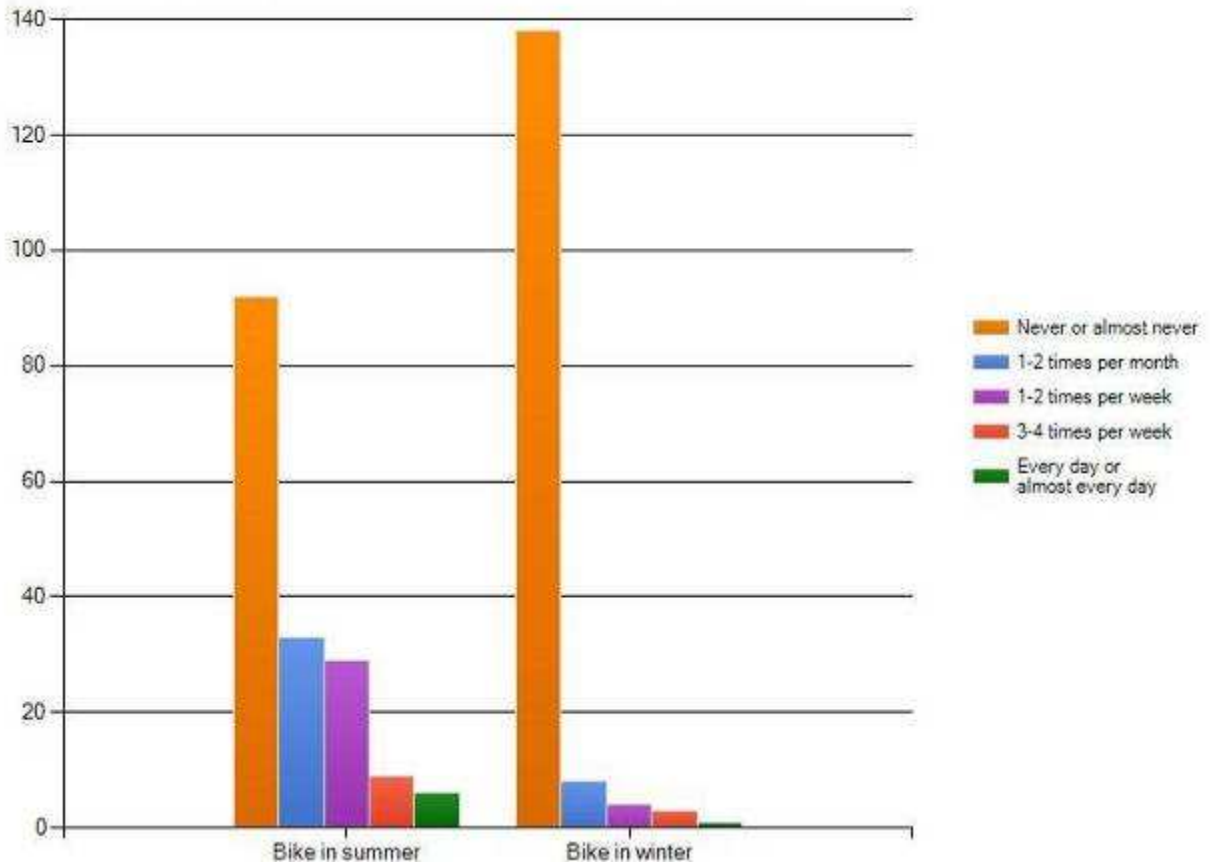


**In your community, are there places where new or repaired sidewalks are needed?**

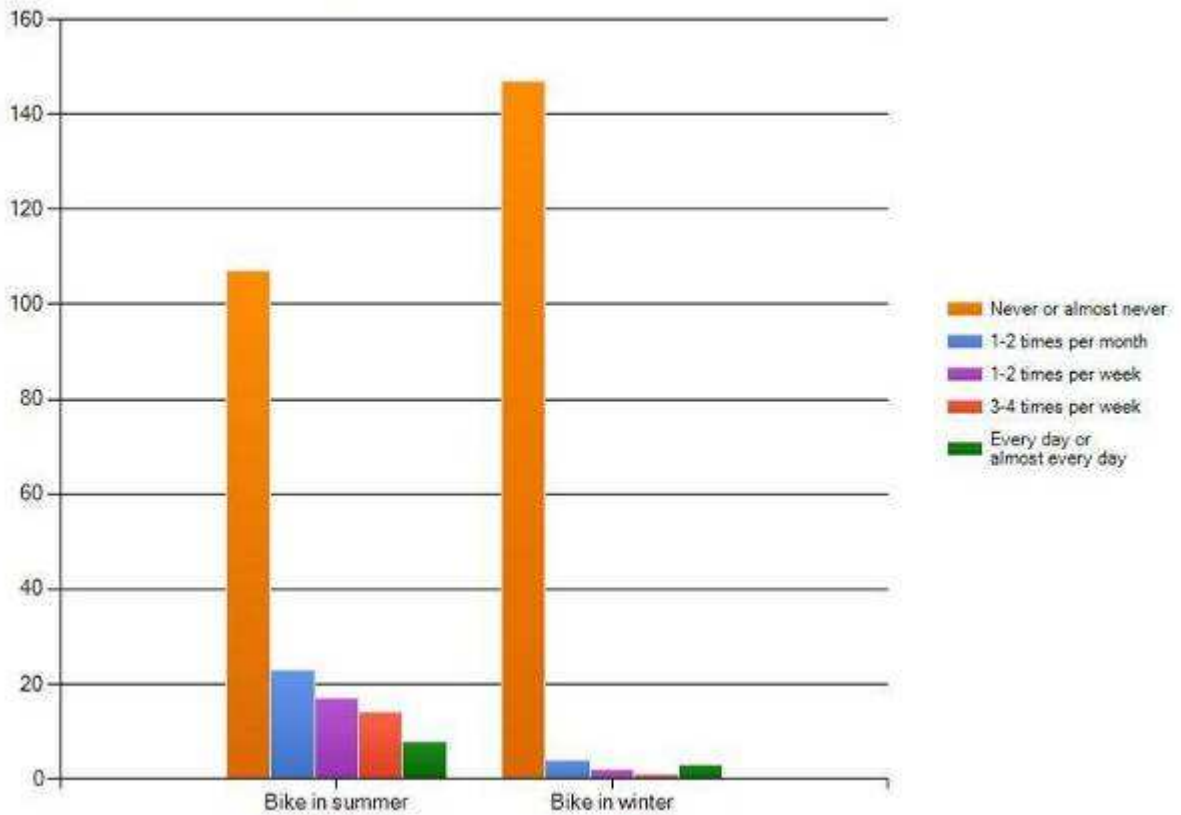


### Do you ever ride a bicycle?

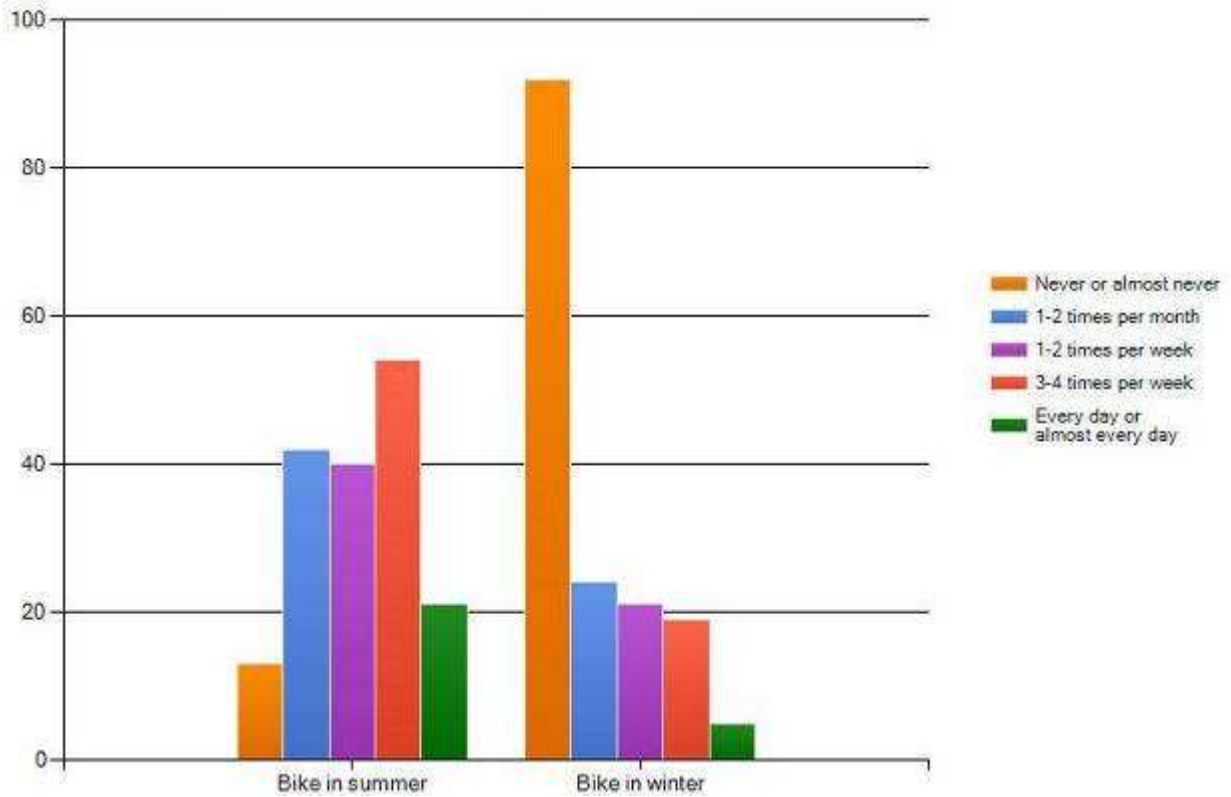
#### How often do you bike to ERRANDS/SHOPS/LUNCH, etc.?



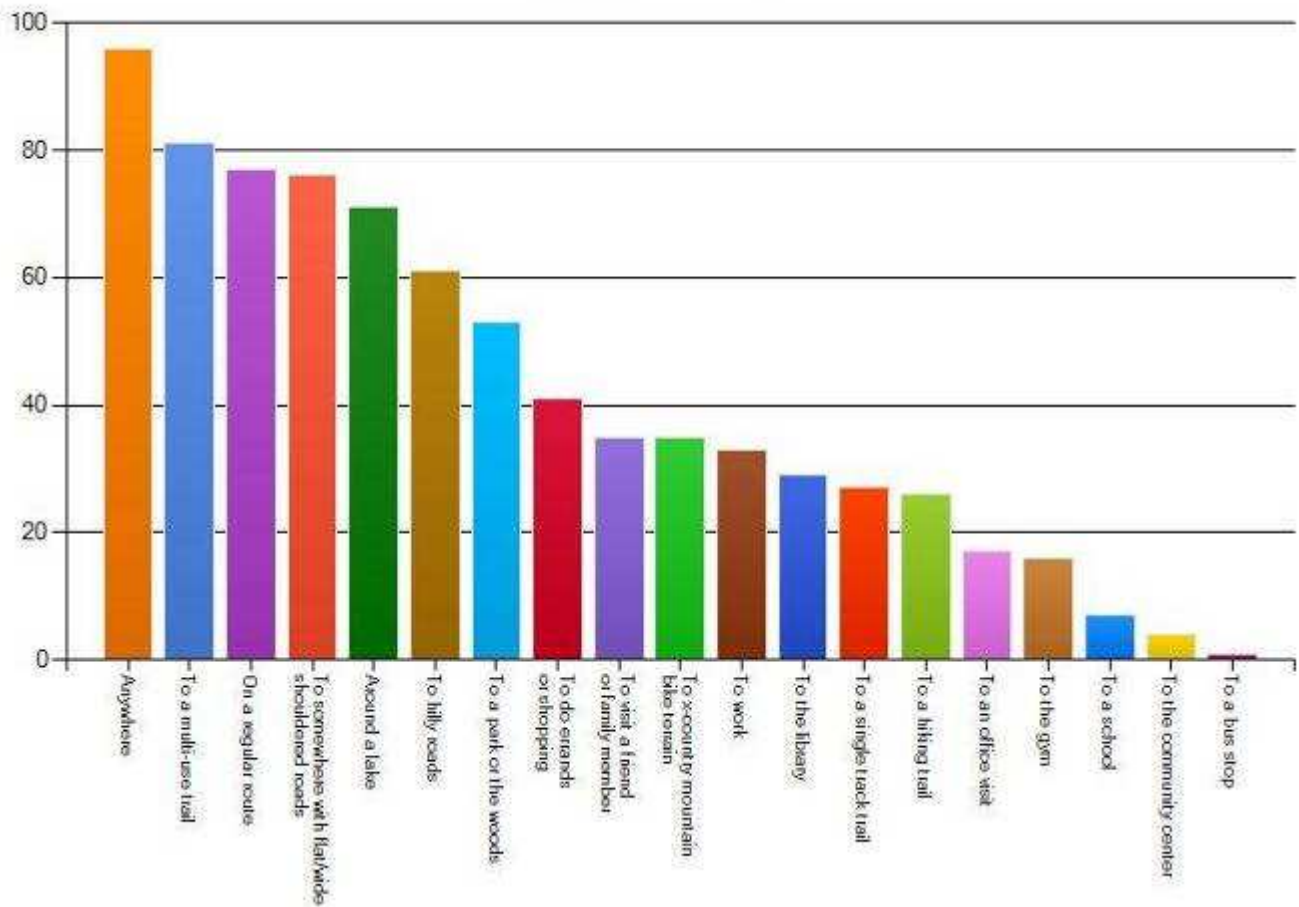
#### How often do you bike to WORK or SCHOOL?



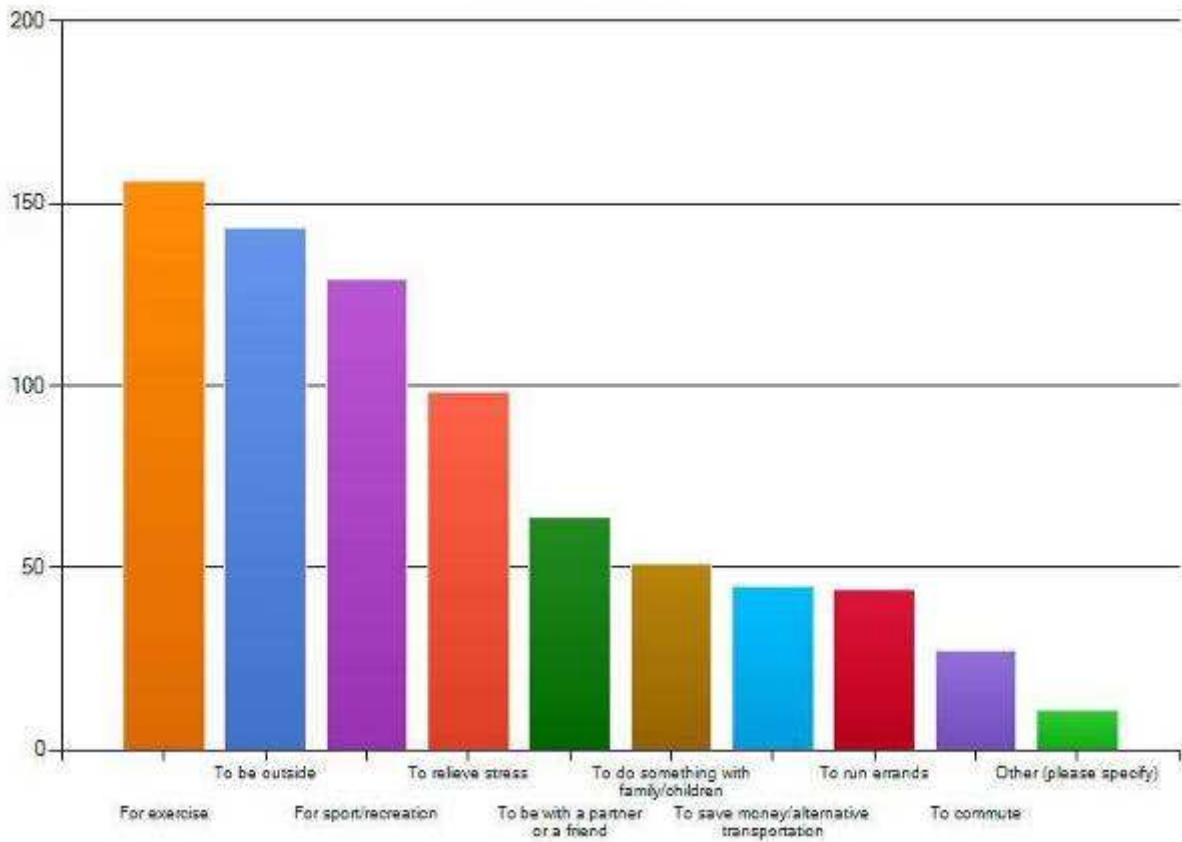
**How often do you bike for RECREATION or EXERCISE? (this can include a stationary bike in winter)**



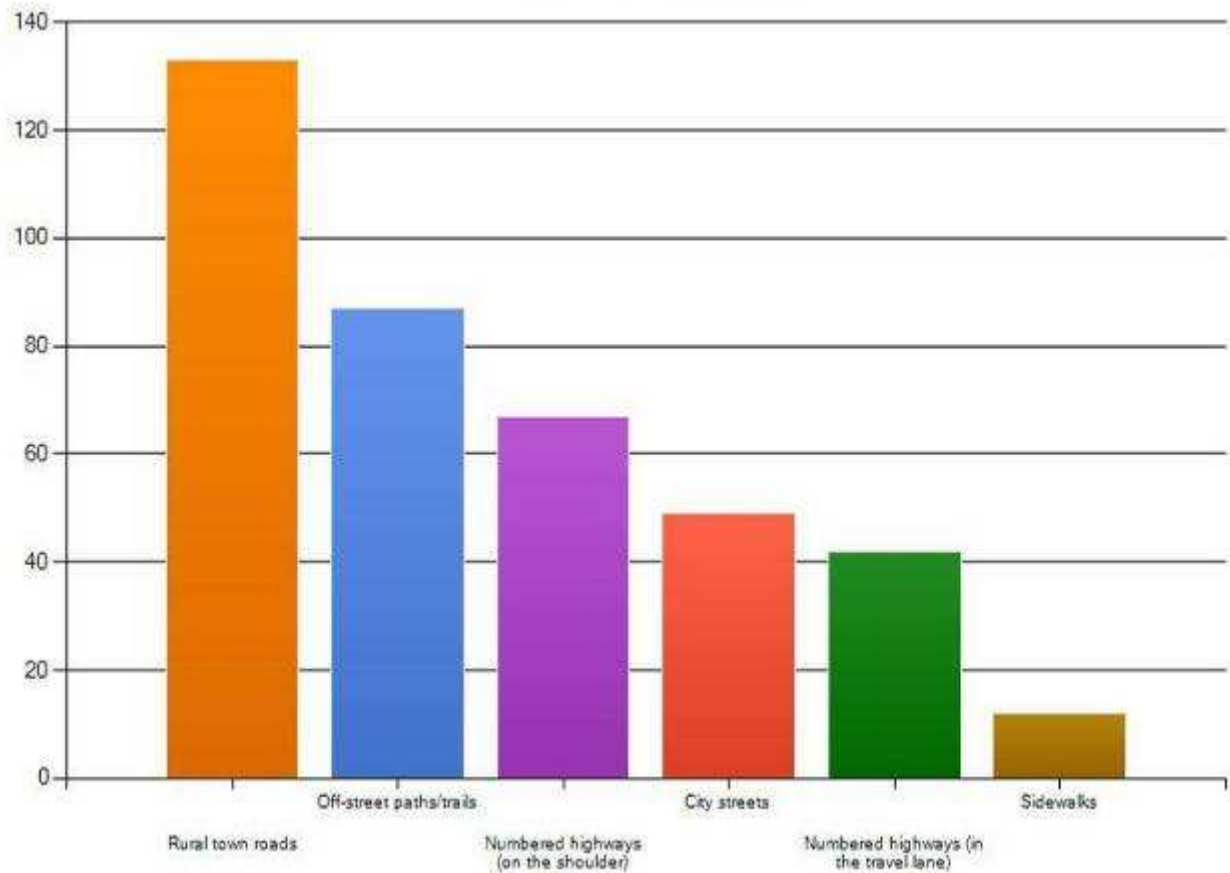
**Where do you go when you bike?**



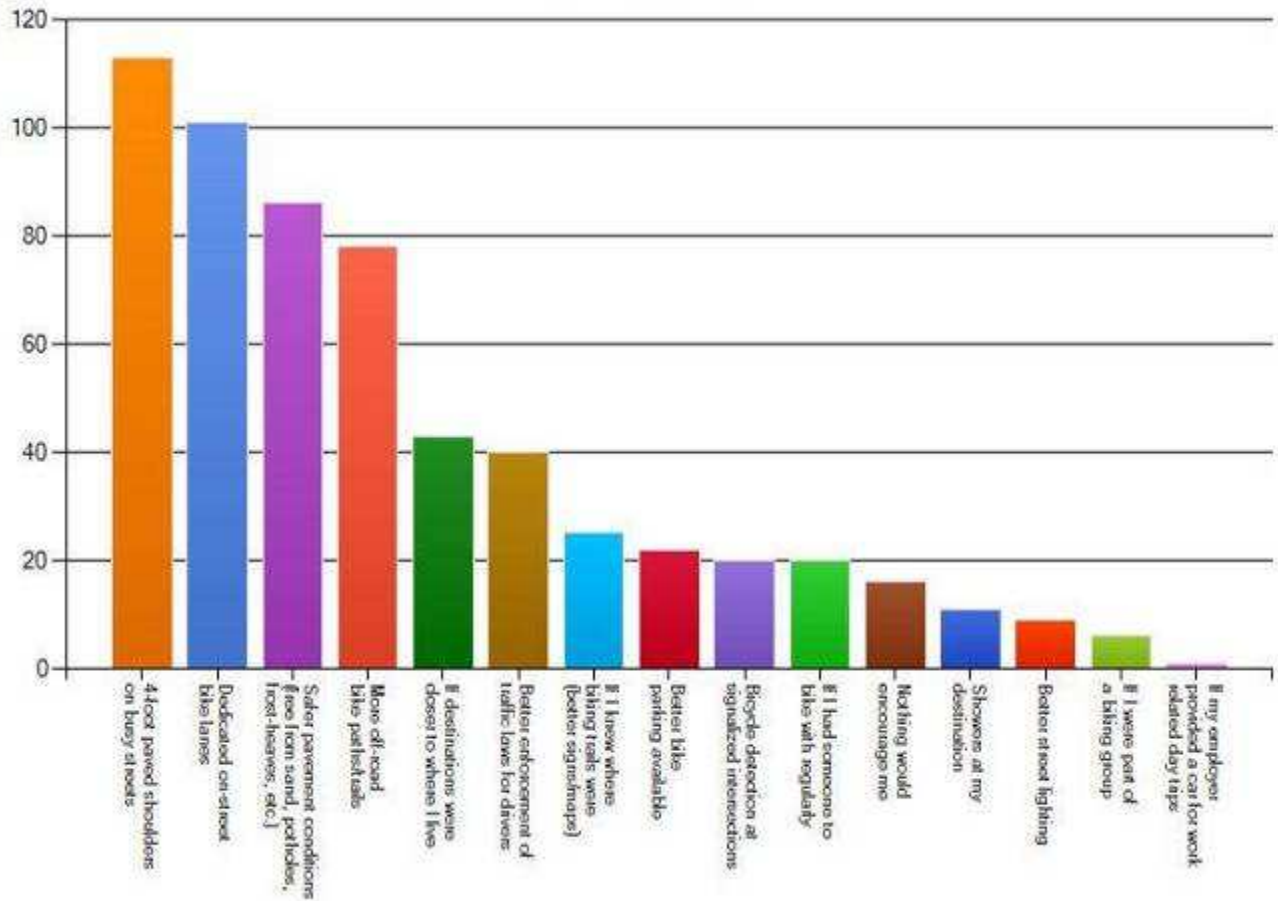
### Why do you bike?



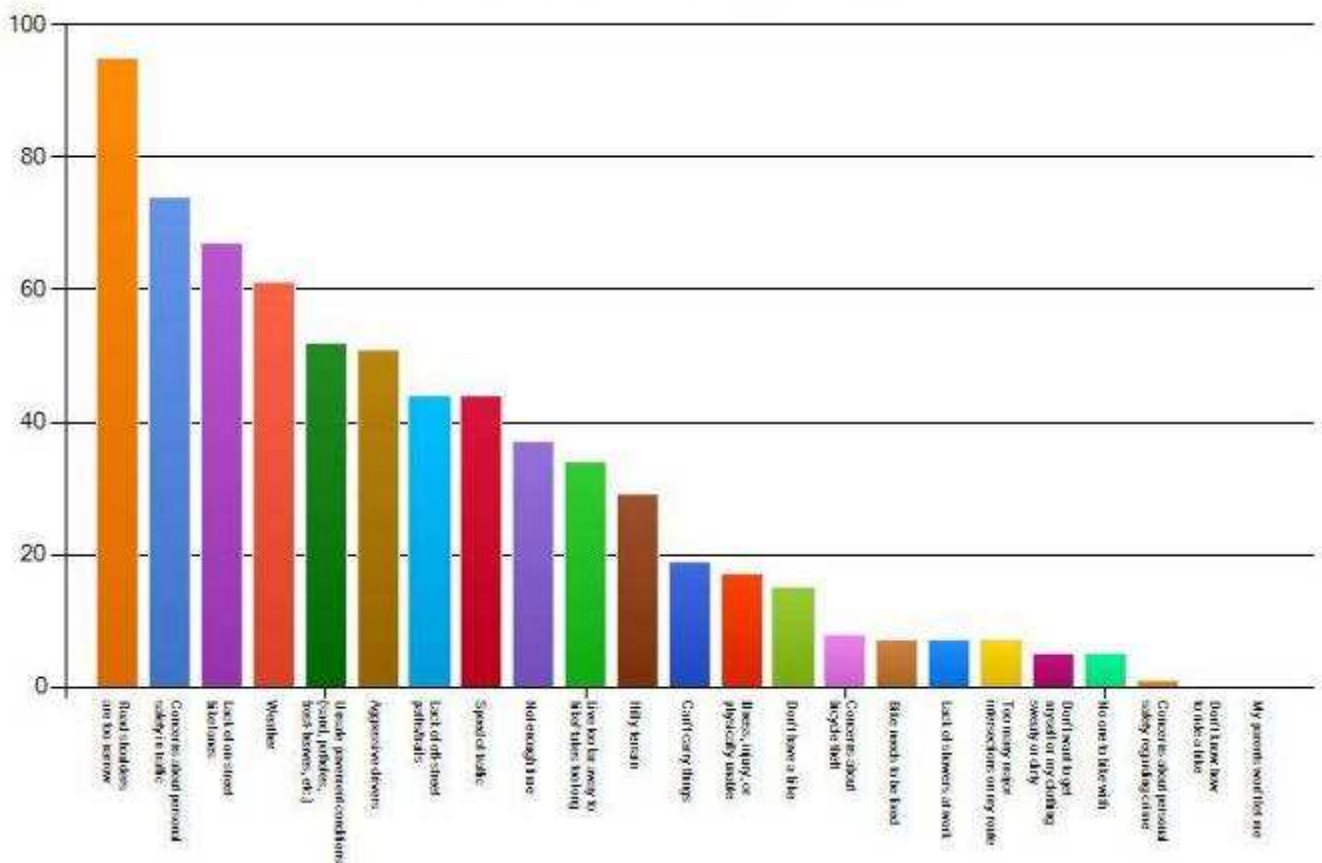
### Where do you PRIMARILY bike?



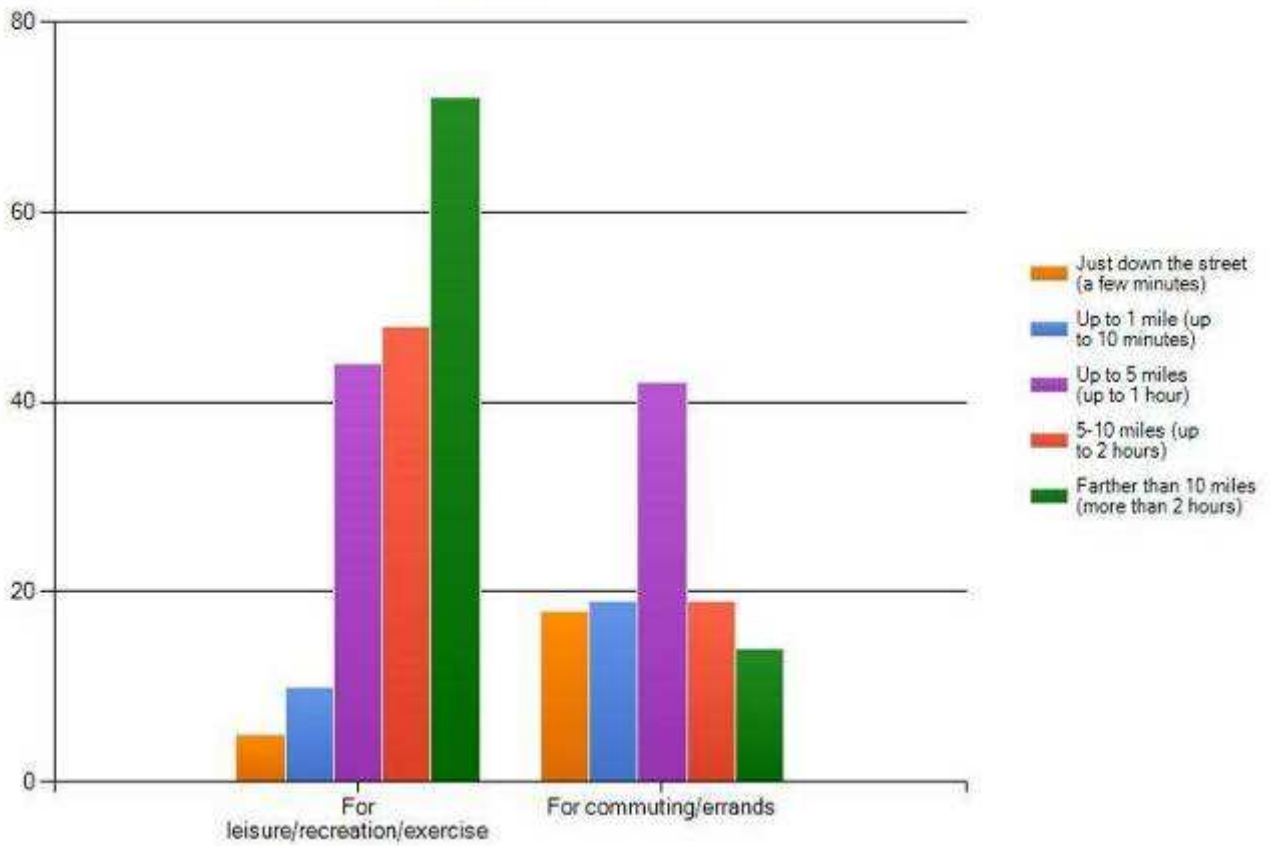
## What would ENCOURAGE you to bike or to bike more?



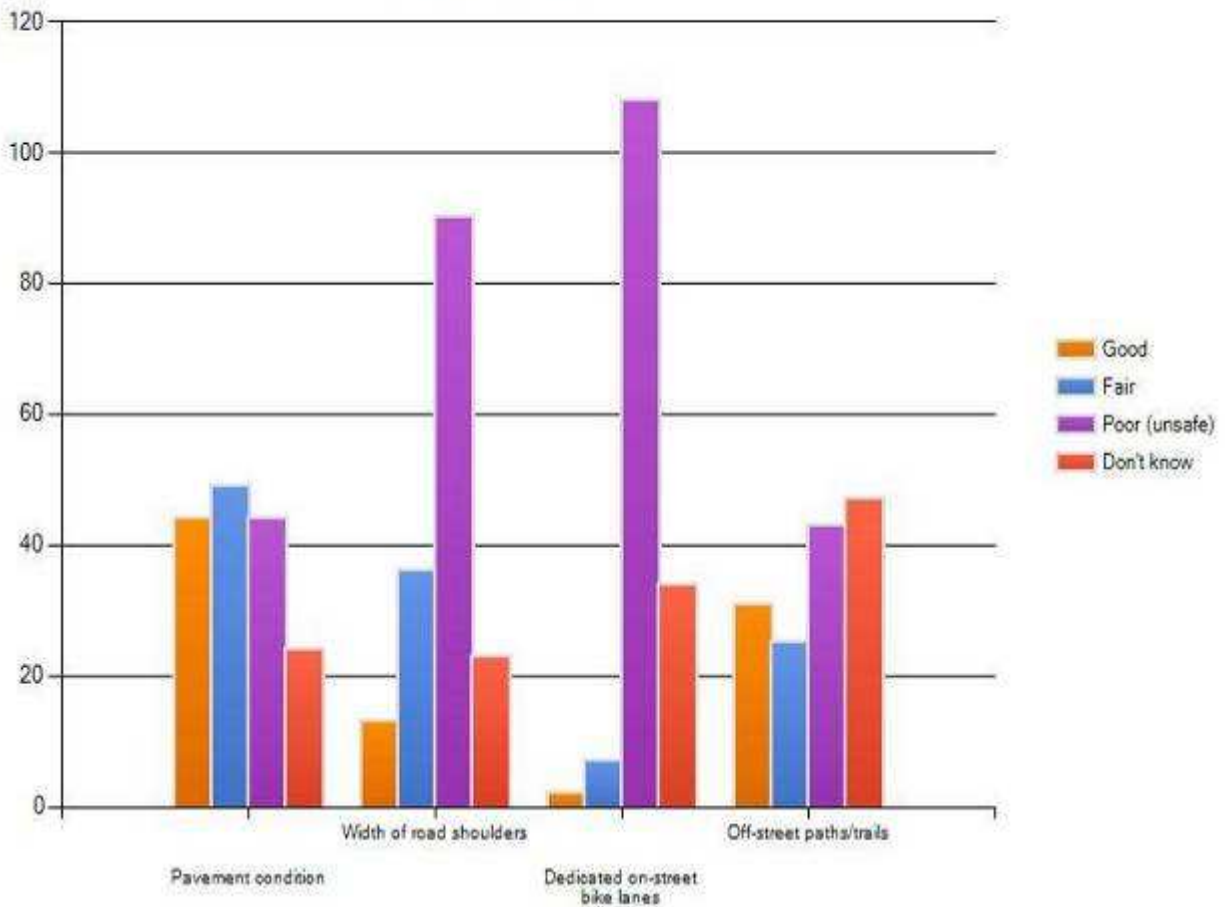
## What PREVENTS you from biking more or at all?



**How FAR or for how much TIME do you usually ride on an average outing?**

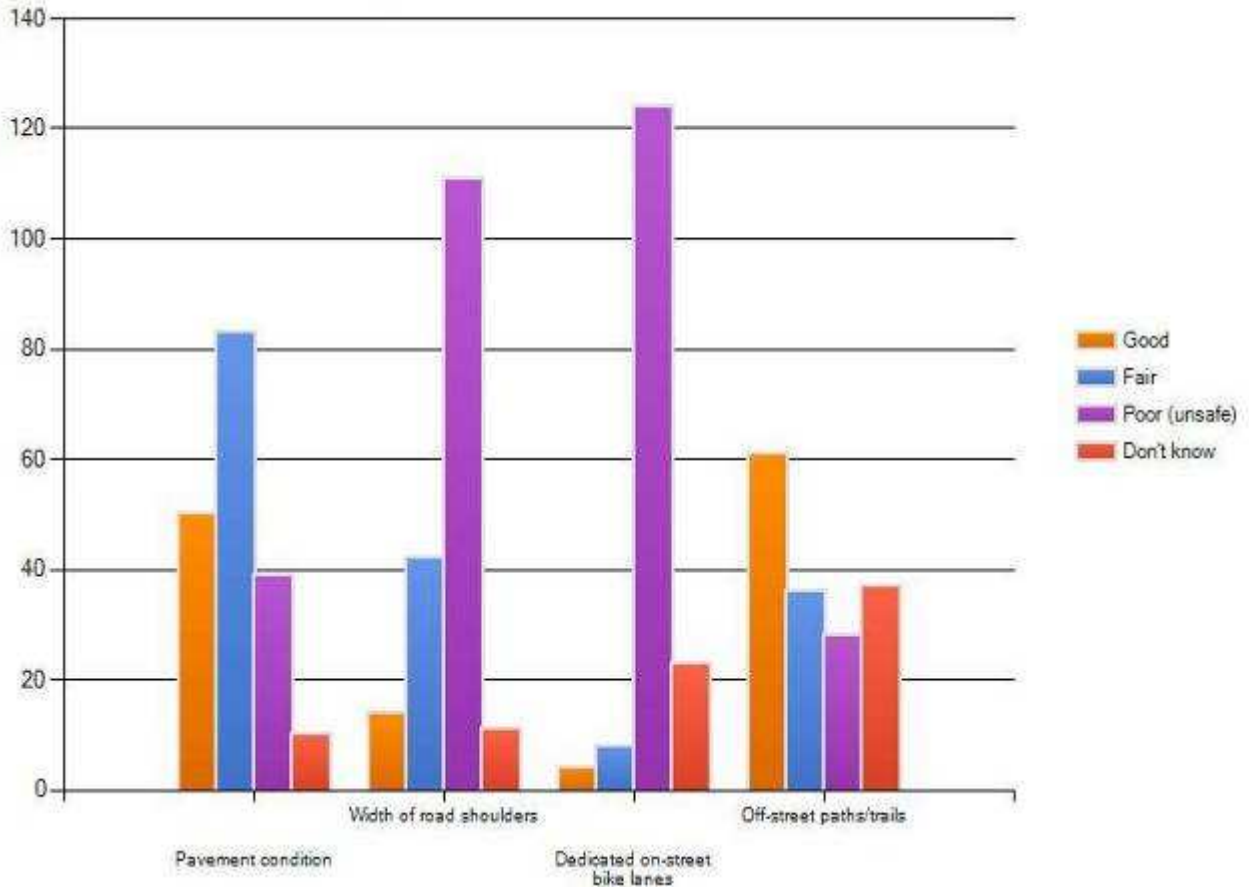


**How would you rate the conditions for biking to WORK or to SCHOOL where you ride?**

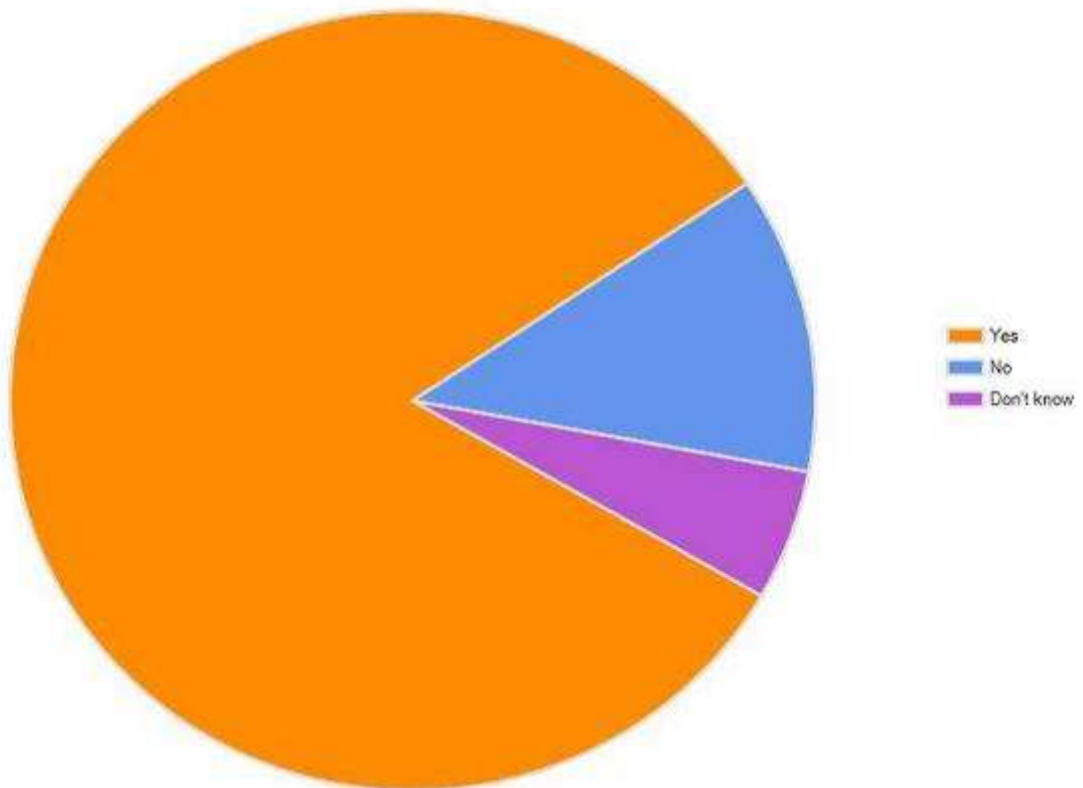




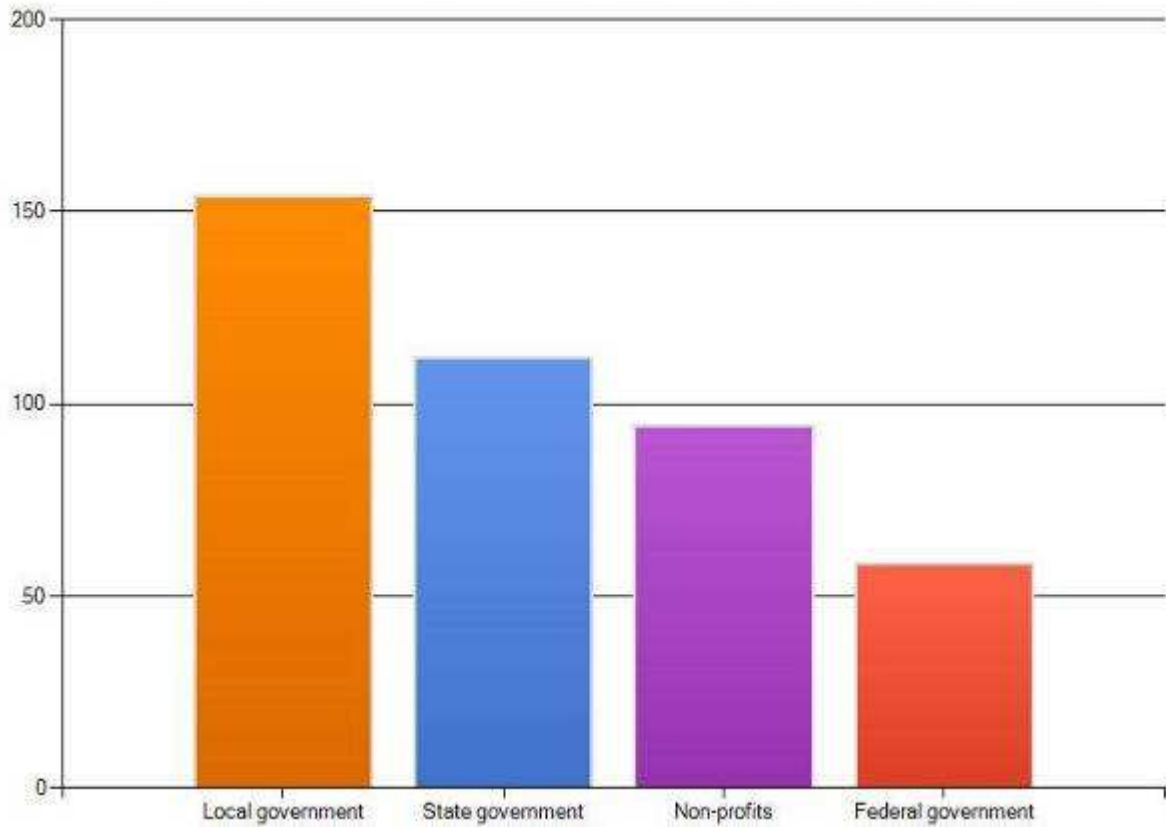
**How would you rate the conditions for biking for RECREATION or EXERCISE where you ride?**



**In your city/town, would you like more off-street paths/trails?**



### Who should be responsible for maintaining or improving places to walk and ride a bike?



APPENDIX C:  
LOCAL MASTER PLAN GOALS AND RECOMMENDATIONS RELATED TO  
NON-MOTORIZED TRANSPORTATION

**Alexandria: 2007**

The stated goals of Alexandria's master plan include establishing a recreation commission and developing trails for non-motorized use. The 2005 community opinion survey states that about thirty six percent (36%) of residents would like to see more opportunities for recreational activities. 244 residents identified hiking/walking as their favorite recreational activity in Alexandria; 69 identified snowshoeing; 62 identified cross country skiing; and 38 identified biking. A total of 87 residents specifically asked for more recreational activities in the above areas.

**Alton: 2009**

Alton's master plan makes several references to bicycle and pedestrian needs. A focus on pedestrian friendly design is clearly stated in the revitalization of the central business district. The town's stated recreational goals include expanding its recreational facilities and programs in a cost efficient manner which includes providing additional space for outdoor recreational activities. The master plan and the 2005 community survey both emphasized the need for additional green space for the purpose of public recreation and implied a strong focus on acquiring these lands. The requests for bicycle paths and running/walking paths were repeated throughout the survey results.

**Andover: 1992**

Andover's master plan does not mention any significant plans or improvements related to bicycle and pedestrian needs. The plan simply states that the Northern Rail Trail is seeing increasing recreational use in all four seasons. The plan does, however, state an acceptance of more businesses that relate to recreation and tourism. One such example stated in the plan that could create pedestrian facilities would be a "pick-your-own-produce" farm. This could promote exercise due to walking throughout the farm.

**Ashland: 2011**

Although Ashland mentions nothing specific towards bicycle and pedestrian needs in its master plan, the town does identify three primary goals for the future in its Vision Statement. One of these goals is to enhance the town's position as a destination for those seeking quality outdoor recreation.

**Barnstead: 2003**

Barnstead's goals stated in the master plan regard extensive improvements to bicycle & pedestrian facilities. The town would like to expand its trail systems. Currently, existing trail systems are either non-maintained conservation land trails or snowmobile club trails. The town does identify two strategies specific to improving trail systems. First, the Recreation Committee, the Conservation Commission, and landowners should work to establish hiking trail systems within town. The second strategy is to establish communication between the Recreation Committee and surrounding area groups such as the Pittsfield Revitalization & Preservation Alliance. This effort would likely require the cooperation of other town groups including the Conservation Commission. The town would also like to see more sidewalks and bicycle lanes. If there is adequate positive input from the community, NHDOT consideration could be given to providing space in the NH Route 28 right-of-way for bicycles. The town also wants to study and explore feasibility and financing for walkways

and bikeways connecting Center Barnstead with the Parade and Locke Lake areas, as well as other areas in town including a sidewalk on NH Route 126 between the Town Hall/Police Station area and the Post Office.

### **Belmont: 2002**

Belmont's master plan includes some very good goals related to bicycle and pedestrian improvement. Two main areas where Belmont identifies its goals are: the Recreation Chapter and the Transportation Chapter. The Recreation Chapter states that the town wishes to establish, create, expand, and map a series of loop trails to link town lands, scenic and wildlife areas, restaurants, and sleeping/camping facilities throughout the town. The town will consider limiting certain parts of the trails to pedestrians only. Currently, BRATT (Belmont Recreational Alternative Transportation Team) is working on the development and construction of the Lake Winnisquam Scenic Trail, which will run from Court Street at the Laconia town line to Jamestown Road at the Tilton town line. The Transportation Chapter's primary goals are to maintain, enhance and manage a transportation infrastructure that facilitates, encourages and supports public transit and non-motorized travel to reduce energy consumption, preserve air quality, and reduce pollution. Suggestions to achieve these goals include town support for new recreational trails, including motorized and non-motorized types. Preservation of existing recreational trails can be achieved by purchasing easements and by working with developers. Lastly, wider shoulders for bicycle paths and sidewalks should be included in any new or existing road.

### **Bridgewater: 2006**

Bridgewater's master plan includes a section specific to bicycle and pedestrian needs. The plan cites serious safety deficiencies in the areas of town where the demand is greatest for walking and biking. These two areas include Whittemore Point, and the area around the school and the Town Offices along NH Route 3A. The town of Bridgewater should promote these healthy activities safely through its transportation improvement program. In addition to considering the infrastructure and safety needs of these modes of travel, a special goal of the town is to provide safe enjoyment not only for walkers, runners, and bicyclists on the roads of the town, but also for hikers, cross-country skiers, and snowmobilers on the back roads and rustic paths of the community. Areas such as the newly established Bridgewater Town Forest along Dick Brown Road and Sawhegenet Park along the Pemigewasset River provide safe recreation areas for a wide array of users.

### **Bristol: 2003**

Bristol's master plan has a very strong focus on revitalizing its Village District. Its plan for downtown improvement encompasses many bicycle and pedestrian improvements. The town states in its master plan that "A downtown is, after all, supposed to be a pedestrian area, and the more attractive it is to people on foot, the more successful it is likely to be". This statement gives a good idea of the town's priorities regarding their improvement intentions. Several sidewalk improvement recommendations are made including widening the sidewalk at Central Square to allow for efficient pedestrian usage and to incorporate attractive design elements. The town also hopes to "soften" the gap between vehicles and pedestrians along Pleasant and Lake Streets by constructing curbed islands or green space. In addition to these and many other pedestrian improvement plans listed in the master plan, sixty percent of respondents to the Bristol Recreation Survey identified that they would like to see the multi-purpose trail along the Newfound River extended to downtown.

### **Center Harbor: 2010**

The Center Harbor master plan is focused on many things, although the needs of bicyclists and other pedestrians is not one of them. With minimal reference to these needs throughout the plan, Center Harbor's standpoint on bicycle and pedestrian needs is as follows: The town does boast a well-established network of nearly a mile of sidewalks within the Village District. Also, the state identifies three roads in Center Harbor on its Bicycle Map. In addition to these bicycle routes, the Squam Lake Association maintains Belknap Woods and Chamberlain-Reynolds Memorial Forest, which offer off-road walking and biking.

### **Danbury: 2011**

Danbury's master plan does not include many references to bicycle and pedestrian needs. The town does have a recreation commission and community center. The town's master plan does not mention any specific plans for improving wellness or providing new recreational areas beyond what already exists. In 2010, the town of Danbury conducted a community survey for the purpose of acquiring community input prior to the master plan process. The top two results for the question "Which municipal or community facilities or programs need to be enhanced or improved?" were the "Community Center" at twenty seven percent and "Recreational Parks" at twenty three percent. This indicates that plans for improvements to Danbury's recreational facilities should be made.

### **Effingham: 2003**

Effingham cites in its master plan that bicycling and walking, as well as other outdoor activities, have long been recognized as important to improving a person's physical and mental health, and are so crucial that they deserve special attention. The plan states that Effingham should promote these activities through a transportation improvement program, not only for personal health reasons, but also to reduce the amount of air pollution and vehicle miles traveled. The town also mentions that it faces serious safety deficiencies in this area offering few places for children and adults to bicycle or walk safely. In order to promote a safer walking community, the town hopes to identify areas where bicycle and pedestrian pathways can be built. It will also seek funding from programs like the NH DOT Transportation Enhancement Program to help develop these pathways.

### **Franklin: 2005**

When Franklin wrote its master plan in 2005, bicycle and pedestrian needs were clearly considered. The primary concern of the city relates to the construction and completion of both the Winnepesaukee River Trail and a river walk connecting Trestle View Park to Odell Park. These projects dovetail into the recent emphasis on creating healthy communities and the need to provide for alternative, non-fossil-fuel orientated means of transportation for both commuters and the recreational user.

### **Freedom: 2008**

Freedom is a town that has had a master plan in use for nearly 25 years. The most recent 2008 revision does acknowledge bicycle and pedestrian needs. Stated in the vision statement is Freedom's plan to acquire additional land for conservation, water supply, open space, public recreation, and town facilities by 2015. In addition, Freedom hopes to plan and implement a safe, attractive, and efficient road transportation network and to support energy conservation and alternative energy usage. Freedom admits that its network of sidewalks is sub-par. Bicycle and pedestrian access exists in the form of four foot wide paved shoulders along Ossipee Lake Road between Babcock Road and Pequawket Trail, which is a new update. This version of the town's master plan suggests completing a 4-foot wide shoulder along the entire length of Ossipee Lake Rd. The town of Freedom has

excelled in one area, that being the work of the town to preserve and enhance conservation lands. In 2001, a group of Freedom citizens led a drive to purchase the Trout Pond property, 1,984 acres in Freedom - 2,600 in all - for a town forest. The land has since been open for public pedestrian access and low-impact activities.

#### **Gilford: 2004**

In regards to bicycle and pedestrian needs, Gilford's master plan is brief and focused. The town identifies that they are seeing greater use of roadways by pedestrians and bicyclists and that their roads are generally not constructed to safely allow for interaction of vehicles and pedestrians. The Planning Board supports the development of sidewalks, bicycle paths, walking paths, and similar recreational trails throughout the town and identifies this intention as their third highest transportation goal.

#### **Gilmanton: 2005**

According to the master plan, a community trail system exists and work has been continuous since the town's 1993 master plan update. This trail system is open to hikers, bicyclists, equestrians, cross-country skiers, and snowmobiles. Additionally, the Gilmanton Snowmobile Club allows the public use of its trails during the fair weather months. Gilmanton has reserved several parcels of land as town forest. Some of these town forests already offer recreational trails. The Conservation Commission is dealing with the remaining parcels through their program to survey the town forests. This program will develop forest management plans which will allow for periods of sustainable timber harvesting together with recreational uses and habitat maintenance. Lastly, the Gilmanton Youth Organization (GYO) is a volunteer group that oversees recreational activities in the town as well as fundraising on behalf of these activities.

#### **Hebron: 2005**

Hebron's few major roads provide little safety for bicyclists and pedestrians alike. The town would like to work with NHDOT to make improvements on NH Route 3A, North Shore Road, West Shore Road, and Groton Road to improve pedestrian safety. The town would also like to add shoulders to their own roads to provide safer travel and recreation for pedestrians and bicyclists alike. An outcry for public town lands and safer recreational paths was repeated throughout the 2003 community survey. In response the town has made recommendations in its land use chapter to: expand recreational facilities on town-owned lands, work with land trusts, and private municipal owners to create linking trail networks, explore the possibility of a Cockermouth River walk, and lastly, encourage the maintenance of class VI roads as four season multi-use trails.

#### **Hill: 2007**

The town of Hill is in the "development" stage of its bicycle and pedestrian planning. The master plan makes note that a limited network of sidewalks and street lights exist in the village and are mostly located within a two-block area of the school. The town feels that these features, although nice, are not practical on the outlying roads. Some ideas for improvement include: seeking grants available to fund sidewalk upgrades within the village, exploring ways to fund the maintenance of its portion of the Heritage Trail, and thinking into the future by requiring new subdivisions to have open space and incorporate room for trails. These trails could eventually connect to an existing trail network, saving the town money, and increasing recreational opportunities for the townspeople.

### **Holderness: 2007**

There are several references related to bicycle and pedestrian needs listed in the Holderness master plan. In addition to citing areas needing improvement in its bicycle and pedestrian system the town points out several of its strong points as well. The rarely used 50-acre town forest boasts a network of logging roads that can be used for hiking in the summer and cross-country skiing in the winter. The town attributes the limited use of the town forest to the unfamiliarity of its location. This may be the driving factor behind the town goal of creating and distributing a town trail map which would include routes to hike, walk, bike, ski, and snowmobile within Holderness town limits. In addition to the fifty miles of trails maintained by the Squam Lakes Association, the town would like to develop a town-wide multi-modal trail system.

### **Laconia: 2007**

The city admits to having poor bicycle and pedestrian infrastructure and has been taking steps to correct that. Luckily, many improvements are currently underway. The city has recently finished a sidewalk project on Elm Street and is in the process of finalizing a joint effort with the State to provide sidewalks for several thousand feet of Endicott Street on either side of its intersection with Weirs Boulevard. Laconia generally requires sidewalks in new developments. The city has also been actively pursuing the construction of new bicycle and pedestrian facilities throughout the city, including the Court Street Bicycle Path, the proposed Winnepesaukee Opechee Winnisquam (WOW) Trail, and the bicycle and pedestrian bridge on Bridge Street. The city network will also become part of the Lakes Region Bikeway, which is proposed to stretch from Meredith to Franklin. The Laconia Trails with Rails Exploratory Committee has been a driving force on these issues. To incorporate their activities into a city wide trails network, Laconia's strategy is to invest in non-motorized transportation systems such as the Riverwalk, sidewalks, and the Rails with Trails program.

Additionally, the City of Laconia provides an interactive walking guide created with Google maps found on the towns website under the Visitors tab > Maps > Laconia Walking Map.

### **Meredith: 2002**

Meredith makes its bicycle and pedestrian needs a top priority. So serious are they that the master plan makes these transportation needs priority number two out of six. Some of the town's objectives in dealing with these needs are to develop a bicycle and pedestrian plan. This plan will: (1) Include an inventory of all existing pedestrian and bicycle facilities. (2) Include an inventory of activity centers or neighborhoods that ought to be connected. (3) Identify specific areas where networks can be expanded or improved. (4) Identify needed support facilities (i.e., restrooms, drinking water, bicycle racks, benches, parking areas, etc.) (5) Include an education and awareness component to encourage greater utilization and to reduce the exposure to the risks associated with these forms of travel. The plan should be considered in the scoping of all public and private development projects. The town hopes to provide a network of multi-purpose facilities to improve travel opportunities to, from, through, and within Meredith. Also, the town hopes to incorporate bicycle and pedestrian access into land use regulatory processes.

Additionally, the Meredith Pathway Committee is an advisory committee appointed by the Board of Selectmen. The broadly stated purpose of the committee is to develop a pedestrian plan and promote pedestrian activity in the community. The Committee provides a pathway map of designated routes throughout the town.

### **Moultonborough: 2008**

Moultonborough's plan to revitalize its village includes many suggestions to update bicycle and pedestrian systems. These include: building sidewalks on NH Route 25 in the Village, installing a crosswalk from Blake Road to the north side of NH Route 25 to connect schools and the Village, and establishing a connection to commercial buildings in the town center. Moultonborough completed Phase II of the Moultonborough Neck Pathway in 2007. Phase II runs along Moultonborough Neck Road. to Kona Farms Road. Phase I runs from Jojo's Country Store to Winaukee Road, leaving the middle of the Neck for a Phase III.

### **New Hampton: 2002**

Regarding bicycle and pedestrian needs, New Hampton's master plan refers to the overwhelmingly enthusiastic response to the community opinion survey. 416 respondents returned thirty-eight percent of surveys distributed by the visioning committee when preparing to revise the town's master plan. In the survey, the townspeople indicated a thirty five percent satisfaction rating with recreation services. When asked their opinion about recreational facilities within the town, seventy-six percent of townspeople indicated their primary want was more hiking trails and picnic areas. The townspeople's desire for more biking trails rates closely behind at sixty-nine percent. The master plan also makes a recommendation to update village zoning to "mixed use", allowing for a pedestrian friendly, multimodal district.

### **Northfield: 2003**

The Northfield master plan briefly touches on several topics related to bicycle and pedestrian needs. These topics include a mixed use village district similar to the plan of nearby New Hampton. The town plan also mentions its desire for a skateboard park, which is often an overlooked type of recreational facility. It also identifies some weaknesses in its bicycle and pedestrian network. The Southwick Elementary School District mandates a "bus only" policy which does not allow students to walk or bike to school due to safety concerns. The town would like a defined bicycle and pedestrian linkage to connect and enhance recreational facilities for people of all ages and levels of ability. Contained within Northfield are two excellent recreational areas; The Winnipisaukee River Trail, which is near completion, and Knowles Pond Park. Together they offer a network of trails that allow access by foot, ski, peddle, snowshoe, and equestrian use.

### **Ossipee: 2006**

Ossipee does consider bicyclists and pedestrians in its master plan. The town plans to install a bicycle path around Ossipee Lake that will connect with existing pathways around the lake and eventually to non-motorized pathways in the rest of the Lakes Region. The regional Transportation Advisory Committee has been instrumental in the development of these bicycle paths throughout the Lakes Region. The Ossipee Conservation Commission plans to develop trails for hiking on conservation land in town. One of the first properties they plan to work on is Sumner Brook. Constitution Park already contains a trail system including wooden bog bridges to prevent adverse impact from foot traffic. Lastly, the master plan recommends that sidewalks and crosswalks be considered anywhere pedestrian traffic exists within the town.

### **Sanbornton: 2011 Draft**

Sanbornton's references to bicycle and pedestrian needs lie within the draft master plan's transportation recommendations. The plan recommends that public right-of-ways should be accessible to alternative modes of transportation including pedestrian, bicycle, and equestrian use and should be designed to include areas for additional utilities where necessary.



### **Sandwich: 2011**

Sandwich's master plan acknowledges several modes of transportation, as well as bicycle and pedestrian facilities. The recent update admits that town roadway facilities for bicycles and pedestrians are limited, especially in Center Sandwich. The plan recommends potential actions that could be taken to achieve overall bicycle and pedestrian facility improvement goals. These actions include: (1) adding an additional 2-feet of pavement to the shoulder of roads to provide a safe place for bicyclists and pedestrians (2) working with NHDOT to assure that any state bridges that are rebuilt or reconstructed provide adequate space for sidewalks and/or bicycle lanes (3) develop a long-range plan for sidewalks in Center Sandwich (4) properly mark and sign the state designated bicycle routes, including NH Routes 113 and NH Route 109 (5) work toward a system of bicycle routes and multi-use trails/paths for the enjoyment of Sandwich citizens and visitors that is coordinated with state and regional trail systems.

### **Tamworth: 2008**

Unfortunately, in some areas the historic rural nature of the town left little physical room for improvements to transportation systems. Regardless, improvements including the installation of a crosswalk in Chocorua Village were in the plans for 2008. This improvement supports Tamworth's second smart growth principle 'Foster the traditional character of New Hampshire downtowns, villages, and neighborhoods by encouraging a human scale of development that is comfortable for pedestrians and conducive to community life.' Community survey respondents indicated a high degree of support for more bicycle paths, sidewalks, and linked trails throughout the town. Development of town bicycle lanes is on the forefront of the 2008 Plan. A local resident is spearheading a project to improve the shoulders on both sides of NH Route 113. Eighty percent of the project is covered by federal funds while the other twenty percent is projected to cost the town \$29,000. These improvements will make the roadway safer for pedestrians and bicyclists and alike.

### **Tilton: 2009**

The master plan of Tilton has few references to the needs of bicyclists and pedestrians. The town does mention that it would like to maintain a pedestrian friendly village district. The plan recommends that transportation enhancement grants be investigated to fund sidewalk construction in the village and resort commercial districts, which see heavy traffic from vehicles and in some areas provide no sidewalks or bicycle lanes.

### **Tuftsboro: 2006**

Tuftsboro's master plan recommends improvements to the town's bicycle and pedestrian facilities. In the 2005 Community Attitude Survey townspeople indicated that biking and walking are the most common outdoor recreation activities enjoyed by residents and seventy seven percent of residents said there is a need for more walking trails. Tuftsboro is fortunate in that it does have recreational paths and trails for use by pedestrians. Some of the trails are on dedicated rail easements; others are on private property, as permitted by the landowner and current use laws. The town currently does not have sidewalk or "streetscape" plans for any of its four villages. The benefits of safe and convenient pedestrian and bicycle opportunities include: improved health, quality of life, and air quality. Tuftsboro is also fortunate to house a number of designated bicycle routes including NH Routes 109A, 109 and 171. Plans for improvement to the town's bicycle and pedestrian facilities include requiring their installation in designated village districts in association with subdivision and/or site plan approval. A viable option in expanding its trail system is to designate class VI roads as non-motorized trails.

### **Wolfeboro: 2007**

Bicycle and pedestrian facilities are constantly referred to throughout the entire transportation chapter of Wolfeboro's master plan. Wolfeboro can claim a strong pedestrian friendly village district. Regardless of its favorability, this aspect can be improved upon. The sidewalks are generally in poor condition and the locations of crosswalks leave no option for continuous connectivity and often leave pedestrians in the pathway of cars backing out of parking spaces. Although the plan does not propose significant infrastructure updates, it does include several recommendations for improvement of a bicycle and pedestrian system within the town. The plan suggests that the town add investments in bicycle paths, bikeways, and bicycle parking facilities to the capital budget. This would allow the town to develop a bicycle plan including specifics on the bikeway system in Wolfeboro as well as invest in education for motorist and cyclist safety. In addition to the needs of bicyclists, the town would like to improve the town wide trail plan to provide off road options for hikers, skiers, mountain bicyclists, snowmobiles, ATV users, and equestrians. Improvement of the town wide trail plan would increase opportunities for recreation and provide awareness of Class VI roads and similar pathways for recreational purposes.

Additionally, Pathways of Wolfeboro was formed to support the town's master plan objectives. Pathways of Wolfeboro provides a map of recreational pathways within the town.

APPENDIX D:  
BICYCLE AND PEDESTRIAN PLANNING INFORMATION RESOURCES

**Larry Kineston** – Intermodal Facilities Engineer, Rail and Transit Bureau, NHDOT  
(603) 271-1668  
[LKeniston@dot.state.nh.us](mailto:LKeniston@dot.state.nh.us)  
[www.bikeped.nh.gov](http://www.bikeped.nh.gov)

**NHDOT Planning and Community Assistance – Safe Routes to School**  
[www.nh.gov/dot/org/projectdevelopment/planning/srts/](http://www.nh.gov/dot/org/projectdevelopment/planning/srts/)

**Bike/Walk Alliance of New Hampshire**  
[www.bwanh.org](http://www.bwanh.org)

**Pedestrian and Bicycle Information Center**  
[www.walkinginfo.org](http://www.walkinginfo.org)  
[www.bicyclinginfo.org](http://www.bicyclinginfo.org)

**National Complete Streets Coalition**  
[www.completestreets.org](http://www.completestreets.org)

**Active Living By Design**  
[www.activelivingbydesign.org](http://www.activelivingbydesign.org)

**Walkable & Livable Communities Institute**  
[www.aginginplaceinitiative.org](http://www.aginginplaceinitiative.org)

**America Walks**  
[www.americawalks.org](http://www.americawalks.org)

**Rails-to-Trails Conservancy**  
[www.railstotrails.org](http://www.railstotrails.org)

**Association of Pedestrian & Bicycle Professionals**  
[www.apbp.org](http://www.apbp.org)

**Congress for the New Urbanism**  
[www.cnu.org](http://www.cnu.org)

**The Alliance for Bicycling & Walking**  
[www.peoplepoweredmovement.org](http://www.peoplepoweredmovement.org)

**Federal Highway Administration Safety Program**  
<http://safety.fhwa.dot.gov/>

## APPENDIX E: MAP OF NHDOT ROAD SHOULDER WIDTH DATA, AND ANALYSIS METHODOLOGY

This map was created using NHDOT data that was released in May of 2011. The road data include a field for 'shoulder width' on either side of the road, but it is not clear if all data contained in the May 2011 release were newly updated data.

The map shows three categories of shoulder width for both sides all minor collectors, major collectors, minor arterials, and major arterials in the Lakes Region.

Shoulder width is shown in three categories:

**0-2 feet = orange**    **3 feet = yellow**    **4 feet or more = green**

The map also shows the potential for road segments with 0-2 foot shoulders to be re-stripped with 10-foot lanes in order to accommodate shoulders of greater than 3 feet. These road segments, totaling over 30 miles, are shown with wide light green buffers underneath the existing condition color.

The map also shows some of the region's off-street multi-use paths in **blue**.