We Built this City on Walk and Roll: Steps Towards a Transportation Transition in Keene, New Hampshire

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Abstract

One of the most important aspects of an urban setting is its effect on the overall health of a community. Due to a habitual use of the automobile for transportation necessities, the American culture seems to have forgotten basic and healthy forms of alternative transit. Walking and cycling are simple, cheap, and relatively 'green', as well as widely applicable. A change in transportation culture would require the pedestrian and biking infrastructure of a city to prove complete and capable.

This report examines the history, current state, and future plans, for bicycle and pedestrian infrastructure development within the City of Keene, New Hampshire. Through the use of a *PEDS Structural Road Survey,* 22 high-volume street segments are thoroughly examined with particular focus on sidewalks, connectivity, lighting, signage, and traffic conditions, among other topics. Each factor contributes to the overall use of the pedestrian paths.

Regarding cycling, several aspects influence a person's willingness to use bike facilities, including but not limited to awareness, accessibility, aesthetics, living situation, and location. The sense of safety proves to be another influential factor in the decision to walk or ride. Based off data from Keene Police logs, monthly motor vehicle accidents ranging from April to September 2009 are plotted on maps to show areas of greater risk. Attitudes are also examined through the distribution of a comprehensive survey to a random sample of 156 students attending Keene State College. Results are analyzed through the statistical software program, *SPSSx.* Findings reveal that 3rd and 4th year students, as well as off campus residents are more aware, use the paths more frequently, and acknowledge the need for path publicity at a statistically significant level.

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Chapter 1
Getting Off on the Right Foot

Urban design and development in the United States is simply and logically framed around existing transportation networks. This web of pavement consists of interstate highways, crowded city streets, and sprawling neighborhoods; each road segment catering to the high and expensive demands of the automobile (Cochran 2009). Ever since its mass production in 1913, the automobile has altered the layout of cities and towns across the United States (Watts 2005). However, before the arrival of the automobile, built environments were constructed in a radically different way. Walkers and horses with riders were the only modes of transportation for which the streets had to accommodate. Today, bicycles and motorized vehicles have replaced horses, with resulting impacts on environmental quality, human health characteristics, efficiency, and safety. Due to the colossal impact that transportation systems have on their given location, the development and installation of an effective and holistic transportation plan is critical to efficiency and health. Additionally, it is important for transportation infrastructures to be designed for long term implementation.

As a result of the substantial negative effects of motor vehicle usage in the United States, the development and expansion of facilities for alternative forms of transportation such as biking and walking is extremely important. Unfortunately, such facilities are neither abundant nor common enough currently to influence a significant change in how people travel on a national scale. However, certain locales within the United States have taken great strides in improving the quality, availability, and accessibility of such facilities. These cities, which include Burlington, Vermont, Davis, California, and Arlington, Virginia illustrate that cycling can become a normalized and effective alternative method of transportation on a city-wide scale.

Other locations that have taken initiatives towards achieving similar alternative transportation expansion and community health promotion goals include the City of Keene, New Hampshire, the areal focus of this study. Located in southwestern New Hampshire, Keene is a relatively small city with a land area of 37.6 square miles and, as of July 2008, a total population of 22,269 (Figure 1) (US Census).

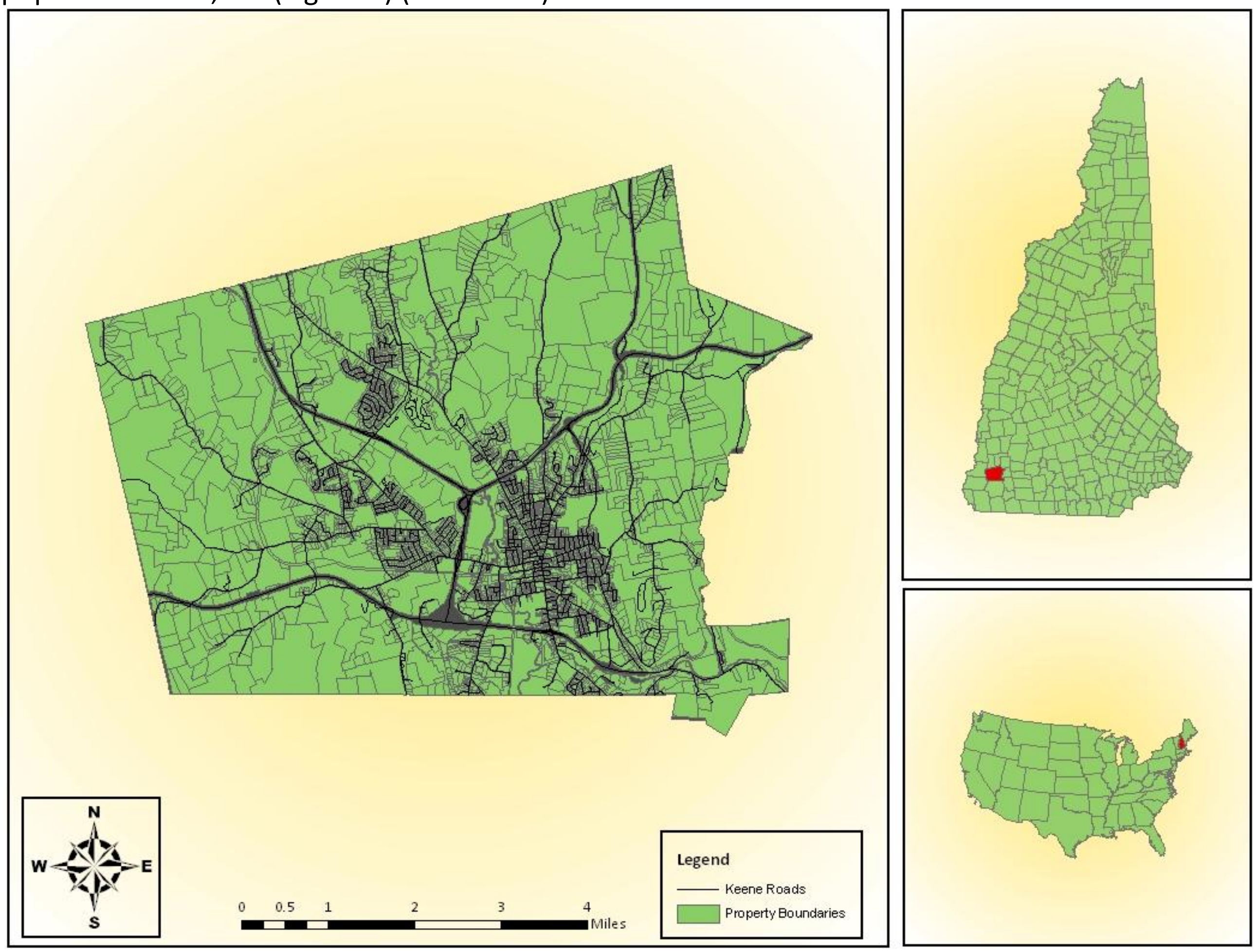

Figure 1 *Relative Location of Keene, New Hampshire.*

The city of Keene has benefited from several organizations regarding community health. Cheshire Medical Center is an excellent example, having taken significant steps towards improving Keene's collective community health and promoting active lifestyles. One of the more notable efforts towards these goals is the development of the Vision 2020 plan, which is designed to engage the citizens of Cheshire County, New Hampshire in the process of becoming the healthiest community in the United States by the year 2020. Vision 2020 is oriented around the use of five health goals (Figure 2) (Cheshire Medical Center 2009).

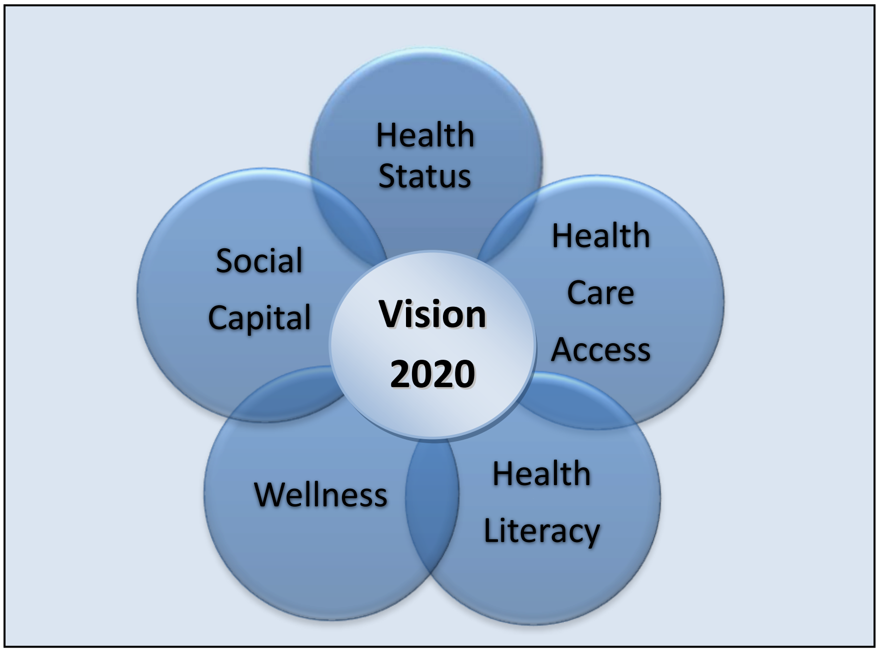

Figure 2 *Five Health Goals of Vision 2020.*

Although Keene is taking initiatives to improve its collective community health, there are other aspects of the city that require improvement as well, such as the condition and extent of cycling lanes. Dr. Yvonne Goldsberry, a Senior Director of Community Health at Cheshire Medical Center agrees that the expansion and development of such facilities could positively influence the effectiveness of the Vision 2020 plan, making cycling a more accessible method of transportation and increasing active living in the process. Additionally, Keene is approximately 6.4 miles across from north to south and approximately 8.4 miles across from east to west. These are very reasonable distances to traverse using bicycles given the existence of safe and accessible bike lanes. Due to its small size, Keene is an excellent candidate for substantial cycling lane development on a city wide scale.

The improvement of community health in conjunction with expansion of cycling lanes and sidewalks can thus substantially influence the amount of motor vehicle usage in Keene. This study aims to positively influence the accomplishment of several goals, namely the improvement and expansion of bike paths and sidewalks, development of a healthy and physically active community, and the reduction of motor vehicle usage and air pollution. Effective implementation of cycling paths and healthy communities may present several favorable results. Examples include reduced motor vehicle usage, a corresponding cleaner environment and improved air quality, reduced cost of living, and reduced national health detriments resulting from physical inactivity and air pollution.

This study is comprised of several analytical components which help identify existing problems associated with alternative methods of transportation, community health, and the natural environment in Keene, New Hampshire. Fieldwork analysis of sidewalks, roads, and cycling paths is conducted in order to identify characteristics regarding structural condition, safety features, and areal dimensions. In addition, motor vehicle accident data is analyzed and utilized in the development of Geographic Information System (GIS) maps which identify high risk intersections, as well as spatial trends over time. The use of GIS is also highly regarded as a tool for the future of improving pedestrian and bicycle safety (Aultman-Hall et al. 1997; Ziari and Khabiri 2005). Interviews with specialists in the fields of alternative transportation and health in Keene provide professional insight and recommendations regarding this study and existing issues associated with alternative transportation and community health. Surveys distributed to Keene State College students reveal statistical patterns associated with methods of transportation and opinions regarding characteristics of existing walking and cycling facilities.

To increase awareness among students, a plan of action geared toward publicity proves vital to increase the physical use of Keene’s alternative transportation paths.

Chapter 2
A Step in the Right Direction:
Literature Review

Effects of the Automobile

The importance of the present transportation infrastructure cannot go unnoticed. This complex system bases its design heavily around the efficiency and safety of travelers. Transportation in the United States has become somewhat one dimensional, revolving around the motor vehicle. A large scale change in the method of transit would entail alterations of the physical properties of the infrastructure. Coincidentally, studies have suggested that current transportation habits geared around the automobile prove detrimental to the health of people and the environment. The possible transition to a more sustainable transportation mode requires a far reaching knowledge base from which to draw, one that spans from the historical past to the present day. In fact, when compared to the infrastructure of a different region of the globe, the road network of the United States shows significant variations in layout and utilization. For instance, European transportation infrastructure and methods display obvious differences from their American counterparts.

The Atlantic Ocean separates more than just the two culturally and physically diverse continents of Europe and North America; it has acted as a barrier to time and technology, dividing some of the oldest cities in the world and some of the newest. History holds the difference between today's radically different transportation networks in Europe and the United States. European urban areas are notorious for tight, winding alleys, unpredictable cobblestone surfaces, and, in many cases, seemingly wild driving habits. When the classic European city was constructed, the automobile was not a factor in the minds of the designers; Henry Ford's Model-T had yet to be imagined. European towns had already been standing for hundreds of years when mass production of the automobile started. Although automobile usage influences every environment, many Europeans continue to use other modes of transportation such as a bicycle or their own two feet (Figure 3).

Figure 3 *Common European Infrastructure Segment. Amsterdam, Netherlands.* Source: Authors

On the other hand, the American cultural landscape sprawls in comparison. Cities in the United States have regimented blocks with suburbs that extend for miles and edge-cities are even more spread out. The automobile is necessarily dominant due to sheer distances (from homes to city centers). While Europe has steadily progressed with the image of a bike as a useful vehicle for place-to-place travel, the United States has maintained a narrow perspective toward transportation consisting of fuel consuming vehicles.

The citizens of the United States have only viewed the bicycle as a recreational tool. Exercise, competition, sport, leisure, and hobby are some uses for the bike in the United States;

transportation remains absent (Varughese 2009). However, exception cities hide within America's borders, though they exist few and far between. The two most bike-oriented American locales, Davis, California and Boulder, Colorado, report that the percent of trips around the city by bicycle account for 15 percent and 12 percent, respectively (Walljasper 2008). Comparatively, European cities, such as Amsterdam, reinforce alternative transportation trends and report that 67 percent of all urban trips are made on foot (36 percent) or on the seat of a bicycle (31 percent) (Walljasper 2005). These numbers alone reveal the American reliance on the motorized vehicle. The choice to drive downtown when biking is reasonable, or the decision to drive down Main Street while running errands, are common examples of unnecessary, everyday vehicle use. Although comforting in some aspects, extensive automobile use can cause many negative effects to personal, environmental, and community health.

An increase in population directly correlates to the quantity of motor vehicles used, and changes in the population of the United States are evidenced by the amount of registered vehicles in the country. Figure 4 illustrates changes in national population and quantity of registered motor vehicles between 1994 and 2007. In 1994, the United States had a resident total population of 260.3 million, while in 2007 a population total of 301.3 million was observed. Similarly, in 1994, the national total of registered motor vehicles was 192.497 million, while in 2007 the national total was marked at 255.8 million vehicles. The most troubling aspect of these numbers is that while the national resident population experienced a 15.74 percent increase between 1994 and 2007, the quantity of registered vehicles between these years increased by 32.9 percent (FARS Encyclopedia).

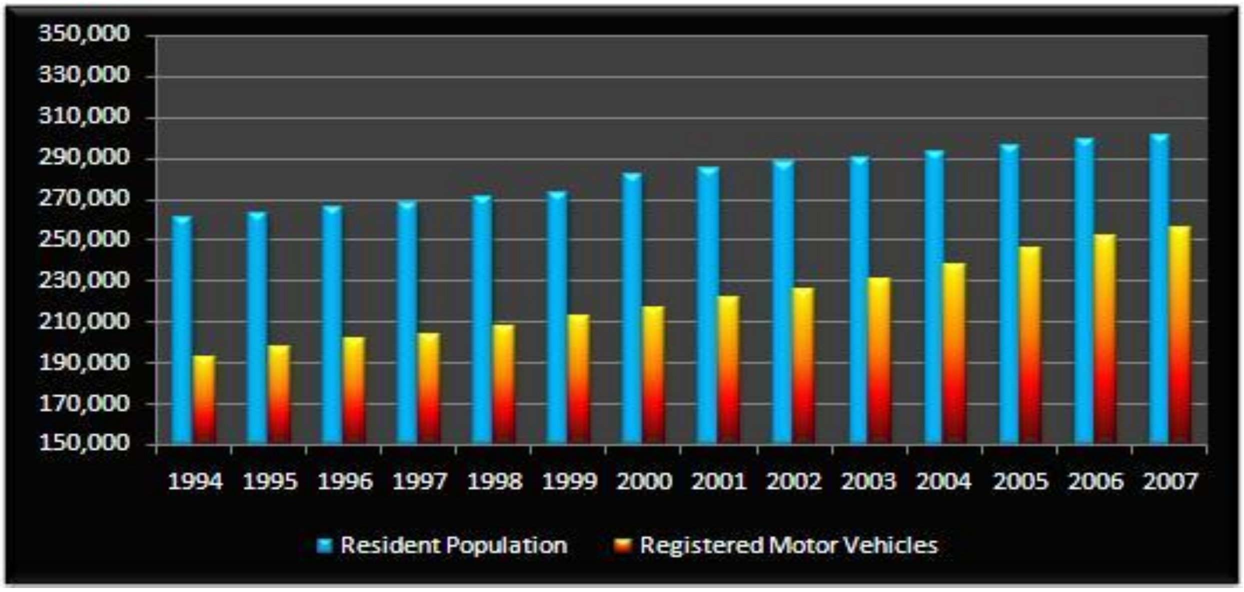

Figure 4 *Change in National Population and Amount of Motor Vehicles. 1994-2007 (in thousands).*

The use of motor vehicles substantially influences the environment, and the increase of carbon monoxide emissions between 1990 and 2002 indicate that a notable amplification of air pollution has occurred. In 1990, off-highway vehicle usage produced a combined 21.45 million tons of carbon monoxide emissions. By 2002, the total carbon monoxide emissions produced by off-highway motor vehicles climbed to 22.61 million tons, a 5.4 percent increase from 1990 (Environmental Protection Agency 2009). Overreliance on individual motor vehicles for transportation is not only detrimental to the environment, but also correlates to and influences health characteristics in a given area, also due to pollution.

Most automobiles on the roads today derive their power from an internal combustion engine. Internal combustion engines require the burning of carbon-based fossil-fuels such as diesel and gasoline. In the 1950s scientists identified three main pollutants caused by the burning of such fuel. The first is carbon monoxide, which can adversely affect the ability of the blood to hold oxygen. The second is hydrocarbons, which can cause respiratory inflammation, and permanent lung damage. Finally, they found that motor vehicles emit nitrogen oxides, which can thicken small pulmonary arteries, thus reducing blood flow (Anastakis 2009). Fine particulate matter (FPM) is another component of motor vehicle exhaust, which is made up of solid particles, miniscule enough to remain airborne for extended periods of time. Studies have shown that long term effects of the inhalation of these gasses and FPM, directly causes lung cancer, death from cardiopulmonary deterioration, cardiovascular disease, and cerebrovascular disease (Moolgavkar 2000, Pope et al. 2002, Francesca et al. 2006). The inhalation of these chemicals in any amounts is harmful and detrimental to both short term and long term health. Because of their higher population concentrations, urban areas harbor more vehicles and corresponding pollutants, creating potentially dangerous environments regarding air quality. A change to alternative forms of transportation would help in reducing these noxious gasses and ultimately provide a better environment for the affected inhabitants.

Transportation and Health

Additionally, frequent transport by biking and walking has great potential to curb the growing poor health trend of the nation. Being on a bike or walking decreases time behind the wheel and increases the amount of physical activity. Therefore, improving conditions for walking and biking is vital for the public health of America (Pucher and Dijkstra 2003). The action of driving a car lacks the requirements to be considered physical activity.

> Participation in regular physical activity depends in part on the availability and proximity to such resources as community recreation facilities and walking and bicycling trails, so building such environments holds much promise in health promotion (Wang et al. 2004, 549).

The phrase “physical activity” holds many definitions, but a certain theme clearly stands out in every explanation: the expenditure of energy to produce healthy individuals. In one case, physical activity is defined as, “Any body movement that works your muscles and uses more energy than you use when you're resting" (National Heart Lung and Blood Institute 2009). It is well researched and documented that physical activity holds an undeniable connection with the overall health of individuals, enhancing muscle and bone strength, blood flow, and the immune system. Specifically, physical activity has been shown to reduce the risk of death from many chronic diseases and health issues prevalent in the United States like heart disease, diabetes, high blood pressure, and colon and breast cancer, and obesity (Department of Health and Human Services 2002; Khan et. al 2009; Hanson and Young 2009, Fenton 2005). Such is the case in the United States, with roughly 25 percent of the total population being categorized as obese; the highest obesity percentage in the world (Centers for Disease Control and Prevention 2005).

Walking is the most common and popular form of physical activity among men and women. Studies consistently show women and individuals older than 50 utilize walking more than any other group of people (Giles-Cort 2003). Coinciding with this fact, the physical environment, social influences, and individual perspectives all play a role in the personal choice to partake in some form of physical activity within the community. These factors collectively act as a deterrent to biking and walking and contribute to the mainstream use of a motor vehicle, further decreasing the health of the nation as a whole. Studies have reinforced the link between health and current transportation trends (Department of Infrastructure 2003; Southworth 2005). Policy makers are beginning to recognize that shifting some travel from auto trips to walking trips can help the country combat obesity, as well as reduce the air pollution and oil dependency that result from auto use (Agrawal 2008). Large scale utilization of alternative transportation methods significantly aid in the reduction of these physical and environmental problems.

Of equal importance as physical health, though perhaps not as widely acknowledged, is the mental health of the citizens. The social life of the citizen has a large contribution to the whole of the community. “The social and community ties are key elements of a more encompassing concept, known as social capital. Social capital is defined as the social networks and interactions that inspire trust and reciprocity among the citizens” (Leyden 2003). For example, if a citizen feels unsafe walking, the citizen will avoid walking and continue to drive a car. From the urban planning perspective, pedestrian accessibility would take a back seat to the priority of corresponding safety concerns.

Areas with high levels of social capital have additionally been connected with better economic development and are proven to have larger amounts of politically involved citizens. There are also noticeable levels of shared kindness between citizens, lower crime rates, and higher trust levels between neighbors.

> Theoretically, pedestrian-oriented, mixed-use neighborhoods are expected to enhance social capital because they enable residents to interact. This interaction can be intentional or accidental. Spontaneous “bumping into” neighbors, brief (seemingly trivial) conversations, or just waving hello can help to encourage a sense of trust and a sense of connection between people and the places they live (Leyden 2003, 1546).

The neighborhoods with the highest social capital levels are pedestrian oriented, mixed-use neighborhoods. The neighborhoods consist of housing for single and multiple families and those people that are classified as renters. Another differentiating factor is the presence of public transportation and building use diversity, including public buildings (libraries, schools) and commercial enterprises (such as restaurants).

Sustainable Urban Planning

To alter the transit habits of a community as a whole, some governments must step back and look at the basics of their city. At a glance, an area under the urban planning microscope presents itself as either compact or not compact. Across the country, “Smart Growth” is a term being used in urban planning to promote a more compact urban environment and stop the sprawl that is slowly consuming undeveloped land (Talen 2002). The realization has been made that sprawl is the root of the congestion, high emissions, and poor health common to the American people. The first use of the term ‘Smart Growth” became public during a debate over a “Smart Growth” legislation in Maryland. It was decided that “Smart Growth” would create “high density mixed-use and pedestrian oriented development that promotes efficient land use and increases transit ridership” (Maryland Department of Planning 1997). Providing citizens with a denser community allows for more green space and facilitates pedestrian activities. Thirty of the fifty largest United States metropolitan areas have developed or are developing green space plans. People, especially the elderly population want to be able to efficiently walk from place to place like church and the post office (McMahon 1999). “Smart Growth” progress continues to strive toward better, livable environment and a huge factor in achieving that goal is the need for a change in transportation.

A more transportation concentrated method to which some governments are turning is the “Complete Streets” approach. An urban planning philosophy gaining much support, “Complete Streets” has influenced many urban centers such as San Diego, Charlotte, and Salt Lake City. The aim of this movement is to produce roads that are safe and convenient for all users. The South Carolina Department of Transportation has embraced this idea, even declaring that bicycling and walking accommodations should be a routine part of the department's planning, design, construction, and operating activities (McCann 2005). The city of Minneapolis has redesigned several streets based on the “Complete Street” method. Each street requires a different design because each street possesses unique qualities such as different dimensions, different settings (urban, rural, suburban), and different resident ages. Minneapolis’ Hennepin Avenue, after a “Complete Street” makeover, totals 57 feet from curb to curb, incorporates a 7-foot wide parking lane on either side of the road, each adjacent to a six and a half foot wide bicycle lane, and three ten foot wide vehicular traffic lanes. Although fairly wide, this blueprint proves aesthetically pleasing and very safe for cars as well as cyclists (Walljasper 2008). The “Complete Street” mentality has created much activity in places where help was needed regarding the topic of non-motorized transportation.

To this day, towns continue to make changes in high-volume road intersections to aid in the movement of motorized vehicles. Multiple roundabouts, or rotaries, replace standard intersections to help reduce congestion and sustain the flow of traffic. Many roundabouts operate through minimal on-road driving instruction, some even using a “yield” sign as the only guideline to the motorist. Ultimately, this leaves the action of proceeding or stopping to the personal decision of the driver. Studies have indicated that the rate of cyclist to motor vehicle accidents increased after the installation of a rotary where a conventional signalized intersection existed previously. Furthermore, concerns regarding pedestrians, especially those with handicapped vision, are considered in the overall safety breakdown of a rotary (Dabbour 2008; Rouphail et al. 2005).

Similar Studies

These ideas could also prove to be a useful improvement to towns such as Burlington, Vermont, whose citizens already enjoy an efficient cycling and walking path network. Nestled on the cold banks of Lake Champlain, the brick building lined streets of Burlington are home to 38,897 people (United States Census Bureau 2009). This town can stand in the company of very few other towns that can brag about being pedestrian oriented. Highlights include the famous pedestrian shopping mall on Church Street (no formal parking; parking is located on the city streets), pedestrian oriented streets with store fronts, and a very well documented historical character that can be viewed easily on foot (Figure 5).

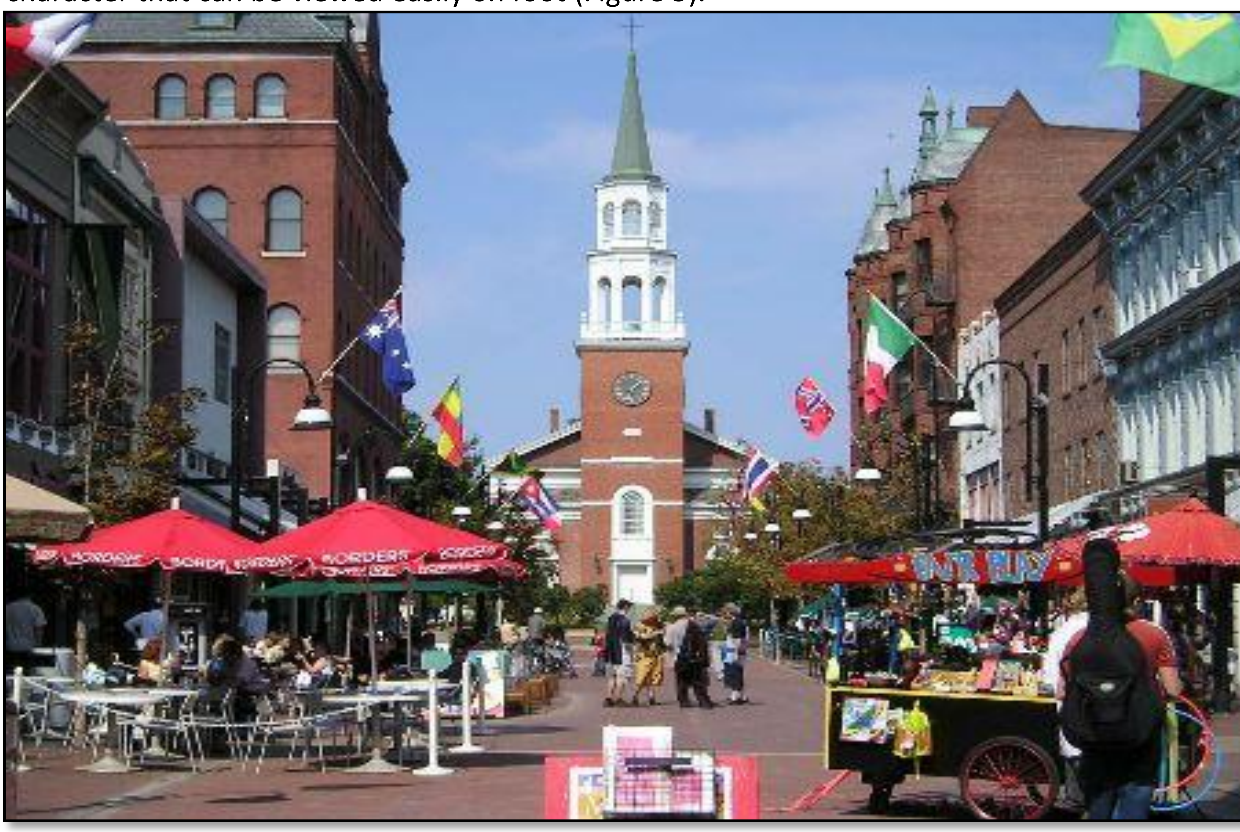

Figure 5 *Pedestrian Oriented Church Street. Burlington, Vermont.* Source: Authors.

In a time when many cities in the United States are experiencing a decline of downtown areas due to suburban development, Burlington resides on the successful side of the proverbial fence. Like other successful towns, Burlington has combated suburbanization and embraced the positive effects of the University of Vermont, retained an ample amount of green space, and preserved its historical character (Filion 2004).

However, the most important and prevalent factor supporting each "successful" town is the ability to accommodate walkers. Such accommodations entail pedestrian environments, street oriented retail, people on sidewalks, green space, and cultural and tourist activities. Environments where walking is routine not only reduces automobile travel time, but also improves overall community development (McMahon 1999). Burlington has continued to further the pedestrian stream of thought by setting goals to improve safety and the clarity of pedestrian travel. These attributes create a more livable community and ultimately reflect a brighter future (Pedestrian Information and Bicycle Center 2009). While walking can be an effective "green" method of transportation, some towns are too large for people to walk around efficiently. Alternative transportation methods need to be considered in such situations.

On the outskirts of Sacramento, the city of Davis, California, is an example of a bicycle utopia. Referred to as "the bicycle capital of the United States", Davis is overwhelmed with wide streets, an extensive bikeway network, level terrain, a mild climate, supportive official policies, and an attitude of mutual respect and awareness between cyclists and motorists. Since 1950, the city's population has grown from under 5,000 to nearly 55,000. This staggering rate of growth has placed pressure on the urban planners and the efficiency of their work. Unusually, this infatuation with the two-wheeler was the trigger that caused the changes the town took to promote bicycling (League of American Bicyclists, 2009).

Choosing to pedal instead of putting the pedal to the metal, hoards of everyday cyclists used the only available space in Davis for transportation-the city streets. Around the University of California at Davis, the growing number of bikers could no longer be ignored. In the 1966 City Council election, pro-bikeway candidates were elected, and a trial bike system was installed and became wildly popular. Following this trial, a hurried expansion of the system was set in motion (League of American Bicyclists 2009). Once new pathways were installed, the University banned nearly all motor vehicle use from its central core roadways that previously were open to automobile traffic. Furthermore, a series of bike paths were installed on the perimeter of the campus to channel people into the heart of city. To promote biking and make it more accessible, bicycle parking was provided in front of nearly every building and activity center on campus (League of American Bicyclists, 2009). Cycling has been entwined into the cultural fabric of Davis since the middle of the twentieth century and continues strongly to this day.

Previously lacking a good cycling system, Arlington, Virginia, experienced a similar public influence that essentially sparked a biking path network. A study on active living in Arlington, states, “One potentially effective political strategy that was successful in Arlington is for activists to pressure elected officials to select professional managers who see bikeways as crucial to the overall transportation system. Then it is important to formalize the government-citizen relationship through an advisory panel” (Hanson and Young 2008). These initial actions have proved to be the most important steps in creating a change in the urban environment.

The incorporation of the bicycle into the existing transportation infrastructure is a time consuming endeavor and results will not become tangible in a short period of time. Many towns already have maximized the use of road space for increasing motorized vehicle transportation. Wide streets with virtually no bike lane and rotaries are perfect for driving a vehicle. Clearly, the relationship of cycle use and walking within the existing infrastructure of a town requires a thorough analysis and perhaps a change in culture. As much of a daunting task this may seem, results would yield nothing short of long term benefits to auto congestion problems, urban sprawl, exhaust and harmful pollutants, physical activity levels and obesity, citizen mental health, and a closer community relationship. To make a noticeable, community-wide transition to alternative transport, towns that have made previous efforts in biking and pedestrian facility improvement are most preferable and open to change.

Keene, New Hampshire, is an ideal candidate for transport modification. The city currently enjoys a beautiful downtown area, having historically and socially appealing attractions that any pedestrian would appreciate. A series of bike paths run through the city, making potentially useful connections to surrounding towns. Furthermore, a community backing exists regarding the bike paths. These tools provide the city a good foundation to expand and improve the existing social cohesiveness and alternative transportation infrastructure.

Chapter 3
Case Study City:
Keene, New Hampshire

Short History

Located in the New England state of New Hampshire, Keene lies on an ancient lake bed, now a fertile valley surrounded by coniferous and deciduous tree covered hills and filled with rich farming soils (Figure 6). The city and its industry grew around these environmental assets, even using the rich clay from the meandering banks of the Ashuelot River to create bricks that were sold to companies based in different locations throughout the region. Keene is in a central seat of Cheshire County in the southwestern corner of New Hampshire. The city is within a relatively short driving distance to cities such as Boston, Massachusetts, Concord, New Hampshire, and Burlington, Vermont.

The Ashuelot River also supplied the necessary power to build an industry around sawmills, gristmills, and tanneries. However, it would not be until 1844 with the arrival of the railroad that Keene would blossom into a core area for manufacturing. The railroad was also one of the first to utilize steam engines in the United States. These tracks connected products manufactured in Keene such as glass, shoes, wooden ware, and bricks, to key areas of Maine and Massachusetts. Soon the rapid increase of industrial success in Keene led to numerous jobs and by 1874 Keene was integrated as a city (Foster 1967). This industrial foundation has given Keene a rich history and beautiful landscapes transforming the city into a tourist attraction in itself. However, annual and traditional festivities of the city boost the tourism immensely, bringing tourists from all over the world. Being a part of New England, the surrounding countryside offers a foliage appeal during autumn that lures tourists from the parts of the world that do not experience this beautiful and natural phenomenon. The outcome of the fall foliage produces one of the largest forms of economic support for all of New England.

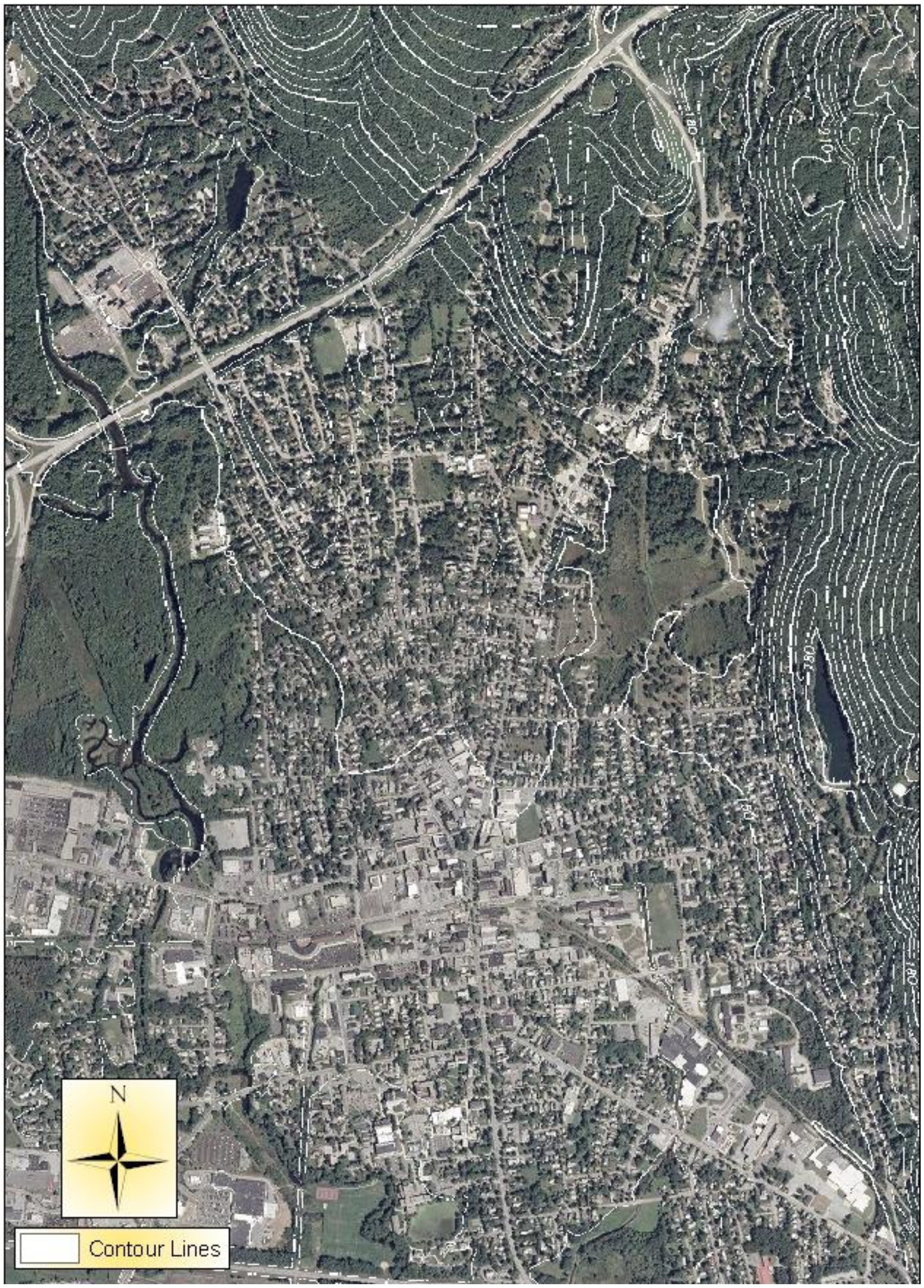

Figure 6 *Aerial Photo and Elevation. Keene, New Hampshire.*

The fall season is also harvest time in New England and in direct relation is the festival in Keene known as "Pumpkin Fest". "The first pumpkin festival was held on Main Street in Keene in 1991. It started as a modest event that was held in the hopes of attracting visitors to the downtown area" (Pumpkin Festival: Main Street Keene New Hampshire 2009). The festival is coordinated by the city, but would not be as advertised and publicized if not for the enthusiastic citizens and the pumpkin lobotomy; a massive pumpkin carving day held and funded by Keene State College.

The largest total of pumpkins rests at 29,762 which was set in 2009 during the 19th annual Pumpkin Festival (Pumpkin Festival: Main Street Keene New Hampshire 2009). The festival might be revolved around the pumpkins, but that is not all the festival offers. The streets are literally packed thousands of people moving past and giving business to street vendors, restaurants, and performers. As night falls, the enormous crowd receives the pleasure of witnessing the lighting of all the pumpkins and a fireworks display by the north end of Main Street. The pumpkin festival is also an opportunity for the tourists, as well as for the locals to truly enjoy the wide sidewalks and bike paths. The occasion closes multiple streets to vehicles so the pedestrians get the full effect of the beautiful and historical scenery that can only be fully appreciated from a casual walk or bike ride. Of course, Main Street is only one of the many sights to witness in the city.

Another beautiful location in Keene is the area at the northern end of Main Street called Central Square. Ironically, the square is in the middle of a roundabout and is styled with Civil War monuments and a large white gazebo (figure 7). In 2009, the American Planning Association (APA) designated this space as one of the top ten public spaces in the United States.

> The picturesque Central Square, with a historic New England church as its backdrop, is singled out by APA for its centuries-long role of being at the center of civic affairs in Keene socially, economically and politically. At the same time, it has been important to Keene spatially given its physical location adjoining or within close proximity to the city's major roads and regional trail system (American Planning Association 2009).

Figure 7 Scenic Views from Central Square. Keene, New Hampshire.

The city of Keene, brimming with sight-seeing opportunities and rich beautiful landscapes makes one wonder why the major mode of transportation is the fast pace motorized vehicle. Keene is indeed a modern city that is heavily involved in the rapid rate of the globalized world, but is best viewed at the casual pace of the pedestrian, bicyclist, and other non-motorized modes of transportation. A decrease in vehicular use would not only decongest the amount of automobiles in Keene, but would also promote safety, health, community connectivity, and be beneficial to the environment. This idea of the encouragement of safety, health and the unity of citizens has actually been a work in progress for Keene.

Today, most of the early manufacturing activities no longer exist, yet the town still preserves the air of the classic mill town, a unique characteristic found in few cities. The out of date, closed down factories have been injected with modern restaurants and shopping centers, many of which maintain the stylish mill antiquity. Similarly, the trains and steel railroad ties have vanished, consequently leaving behind a pathway. Now accessible to bikers and walkers, these trails make up the bike path network in the city.

The People of Keene

The population size of Keene, starting from a meager 300, has increased at a steady rate and as of 2008 is at an estimated 22,269 (U.S. Census Bureau 2008). Whites make up the majority (95.8 percent)**.** The rate of change in the population has significantly slowed in the past two decades. The population growth rate of Keene has experienced slower than usual growth since 1970 and has essentially steadied from 1990 to the present day (Figure 8).

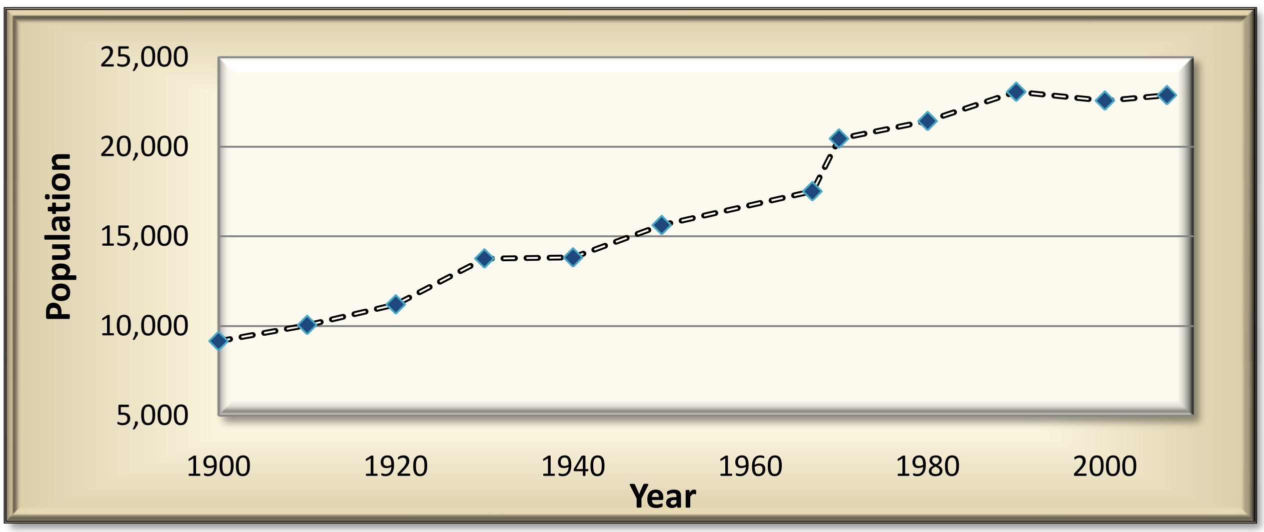

Figure 8 *Population Growth: 1900-2008. Keene, New Hampshire.*

The largest portion of the population is the people aged 15 to 24 years, contributing an amazing 25 percent of the total population (Figure 9). This statistic receives great influence from the presence of Keene State College and the consequent attendance of students in the autumn and spring. This age group consists of bike riders, walkers, recreational sports players in parks, jogging high school and college athletes, restaurants goers, and downtown shoppers. These are the people interacting with the sidewalks, bike paths, and green spaces. Children less than five years old make up slightly more than five percent, a stunningly low percentage of the population. Comparing children to elderly residents, the difference is overwhelming. People above the age of 65 contribute 14.1 percent while children under the age of five barely contribute 7.2 percent. As mentioned earlier, the large percentage of elderly residents encourages the need for a denser community and corresponding intermodal transportation accommodations. Excluding children under five, the aforementioned age cohorts make up 39.1 percent of Keene's total population (15-24 years and 65 years+). These are also the same people who utilize the sidewalks and bike paths the most.

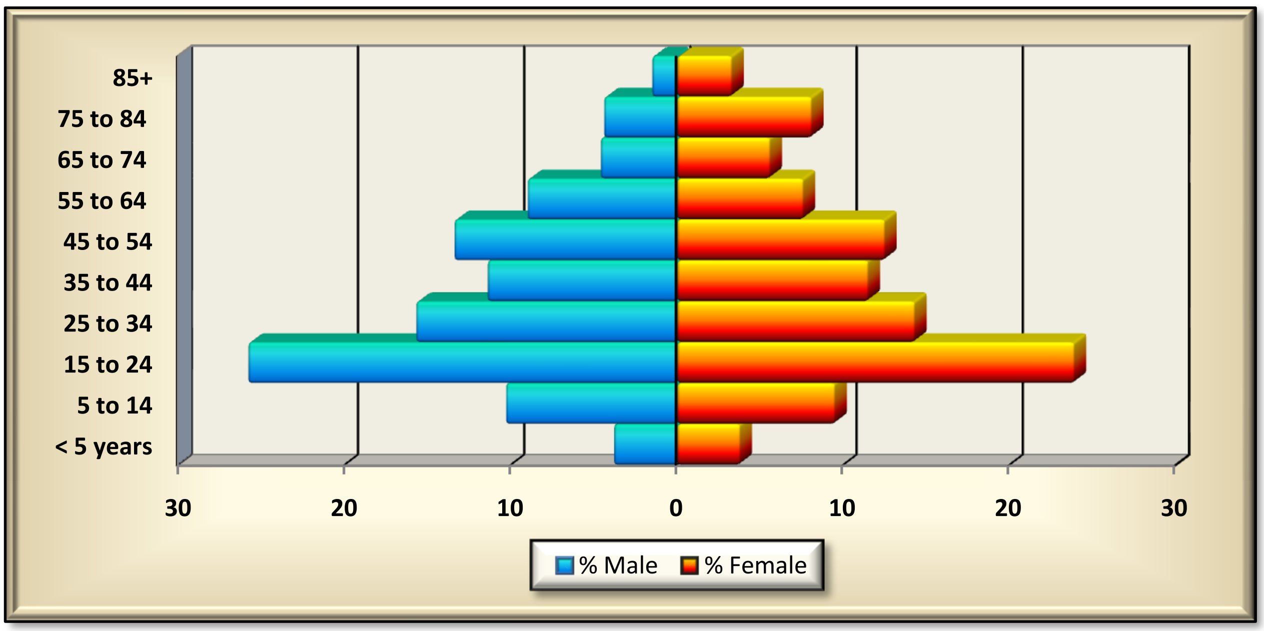

Figure 9 *Population Pyramid for the City of Keene, New Hampshire, 2006-2008.*

Transportation Habits

Ideally, the network of alternative transportation paths would reach each and every corner of Keene and be easily accessible to all residents. To reach this goal, the primary steps should focus on priority areas of the city, like those of high population densities. Keene is made up of approximately 37.1 square miles of land area and the population density of the city has an average of 615.5 persons per square mile (Economic & Labor Market Information Bureau 2008a). Population densities within the city vary significantly, with the most densely populated areas being located in the vicinity of Keene State College and along the Park Avenue corridor. Due to the location of frequently used buildings like ones located on Main Street, and shopping centers located away from the core area surrounding downtown, a diverse array of bike trails would prove useful and important.

With a high population density concentrated in a relatively small area of Keene, naturally, the automobile congestion will be denser. Fully, 76.6 percent of the workers commute within the city boundaries, while the remaining 23.4 percent commute to destinations outside of Keene (U.S. Census Bureau 2007b). The average time for a commute to work is approximately 14.4 minutes of travel. The majority of the surveyed commuters drive cars, trucks, or vans with no passengers (73.4 percent). The largest percentage of those surveyed by the U.S. Census Bureau in 2007 shows that 80.7 percent of those commuting to work have less than a twenty minute voyage. On the other end of the spectrum, 2.9 percent of the commutes to work consist of one hour or more (Figure 10). The percent of people with a considerably long commute time respectfully reserve the right to utilize a vehicle. However, the portion of people that have a commute time under 20 minutes could easily pedal or walk to their place of employment (depending upon the physical health of each case). Furthermore, with over three quarters of people working within the city boundaries, a bike ride through town is not an impossible task.

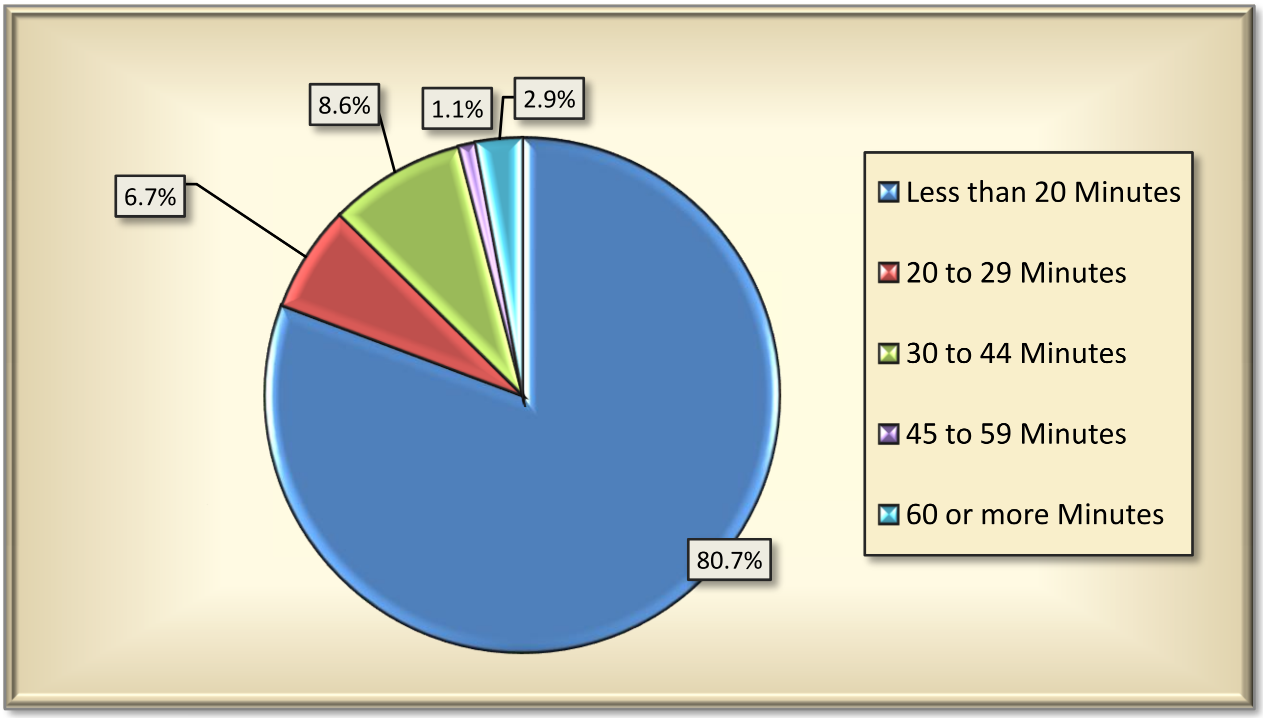

Figure 10 *Percentages of Travel Time in Minutes, Commuting to Work.*

Second to commuting with a motor vehicle, 10.1 percent of Keene residents walk to their place of work (U.S. Census Bureau 2007b) (Figure 11). This means that approximately 1,301 working citizens over the age of 15 walk to work. Possessing such high pedestrian activity, the safety of the walker proves highly important. Keene roads are still clearly giving priority to the automobile due to the installation of roundabouts. The roundabout is an efficient tool to reduce vehicular congestion, but is relatively unsafe to the pedestrian and cyclist. A much smaller portion (2.5 percent) of the population commutes to and from the workplace through the use of a bike (U.S. Census Bureau 2007b) (Figure 11). The percentage of people who walk to work is subject to future depletion due to the ongoing development and construction catering to the automobile.

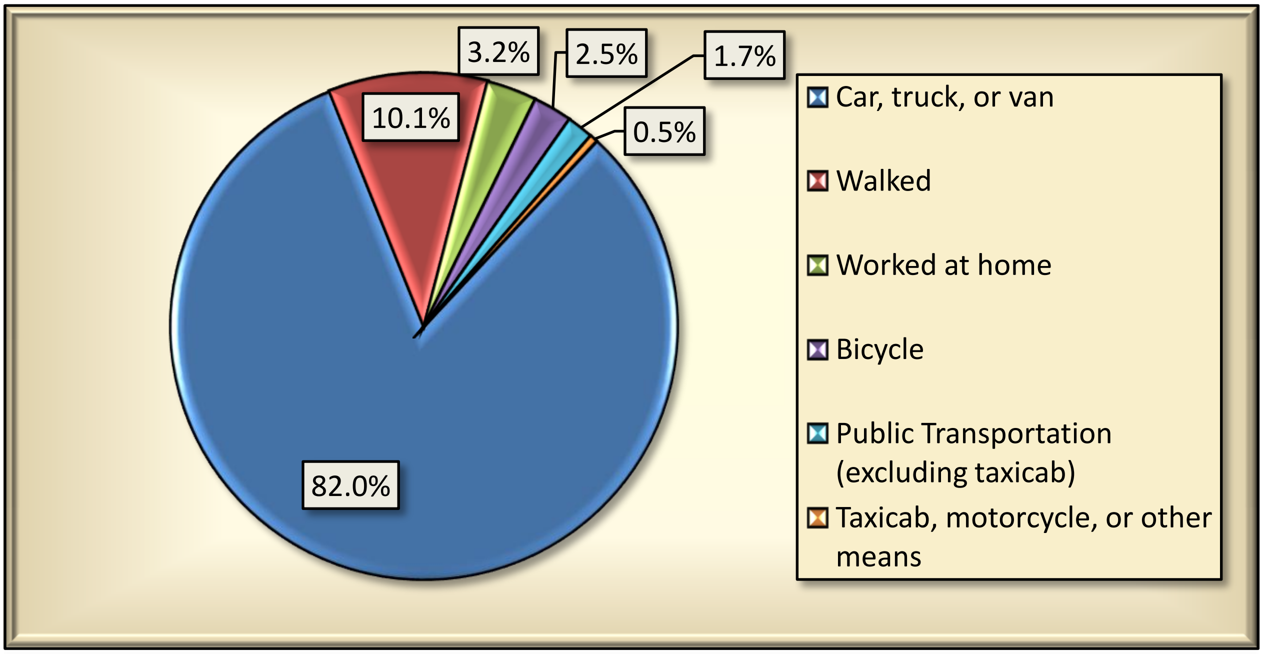

Figure 11 *Percentages by Method of Travel for Keene, New Hampshire.*

Community Action

Multiple factors contribute to the low amount of cyclists, including a lack of bike racks, dangerous high-volume roads, and a limited access downtown around Main Street. Another problem area is found where the old railroad bed crosses the high speed Route 101. A total lack of accommodations for bikers and walkers lingers here, creating an extremely dangerous situation. The juncture lacks cross walks, signage, and lighting. This is an area focus for the local non-profit organization known as *Pathways for Keene.* According to Thom Little, the *Pathways for Keene* Secretary, two pedestrian bridges are in the works, one spanning over Route 101 and one spanning over Route 12 (connecting West Keene to the downtown access routes). In addition to physically connecting both sides of the busy roads, the sense of safety will stay with walkers and riders alike, even while traversing above the busy roads.

The addition of new bicycle paths and the connection of existing ones would undoubtedly raise the percentage of bikers. The introduction of more bike racks also would raise the number of bikers. John E. Clark, a former professional skier and an immensely experienced road and mountain biker initially joined the Keene *Bicycle and Pedestrian Advisory Committee* (*BPAC)* to promote cycling and improve its safety (Personal Communication 2009). With his term ending December 31, 2009, Clark has actively contributed his knowledge to the committee and positively advised the city council in decisions regarding bike paths for years. According to Clark, when the idea for the installation of an experimental U-lock friendly bike rack around a parking meter was presented, it was denied by the city. Further rejections came after Clark himself tried to donate the rack to the city. Inhibition of the parking meter attendant was the given reason. Despite the denials made by the city the rack was installed in front of *Brewbaker's Café* on Main Street. Since the installation and resulting positive effects, the coffee shop has submitted a formal letter to the city requesting the installation of three more similar racks, indicating that the bikers exist but the accommodations might be lacking. Such additions would certainly contribute aid toward decreasing vehicle emissions, lowering the percentage of unhealthy citizens through the institution of physical activity, and promote a more interconnected and unified community.

Recently, Keene began to largely involve community members in future actions taken in city development. As of 2008, the City of Keene promised to utilize a new comprehensive Community Master Plan, promising to be more comprehensive and inclusive towards the thoughts and ideas residents of the city. Encouraging a more interactive community, over 1,000 Keene residents gathered and developed an extensive group vision. Adopted by the Keene City Council the same year, the Six Vision Focus Areas aim for a general, city-wide improvement. The consensus at the time resulted in the choice of 2028 as the year Keene would hopefully be considered “the best community in America” (City of Keene 2009). The vision possesses six focus areas, each equally and extremely detailed and pressing:

- A Quality Built Environment
- A Unique Natural Environment
- A Vibrant Economy
- A Strong Citizenship and Proactive Leadership
- A Creative, Learning Culture
- A Healthy Community

Under the first focus area, a Quality Built Environment was called for, and today is coming to fruition. In relation to the built environment, an aesthetic experience is also a contemporary goal for improving multiple aspects of quality of a place. This means that there is a direct correlation between the aesthetics of the built environment and the value of daily life. In other words, people are less likely to be a burden on the environment by littering, for example, when the town or city is highly regarded (Isaacs 2000). Supporting the environment issue, many publicly agreed upon goals were produced comprising of fostering renewable energy and efficient use of resources, maintaining neighborhoods, and a complete transportation system among others.

A different and unique sense of the word “complete” is explained in the subcategories under the Complete Transportation System. In general, the community has called for a design that connects people to goods, reduces the necessity and dependence of the automobile, and aids in the shift away from the large scale use of fossil fuels common to not only Keene, but the entire country as well. The citizens of Keene have also publicized their opinion on the creation of safe and efficient sidewalks, footpaths, bicycle paths, and other pedestrian and bicycle infrastructure. More importantly, citizens demonstrated their knowledge and awareness of the need to prioritize pedestrians and cyclists over automobiles (City of Keene 2009).

An obvious issue concerning safety and maintenance within the alternative transport infrastructure is the temperate climate zone common to New England. Four distinct seasons accompanied by large swings in temperatures and precipitation could slow progress in alternative transport development. The summers of the region can become fairly hot at times, with average temperatures during the hottest days of summer in July, at approximately 82.2 degrees Fahrenheit. The winter season in the New England region is not one to underestimate, with harsh low temperatures averaging at a minimum of 8.9 degrees Fahrenheit in the coldest month of January.

The most impeding weather comes with the harsh conditions of late fall and winter. All citizens of the city experience transportation trouble during these times, especially walkers and bikers. The walkers, brave enough to stroll through the shuttering cold, have to deal with slippery conditions because the city is not able to keep all of the sidewalks clear of ice and snow. Also avoiding the frozen sidewalks, the bikers are forced to ride in the streets side by side with cars. As for the bike trails, the snow and ice become compacted and remain unkempt making the trails inaccessible throughout the winter and early spring, and some trails are actually used by snowmobilers. The similarity between bike paths and motor vehicle streets is basic: each provides the necessary thoroughfare that all vehicles require. Being equivalent in that respect, the same quality of maintenance and attention should be provided by the city for both types of transit paths.

A more balanced distribution of city aid to both bike and automobile transportation infrastructures proves necessary, yet this is a modern need, brought about by a population growth and change movement methods. Whether being influenced by activists or taking the primary initiative, local and federal governments need to make changes in the urban environment; changes that prove conducive, appealing, and safe to walkers, bicyclists, and vehicles alike.

The development of more bike paths and pedestrian accessibility has not gone unnoticed in Keene. The city experiences obvious and overwhelming congestion of automobiles in certain areas, and it was so noticeable that the local newspapers addressed the issue. The vicinity of study for one front page Keene newspaper article is West Street, where the author states, "Turning left onto West Street in Keene can be a frustrating experience during heavy traffic. The wait is long when traffic is congested; when it isn't, drivers often speed along in both directions" (Gearino 2003, 1). Traffic congestion is a bearing, real life problem for citizens. In 2003, the topic lingered for two consecutive days on the front page of the local *Keene Sentinel* newspaper. Each article was filled with the comments of despondent citizens that are tired of being stuck in traffic. The same author, during the following year, also illustrated the "snarls" that tie up Route 101 and had a handful of comments from concerned and annoyed citizens. Years later the solution of this problem was that a rotary was to be developed, an answer aimed primarily toward the safety of the car owning populace.

Other articles touch on topics such as the link between the growing economic role of Keene within Monadnock County and the corresponding traffic volume growth (McGrane and Gearino 2003). Keene's economic role, as stated in the article, provides the majority of jobs for the entire county. The significance of the topic relating to the congestion of vehicles is emphasized by the fact that local newspapers not only released front page articles in successive days, but also in consecutive years. The articles do not touch on subjects such as pedestrian safety and access to bicycles, but the consequence of these areas of discussion would inevitably lead to fewer cars on the road. Similarly, fewer vehicles would result in less car accidents involving pedestrians.

Chapter 4
The Existing Built Environment

Overview

Currently, Keene offers a respectable amount of pedestrian and cycling facilitation. However, there are many components which need to be improved and expanded upon. Presently, 82 percent of the population travels by way of motor vehicles, which in a town with a total area of 37.6 square miles, is not conducive to the natural environment or community health (US Census 2008). Refinement of existing walking and biking facilities will encourage more people to utilize these methods of transportation. Additionally, expansion of said facilities will result in neighborhoods outside of downtown Keene becoming accessible safely via bicycle. In conjunction with decreasing the use of environmentally damaging motor vehicles, cycling and walking will also substantially improve community health and consequentially result in the success of the Vision 2020 initiative.

Although pedestrian and cycling facility limitations can be counterintuitive to the development of a healthy and environmentally clean community, traffic flow and motor vehicle accidents are detrimental as well. Areas with high traffic congestion can create hazardous scenarios for pedestrians and cyclists. Additionally, road sections with high accident counts also prove to be a deterrent, as they discourage walkers and bikers from using those corridors to travel. In a city small in size like Keene, few primary corridors of travel exist, thus lack of safety on one may result in a substantial decrease of alternative transportation usage. As such, the identification of high risk areas regarding motor vehicle accidents is a critical component to conducting a thorough analysis.

Sidewalk Condition Analysis

Due to the importance of walking and cycling facilities to a physically active community, a thorough structural analysis of sidewalks, roads, and associated cycling paths is necessitated. The primary method of data collection involved the use of the PEDS structural survey, which is comprised of 3 sections; Pedestrian Facility, Road Attributes, and Walking/Cycling Environment. Some Pedestrian Facility section attributes include sidewalk buffer width, sidewalk width, and path condition, while Road Attributes characteristics feature condition of road, number of crosswalks, and number of lanes. Additionally the Walking/Cycling Environment section offers attributes such as roadway and path lighting, quantity of trees shading sidewalks, and path amenities. Each section contains important structural attributes and scales corresponding to each attribute. All PEDS structural surveys conducted can be viewed in Appendix A.

Although many roads in Keene feature substantial commuting, the PEDS structural survey was applied only to the main corridors of transportation, namely Main Street, Marlboro Street, Roxbury Street, Washington Street, West Street, and Winchester Street. These roads were selected due to their high traffic flow, illustrated in Figure 12. West Street and Winchester Street exhibit the highest quantity of traffic flow in Keene. Furthermore Court Street and Main Street experience a substantial amount of traffic as well, while Marlboro Street, Roxbury Street, and Washington Street feature comparatively less traffic flow. The selected corridors all effectively connect downtown Keene to the outside residential branches of the city, thus adding emphasis on their importance and relevance to alternative transportation. Additionally, these corridors are divided into smaller segments in order to more accurately survey varying structural conditions in different areas of each corridor, listed in Table 1.

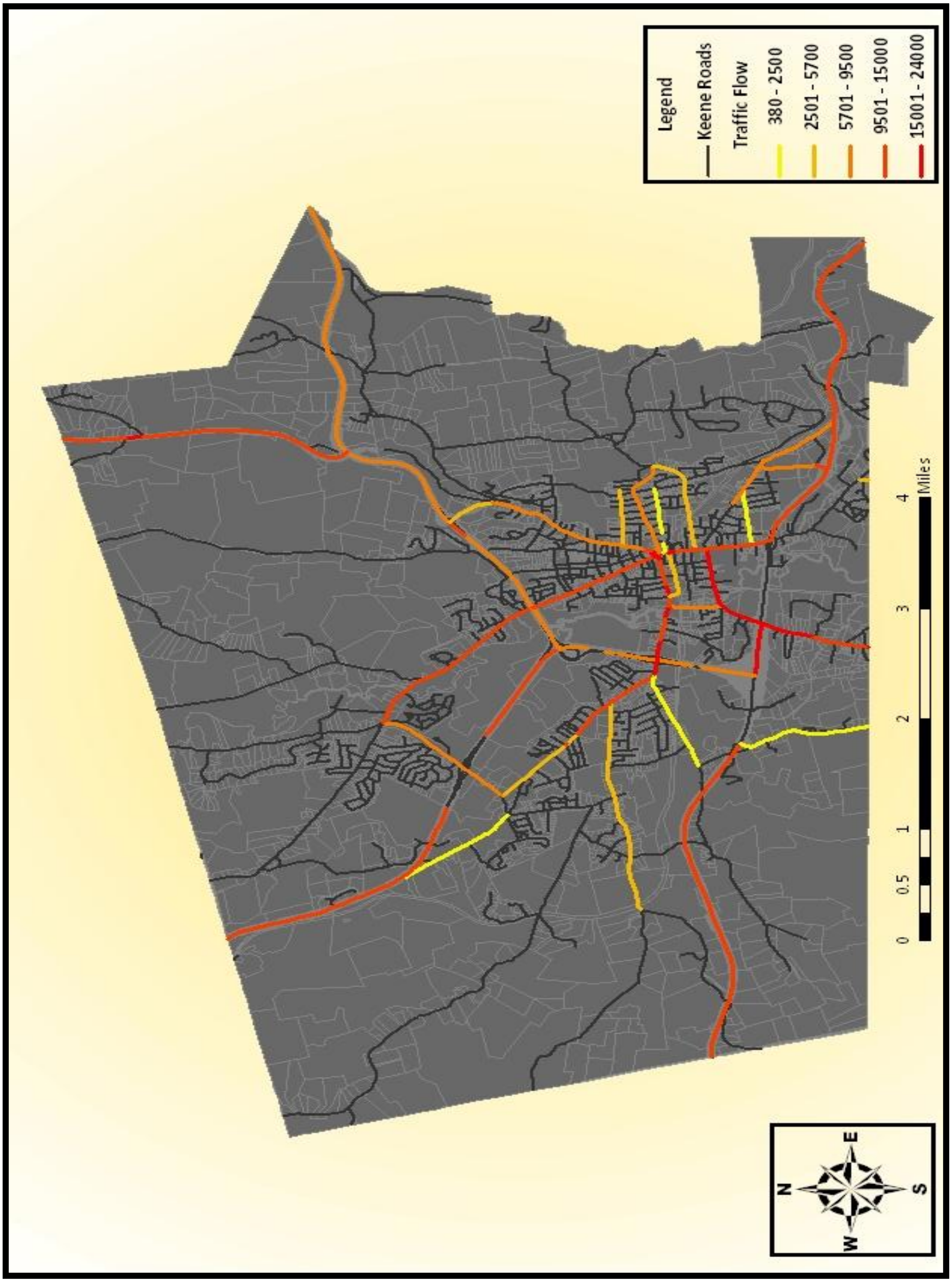

Figure 12 *Traffic Flow Density 2001 to 2008 in Keene, New Hampshire.*

__Table 1__ List of Surveyed Corridor Section

Road Section	Description	Road Section	Description
Court St Section 1	Winter St to School St	**Roxbury St Section 3**	Probate St to Terrace St
Court St Section 2	School St to Forest St	**Washington St Section 1**	Central Sq to Union St
Court St Section 3	Forest St to North St	**Washington St Section 1**	Union St to Cottage St
Court St Section 4	North St to Crestview St	**Washington St Section 1**	Cottage St to Woodbury St
Main St Section 1	Roxbury St to Marlboro St	**West St Section 1**	Main St to School St
Main St Section 2	Marlboro St to Route 101	**West St Section 1**	School St to Island St
Marlboro St Section 1	Main St to South St	**West St Section 1**	Island St to Pearl St
Marlboro St Section 2	South St to Baker St	**West St Section 1**	Pearl St to Franklin Pierce Hwy
Marlboro St Section 3	Baker St to Eastern Ave	**Winchester St Section 1**	Main St to Ralston St
Roxbury St Section 1	Main St to Harrison St	**Winchester St Section 1**	Ralston St to Island St
Roxbury St Section 2	Harrison St to Probate St	**Winchester St Section 1**	Island St to Route 101

The structural attributes featured in the PEDS survey are of varying importance to physical safety, thus emphasis is placed on characteristics that have a substantial influence on the integrity and safety of pedestrian and cycling facilities. Among such characteristics is the physical condition of the sidewalks along these corridors. This attribute is categorized by one of four descriptions; poor, fair, good, and under repair. Each corridor section was assigned into one of these categories, however when applying the data in GIS, each category is represented by a numerical value rather than a text description. While observing the varying sidewalk conditions of each corridor, a noticeable pattern becomes apparent; Figure 13 shows that sidewalk condition is in notably better shape in areas on Court Street and Main Street, and progressively deteriorates as the distance from Main Street increases.

Figure 13 *Physical Condition of Sidewalks Along Main Corridors in Keene*, New Hampshire.

Sidewalk condition on West Street and Marlboro Street is particularly poor as the distance from Main Street increases. For West Street, the sections bearing this characteristic are the sidewalks between Island Street and Pearl Street, while the sidewalks on Marlboro Street between Baker Street and Eastern Avenue. The portion between Island Street and Pearl Street is substantially more hazardous to cyclists and pedestrians when compared to the segment between Baker Street and Eastern Avenue for a number of reasons. There are no buffers separating the sidewalk from the road, whereas the Baker Street to Eastern Avenue section of Marlboro Street features a grass buffer of 3 feet. Additionally, West Street is a high traffic volume road in all four sections, whereas the only truly high traffic volume section on Marlboro Street is the area between Main Street and South Street. Furthermore, West Street features heavy restaurant and commercial development, a cause of high traffic volume, while Marlboro Street has minimal commercial development and some institutional buildings, resulting in low traffic volume. Although both sections require substantial structural improvement, West Street is clearly a higher priority due to its noticeably more hazardous walking and cycling facilities.

In addition to the physical condition of sidewalks, the extent of buffers is an equally important characteristic in terms of physical safety. Sidewalks with small or no buffer separating them from the road are far more hazardous to pedestrians and cyclists than those with substantial buffers. Separation between roads and sidewalks provide several advantages, including “an essential buffer between an out-of-control motorist and a pedestrian, improved sight distances at driveways, and adequate width for landscaping and street trees” (Federal Highway Administration 2009). These borders can be 5 feet wide, however the ideal width of such barriers should be 10 feet or more (Federal Highway Administration 2009). Unfortunately, few of the sidewalks along the major corridors surveyed feature adequate buffers, while some sections are not buffered at all, Figure 14.

The most troublesome pattern associated with sidewalks in Keene is that many completely lack buffers altogether in sections with high traffic volume. This factor only adds to the already existing safety risk associated with the lack of separation between roadway and sidewalk. Examples include sections of West Street between School Street and Franklin Pierce Highway and the commercial section of Winchester Street between Island Street and Route 101. Additionally, some sections feature both areas with buffers and areas without. While not as hazardous as sections completely lacking in buffers, inconsistency in this regard is not conducive to pedestrian and cyclist safety.

Although numerous road sections require sidewalk buffer improvement, there are sections which do offer buffers with adequate width, effectively separating their respective sidewalks from the road. Examples include Main Street from Central Square to Route 101, the section of Marlboro Street between South Street and Baker Street, Roxbury Street between Probate Street and Terrace Street, and the portion of Washington Street between Union Street and Cottage Street. These sections all feature buffers with a width greater than 5 feet. In addition, buffers on Main Street between Marlboro Street and Route 101, Roxbury Street between Probate Street and Terrace Street, and Washington Street between Union Street and Cottage Street contain numerous trees, thus adding an additional layer of safety and separation between the sidewalk and roadway.

Figure 14 *Width of Buffer Separating Sidewalks from Roadways in Keene, New Hampshire.*

Should sidewalk and road work become a financially plausible option for the City of Keene, several segments require higher priority than others. The sections in need of immediate improvement and expansion are West Street between Island Street and Franklin Pierce Highway and Winchester Street between Island Street and Route 101. These segments offer very poor physical sidewalk condition, and are further hindered by high traffic volume, thus adding an additional element of risk to pedestrians and cyclists in conjunction with the complete lack of buffers. Washington Street between Cottage Street and Woodbury Street as well as Marlboro Street between Baker Street and Eastern Avenue are prospects for sidewalk repair. Additionally, Roxbury Street between Main Street and Probate Street and Winchester Street between Main Street and Island Street are fairly inconsistent in regards to sidewalk buffers and would benefit from extension of buffer width. Winchester Street in particular would benefit the most from buffer extension and consistency due to its adjacency to Keene State College, an institution which generates high pedestrian activity.

Keene Bike Path Network Analysis

Cycling paths are an important component to alternative transportation. When paired with a well developed and implemented sidewalk system, the result is an effective and highly accessible network of alternative transportation. Accessibility is an important contributing factor to the effectiveness of a cycling path system. Ideally cycling path networks should exist within spatial vicinity of high employment areas of city, thus making cycling a plausible method of transportation to and from work as well in addition to a recreational activity. Additionally, cycling path networks should provide accessibility to residential areas as well in order to effectively connect employment areas to residential regions. These factors are very important to the effectiveness of bike path network, and play a crucial role in determining to what extent cycling networks are used by the community.

The existing cycling path network in Keene facilitates cycling as a plausible method of transportation to an extent; however limitations in several areas keep it from successfully making cycling a viable option for daily transportation. The most notable restriction to residential areas is the complete lack of cycling facilities along Washington Street and Court Street, Figure 15. According to Thom Little, Secretary of Pathways for Keene, development of a cycling lane along Washington Street will be particularly difficult due to the various local businesses which utilize the roadside for client parking (Personal Communication 2009). Also, Court Street shows little promise of future cycling lanes as a result of its recent renovation excluding the development of bike lanes. Furthermore, Park Avenue is fairly limited by the lack of an adjacent bike path or roadside cycling lane. This is a notable limitation to the Keene bike path network due to the large amount of residential housing along this corridor.

While extremely pedestrian friendly, Main Street between Roxbury Street and Marlboro Street, is extremely counterintuitive for cyclists for a number of reasons. Legally, cyclists are not permitted to ride on the sidewalks along this segment, thus being left with two options: ride in the road in a segment with high traffic volume, or walk alongside the bicycle on the sidewalk. Both options are ineffective for cyclists, as one forces the cyclist to place themselves at high risk in traffic, while the other negates the speed advantage of using a bicycle as opposed to walking.

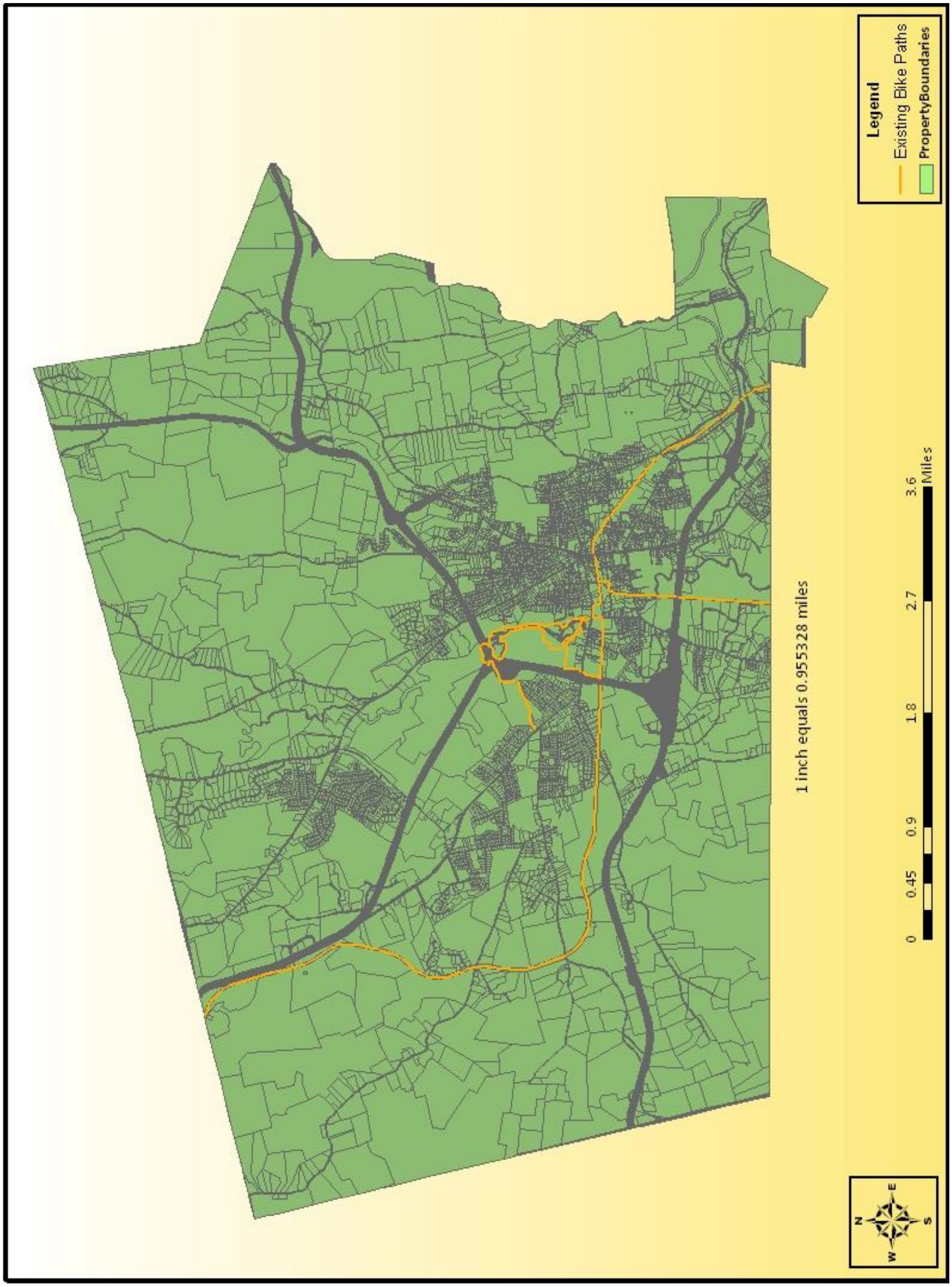

Figure 15 *Existing Bike Paths in Keene, New Hampshire.*

Additionally, there are no cycling lanes on Main Street, resulting in a lack of northbound and southbound routes; however the Keene Industrial Heritage bike trail traverses Main Street effectively providing an eastbound and westbound option. As Main Street is a highly commercial area with multiple employers, the legal restraints in conjunction with lack of cycling lanes, makes the section a substantial limitation to the effectiveness of Keene's cycling path network. The Cheshire Rail Trail and Downtown Cheshire Trail provide an accessible link via cycling between neighborhoods along West Street west of the Franklin Pierce Highway and downtown Keene. Speaking of the Franklin Pierce Highway, it is the only factor deterring the Cheshire Rail Trail and Downtown Cheshire Trail from being fully effective and safe cycling corridors, illustrated in Figures 16 - 18. The highway severs the Cheshire Rail Trail off from the Downtown Cheshire Trail, thus creating a high risk crossing area for cyclists and pedestrians alike, and placing a substantial handicap on the safety component of both trails.

The North Bridge is an overpass project designed to alleviate disconnection between the two trails, and its construction is scheduled to begin in 2010, costing an estimated 1.25 million dollars, according to Thom Little. Additionally, Pathways for Keene is planning on contributing 50,000 dollars to the development of this overpass. However, until this overpass is built and opened, safety is still a major hindrance to these two otherwise effective trails. Until the completion of the North Bridge overpass is achieved, a crossing segue would greatly aid the disconnection among the two cycling trails. Potential solutions include the installation of warning lights and yield signs on both sides of the crossing area.

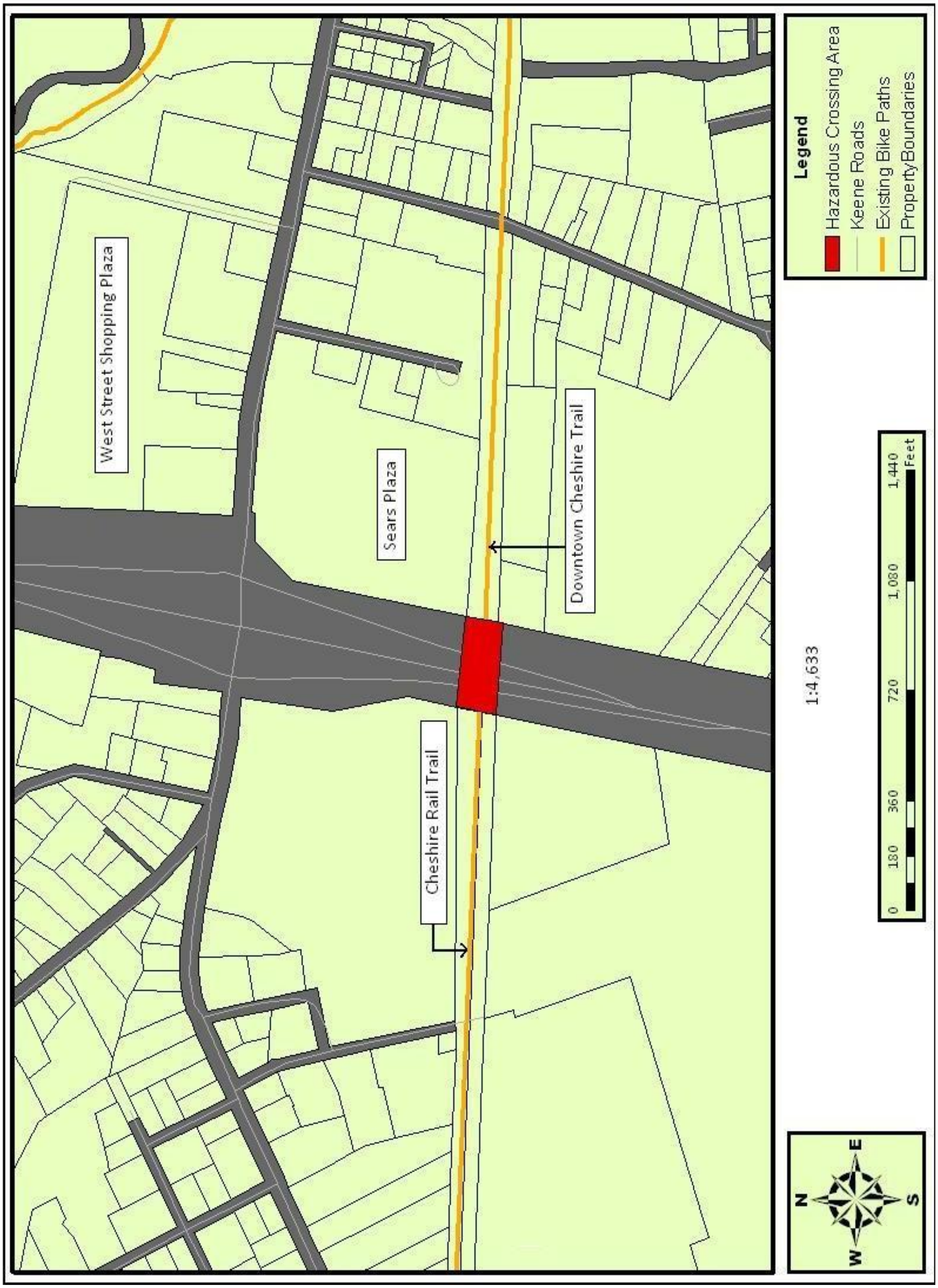

Figure 16 *Cheshire Rail Trail and Downtown Cheshire Trail Hazardous Crossing Area.*

Figure 17 *Dangerous Crossing Area on Franklin Pierce Highway (Source: Authors).*

Figure 18 *Cheshire Rail Trail Intersection with Franklin Pierce Highway (Source: Authors).*

The Ashuelot Rail trail, connecting the Keene State College area to the south side of Route 101 is an effective connection between the two regions, however suffers a limitation similar to that of the Cheshire Rail and Downtown Cheshire trails. Route 101 separates the Ashuelot Rail Trail into two segments, and limits its continuity, Figures 19 - 20. A tunnel running below Route 101 links the two trail segments together however this connection is ineffective for a number of reasons. The tunnel is very narrow in width, and both entry points are 90 degree corners resulting in limited visibility, Figure 21. These factors result in very unsafe conditions for cyclists intending to traverse Route 101 from either side of the Ashuelot Rail Trail. Additionally the tunnel is not limited to cyclist travel, thus adding a substantial risk to pedestrians in conjunction with cyclists entering the tunnel. The tunnel is well lit however its isolation from public view has led to crime risk concerns as well.

The South Bridge is a project similar to the North Bridge, designed to connect the two Ashuelot Rail Trail segments by way of an overpass. However, the South Bridge project is limited by a constraint which the North Bridge project does not endure. Unlike the North Bridge, which is funded by the city of Keene, the South Bridge is a state funded project. According to Thom Little, construction South Bridge was initially scheduled to begin in 2011, however on account of the fact that this is a state project, the date is not finite and is very likely to be postponed. This limitation is a result of state projects needing approval from substantially more officials, featuring stricter requirements, and being an overall longer process when compared to city projects. Therefore, the Ashuelot Rail Trail is a higher priority for temporary segue solutions to alleviate the current separation between the two segments of the trail.

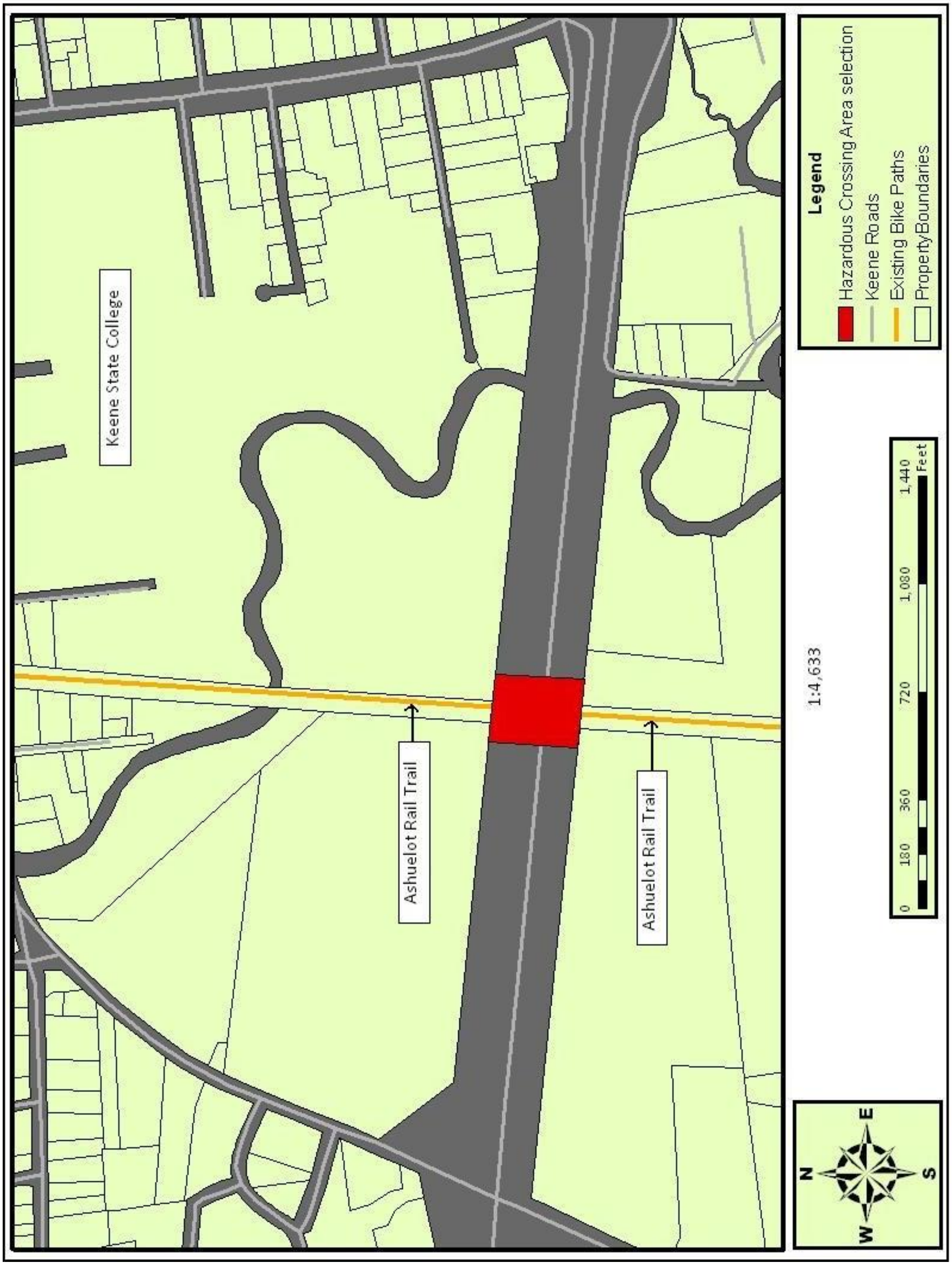

Figure 19 *Ashuelot Rail Trail Hazardous Crossing Area.*

Figure 20 *Dangerous Crossing Area Dividing Ashuelot Rail Trail (Source: Authors).*

Figure 21 *Tunnel Running Below Route 101 (Source: Authors).*

Conclusions

The existing cycling path network in Keene is effective to an extent, however it is hindered by a number of major limitations, including: the trail interruptions caused by Franklin Pierce Highway and Route 101; the legal and built environment limitations on upper Main Street; and, the complete lack of cycling paths and or lane along and adjacent to Washington Street and Court Street. Some limitations such as the cycling facility deficit along Court Street and Washington Street are unlikely to see improvement in the near future. Other aspects are manageable, by way of developing temporary solutions to alleviate the trail separation caused by Franklin Pierce Highway and Route 101 until the two overpasses are completed. The existing bike path network offers acceptable solutions for cycling, however it will require substantial improvement and refinement in several key areas to truly shine and successfully transform cycling into a mainstream method of transportation.

Chapter 5
Motor Vehicle Accident Analysis

Accident Analysis

Traffic accidents are an important characterizing factor of any cycling path and sidewalk network. Although they do not have a direct physical impact on the sidewalks and cycling paths themselves, they play a highly influential spatial role in the overall effectiveness of such networks. Frequency of motor vehicle accidents is a particularly important trend to monitor, as it determines the level of risk pedestrians and cyclists are forced to assume while traveling through different sections of a city, Keene or otherwise. Consequently, analysis of spatial accident frequency allows the identification of cycling and sidewalk facilities with the greatest need of safety features, such as buffers, and signs.

The analysis of traffic accidents in Keene utilizes GIS to generate maps illustrating the spatial location collisions caused by motor vehicles. Data is acquired from the Keene Police Logs available on the City of Keene website, where each accident log entry states the date and location of each accident (Appendix 1). During the acquisition of said data, several limitations became evident. The most notable limitation was the lack of in depth history of accidents, with the most recent entry beginning halfway through March, 2009. This aspect limited the analysis strictly to 2009 and negated any multiyear trend identification. As a result, data used was limited to the months of April, May, June, July, August, and September of 2009. Additionally, when the accident data was entered into Excel in order to categorize accidents by month, a second limitation became apparent. Due to the formatting of the data, geoprocessing, the initially planned method of plotting accident locations, is ineffective. Thus accident locations are individually plotted on the map manually, resulting in accident location maps for each month discussed above.

April 2009 is the first month with a complete record of accident locations, and along with September, one of two complete months within the Keene State College academic year. This is an important characteristic to note as the Keene State College population consists of 5,282 students, 23.6% of the Keene's overall population of 22,407 (Keene State College; United States Census 2008). May is expected to experience a substantial amount of accidents due to college graduation and the resulting increase in traffic flow, while June through August are likely to consist of substantially fewer accidents due to the absence of the majority of the student body. Results support this projection, as May had 101 accidents, the highest amount of the group, while August had 73, the lowest quantity, shown in Figure 22. April and September, the two months completely within the Keene State College academic year had 80 accidents and 89 accidents respectively. Additionally, the 88 accidents which occurred in July may have been influenced in part by the influx of traffic resulting from the Independence Day holiday weekend. Figures 23 through 28 graphically represent accident locations for each month.

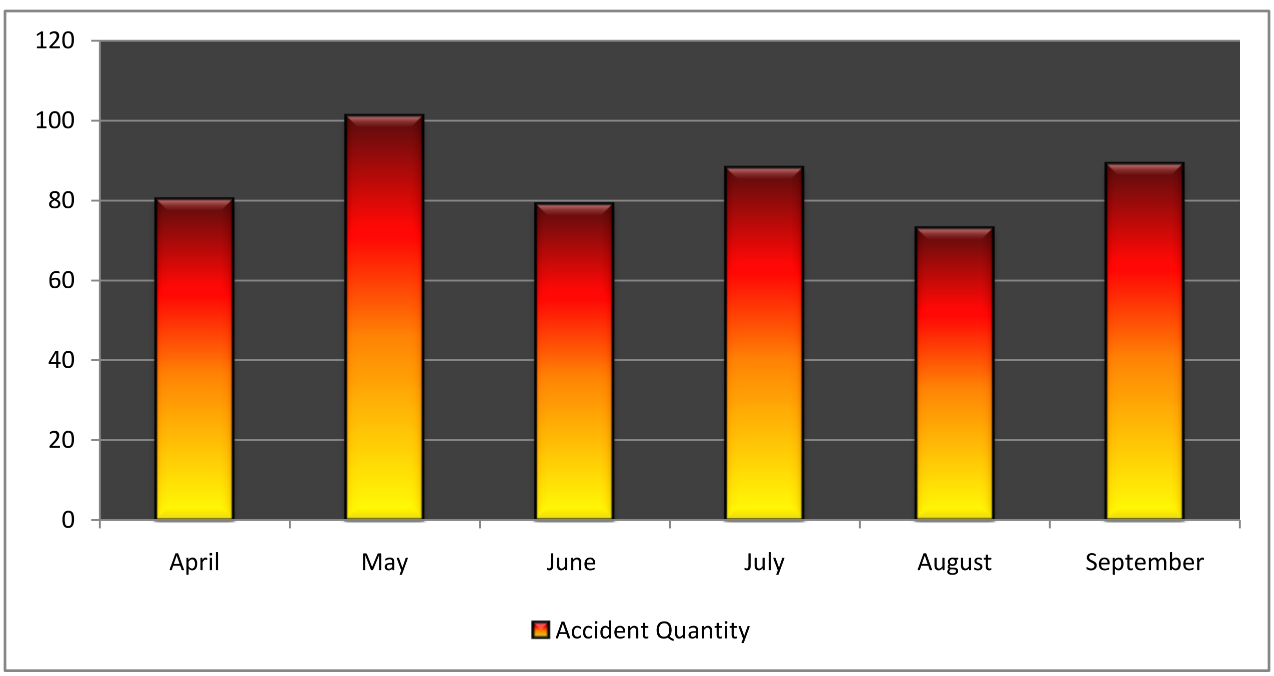

Figure 22 *2009 Monthly Accident Quantities in Keene, New Hampshire.*

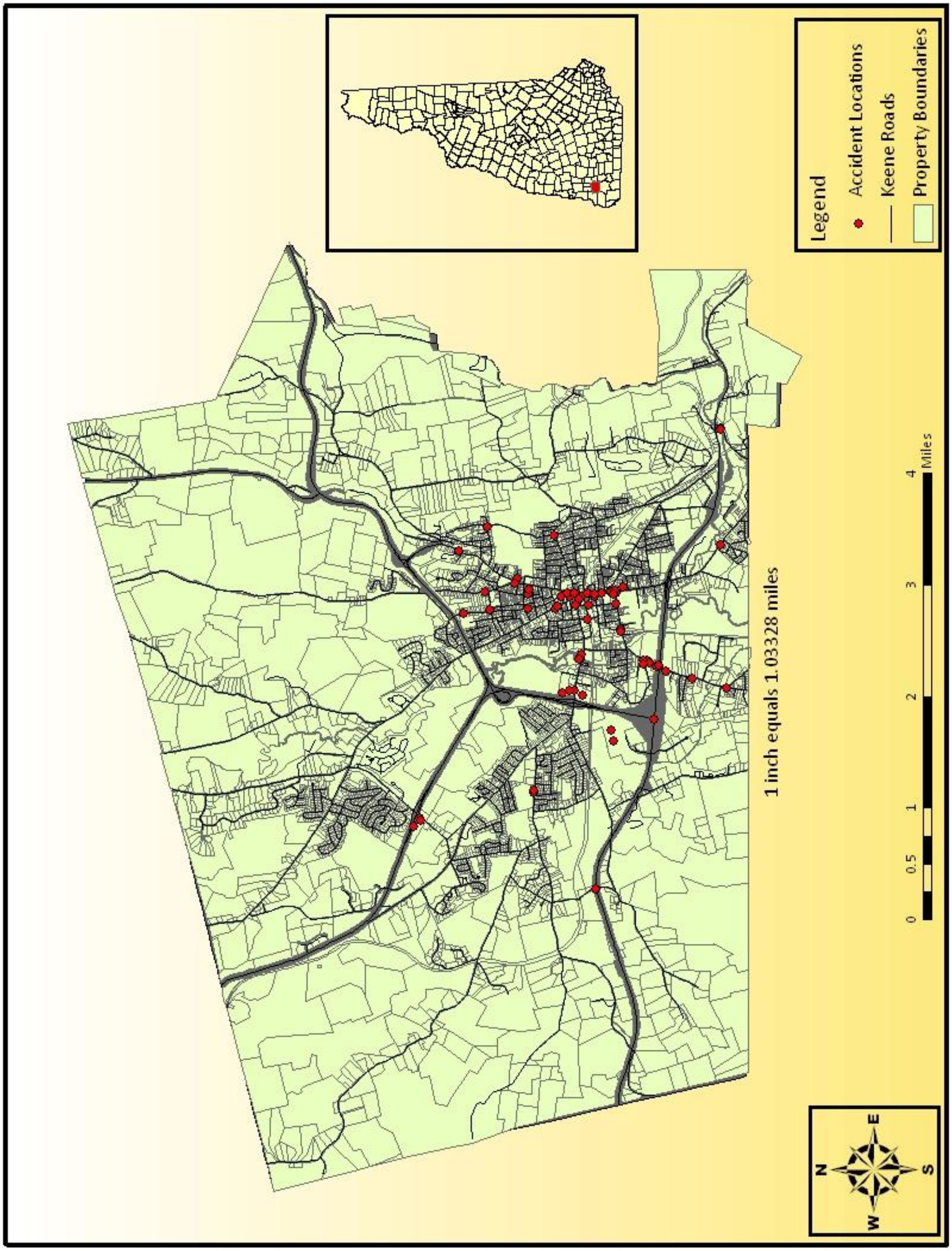

Figure 23 *Locations of Accidents Having Occurred During April 2009.*

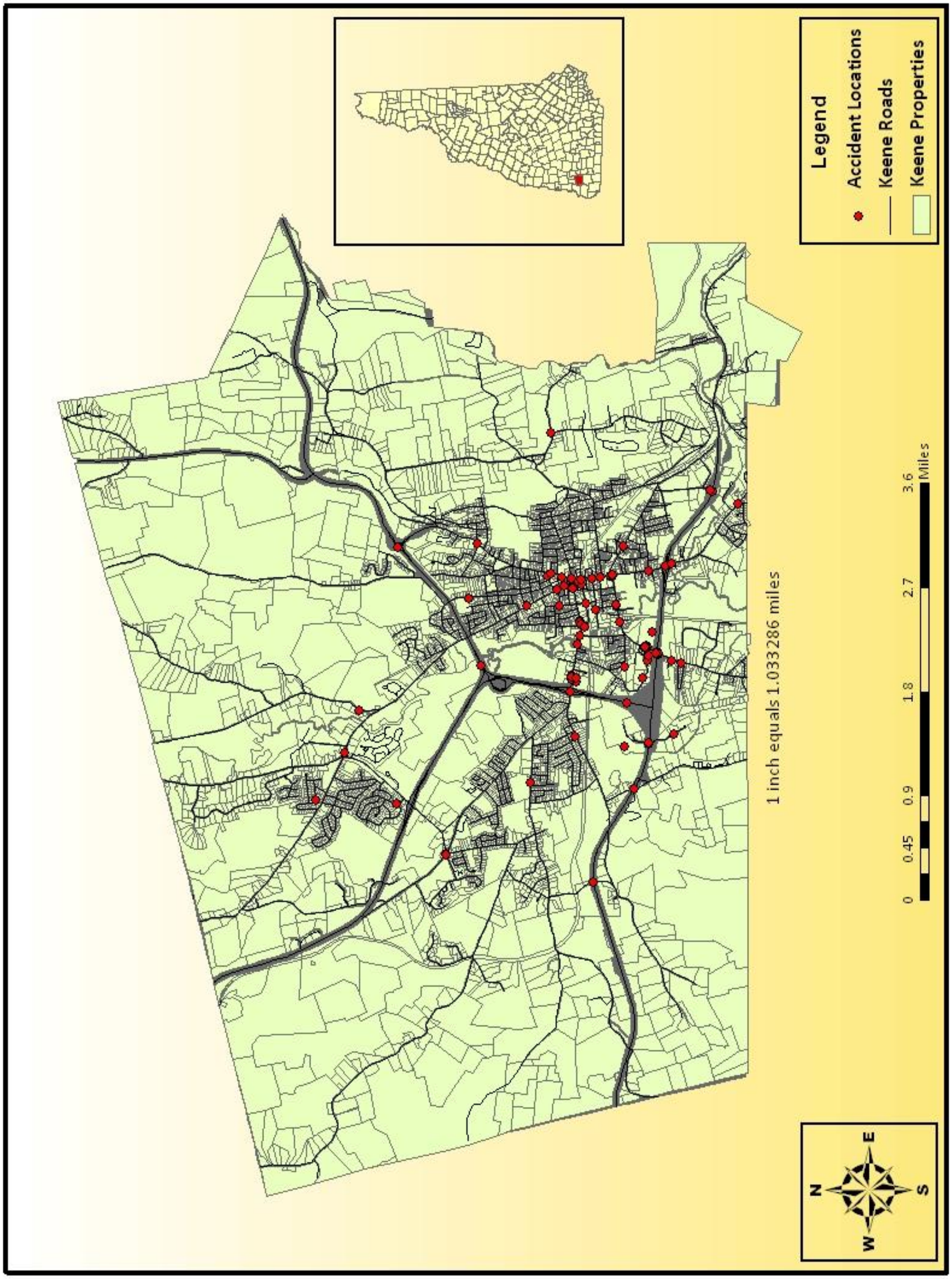

Figure 24 *Locations of Accidents Having Occurred During May 2009.*

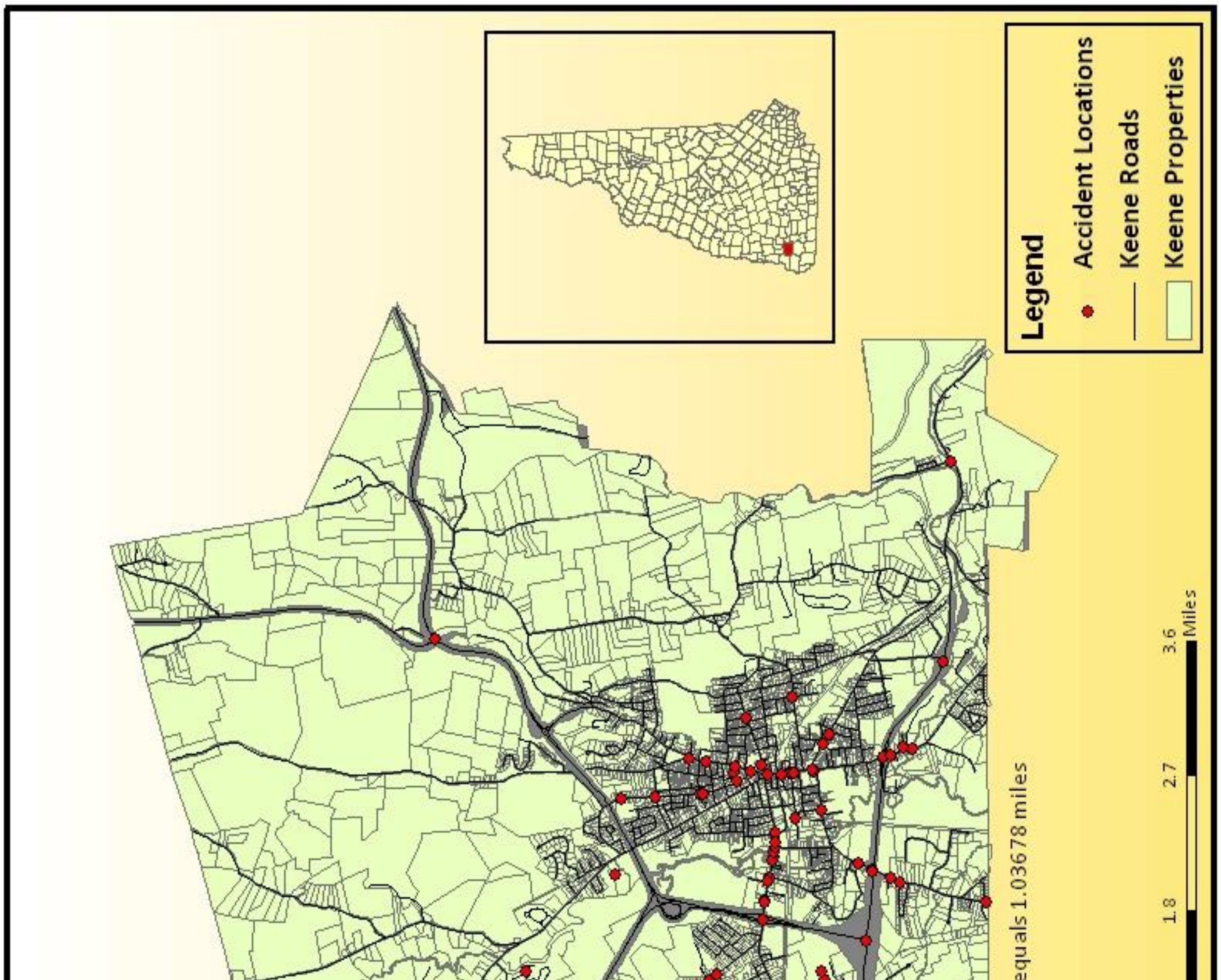

Figure 25 *Locations of Accidents Having Occurred During June 2009.*

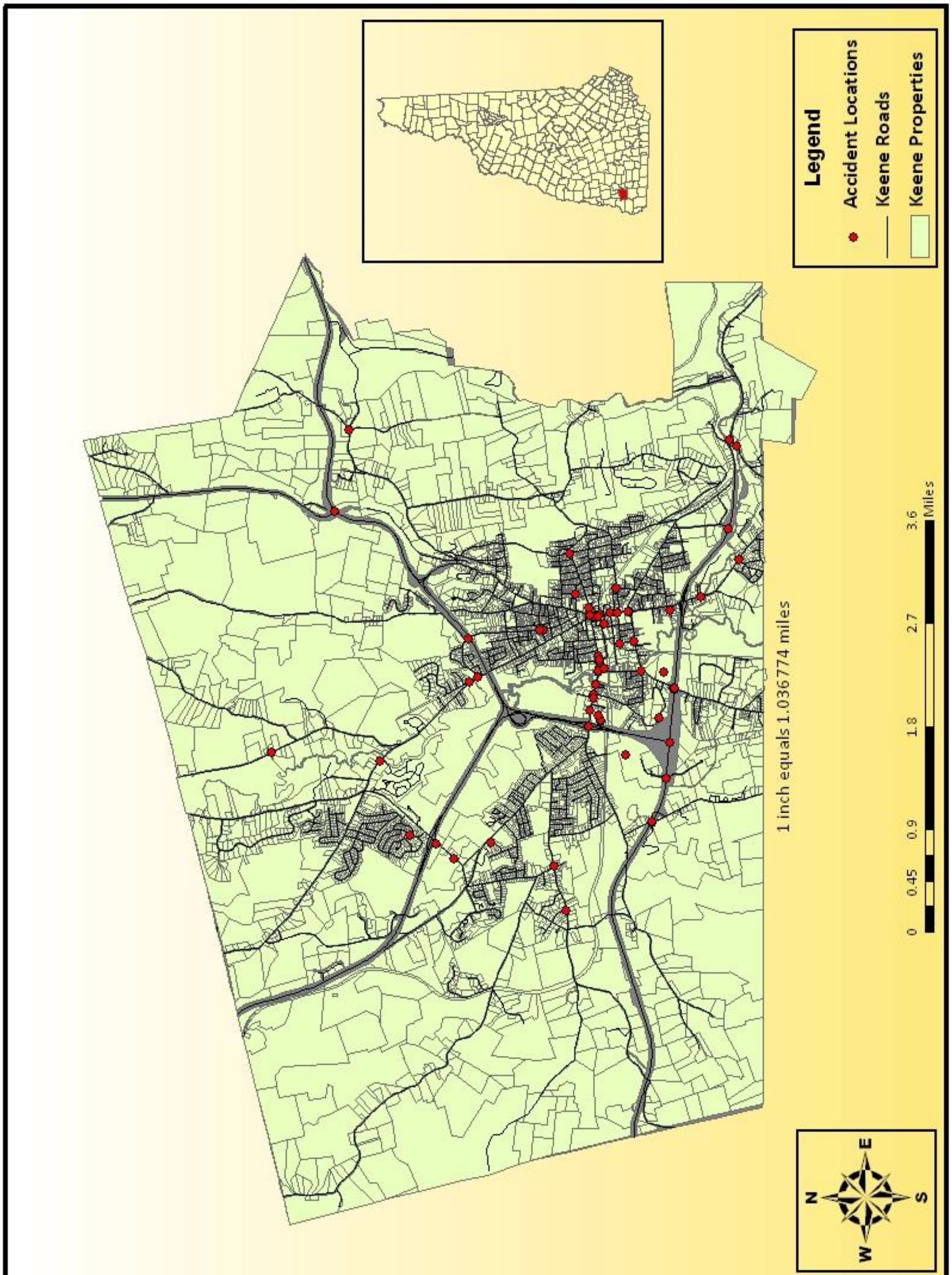

Figure 26 *Locations of Accidents Having Occurred During July 2009.*

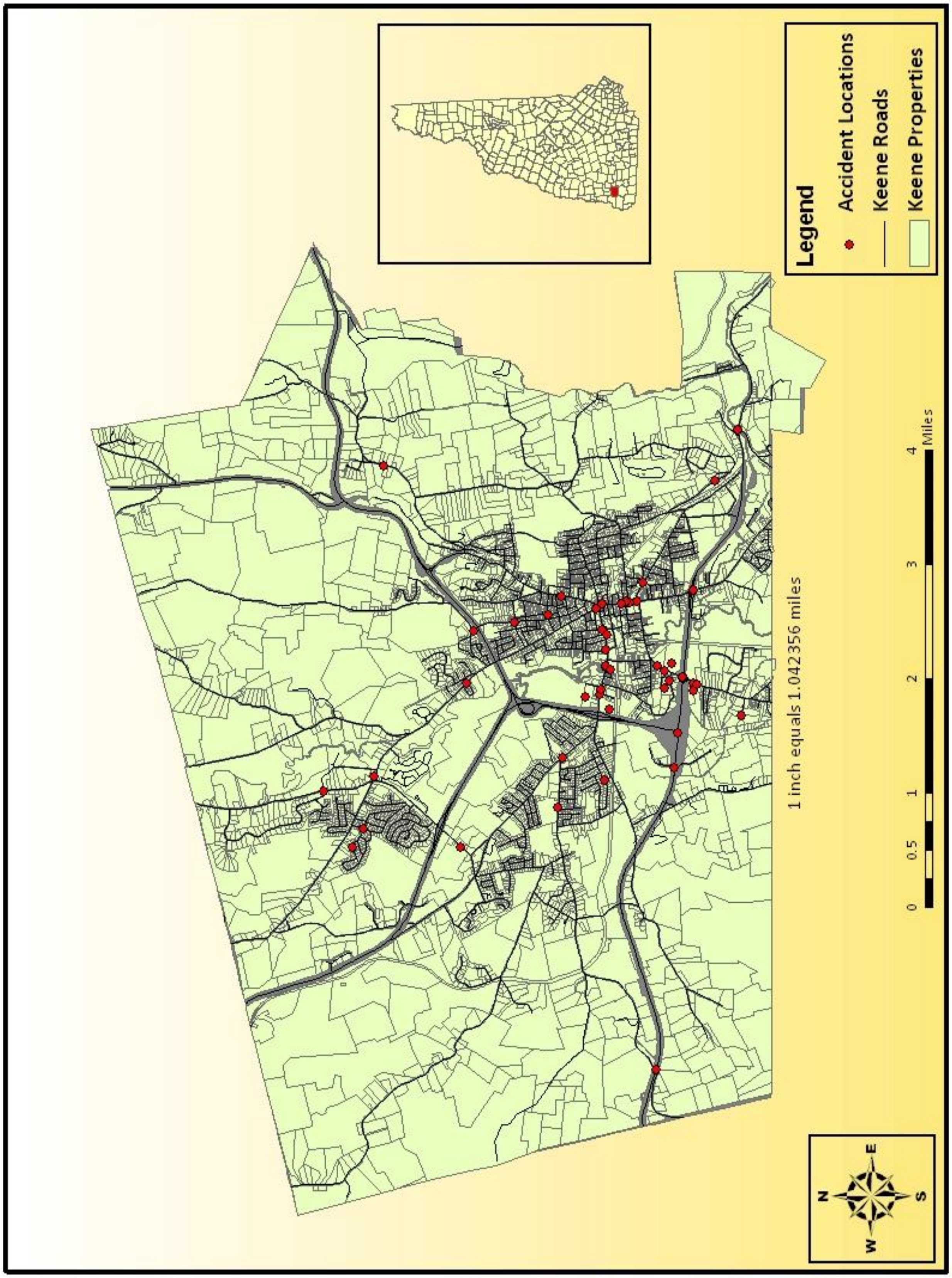

Figure 27 *Locations of Accidents Having Occurred During August 2009*.

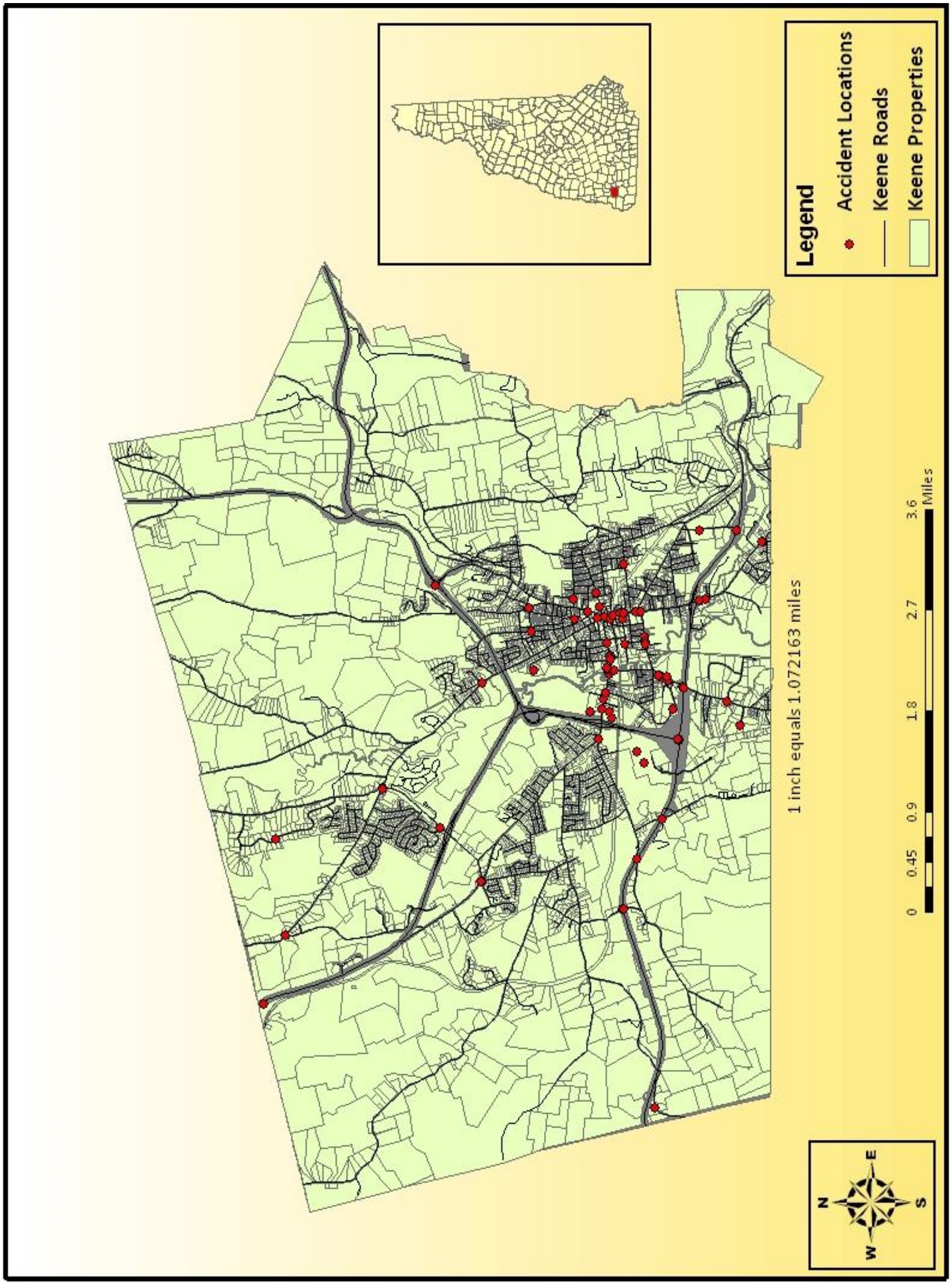

Figure 28 *Locations of Accidents Having Occurred During September 2009*.

Several spatial patterns are observed regarding accident locations in April, Figure 23. A substantial amount of accidents occurred along the section of Main Street between Roxbury Street and Marlboro Street. Additionally, a number of accidents ensued in the vicinity of the Route 101 and Winchester Street rotary. Both regions of high accident frequency are commercial segments, thus commercial areas could correlate to higher accident quantity. Some accidents are scattered along West Street and in the vicinity of Washington Street however these are small quantities when compared to accidents having occurred on Main Street and Winchester Street.

May features similar spatial patterns to April however as mentioned above features a higher quantity of accidents, shown in Figure 24. Additionally, noticeably more accidents occurred near the Route 101 and Winchester Street rotary as well as along West Street. Furthermore, marginally fewer accidents occurred along Main Street, while accidents along Washington Street decreased substantially. April and May exhibit similar spatial patterns regarding accidents even though minor differences in quantity exist along several corridors.

June has several spatial patterns which differ from the previous two months, shown in Figure 25. The most evident difference is the substantially fewer amount of accidents along Main Street. Additionally, Winchester Street experienced far less accidents, especially in the commercial sector between Island Street and Route 101, likely due to the lack of Keene State College students. West Street shows a more spatially even distribution of accidents in comparison to April and May where accidents along this corridor were fairly clustered at the intersections with Island Street and Franklin Pierce Highway. Also a notably higher amount of accidents occurred on and in the vicinity of Washington Street in comparison to April and May.

July shows patterns similar to June however several differences become noticeable upon closer inspection. Perhaps the most notable aspect is the decrease in accidents on Route 101 at the Winchester Street and Main Street intersections, illustrated in Figure 26. Also, substantially fewer collisions occurred along Washington Street when compared to June. Conversely Main Street experienced a slight increase in accidents in comparison to June. Additionally, July had no accidents along Marlboro Street while accidents along Route 9 where identical in quantity when compared to June. Finally, accidents along West Street, while similar in quantity appear more clustered, primarily near the Island Street intersection.

The month of August experienced the fewest accidents, a total of 73, and features a notably different spatial pattern in comparison to the previous months, shown in Figure 27 below. The most apparent characteristic is that accidents are extremely clustered, particularly on Main Street, whereas the other four months showed a relatively even distribution of accidents along this corridor. Additionally, fewer accidents occurred along West Street when compared to May, June, and July, the majority of which occurred in the vicinity of the West Street Plaza and near the West Street entrance to CVS. Finally, accidents occurring near the Route 101 and Winchester Street were notably higher in quantity in August compared to those having occurred in the months of June and July.

September experienced the second highest accident quantity out of the six months analyzed, a total of 89, and shows spatial patterns which are very similar to May, illustrated in Figure 28. Most noticeably accidents are clustered rather than evenly distributed along the roadways, and there is a deficit of accidents along Court Street and Washington Street. Additionally multiple accidents occurred near the Winchester Street and Route 101 intersection as well as the West Street and Island Street intersection. Finally, accidents having occurred on Main Street were evenly distributed between Marlboro Street and Central Square while Winchester Street experienced a highly clustered accident distribution.

Several spatial patterns become apparent regarding high risk intersections and road segments during these months. Figure 29 represents the areas of highest accident risk. Main Street was limited to the section between Marlboro Street and Central Square since most accidents along Main Street occurred in an even spatial distribution along that stretch and had a total of 37 accidents. Similarly West Street experienced the majority of its accidents between Ashuelot Street and Franklin Pierce Highway and thus data represents only that segment. The West Street section experienced the most accidents, a total of 57, while the Main Street and Route 101 intersection had the fewest accidents. Finally, the Winchester Street at Key Road and Main Street at Marlboro Street intersections endured similar quantities of accidents, 20 and 21 respectively.

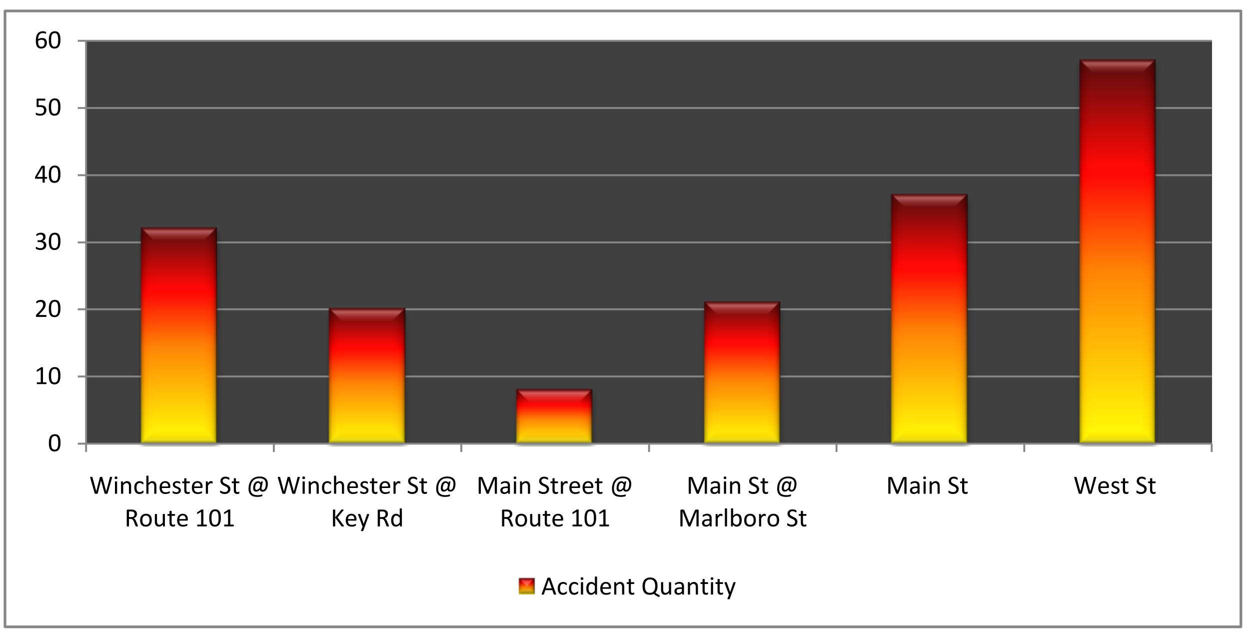

Figure 29 *High Risk Intersections and Road Segments.*

Conclusions

The spatial patterns discussed and illustrated above result in several conclusions regarding areas of high physical risk to pedestrians and cyclists. West Street exhibits numerous accidents with various spatial distributions throughout all five months. This corridor places automobiles, pedestrians, and cyclists at considerably higher risk in comparison to other corridors due to its traffic volume, poor sidewalk condition and width, and the lack of cycling lanes. Although the Downtown Cheshire Trail does run parallel to West Street, it will not be an effective alternative route for cyclists until the separation caused by the Franklin Pierce Highway is alleviated by the completion of the North Bridge.

Main Street proves to be a high risk for automobiles, pedestrians, and even more so for cyclists due to the legal constraint as well as the notable amount of accidents, particularly in the vicinity of the Central Square rotary. Pedestrians are to an extent at lower risk due to the wide sidewalks and buffers; however the consistent occurrence of accidents along this corridor is a risk factor to cyclists and pedestrians alike. Winchester Street is perhaps the third major area of risk to pedestrians and cyclists, particularly near the Route 101 intersection and the surrounding commercial areas. Accidents are frequent in this area although the lack of sidewalks and cycling lanes near the rotary only amplify the already high risk caused by high accident frequency. Reducing the existing risk on Winchester Street will be fairly difficult as traffic flow is high in this area and extensive construction of sidewalks and cycling lanes will be difficult as a result.

Court Street, Marlboro Street, and Washington Street all feature a low amount of accidents, thus making them considerable safer corridors of travel for all forms of movement.

However, several characteristics negatively affect alternative transportation on these corridors. Washington Street and Marlboro Street both feature rather poor sidewalk condition while Court Street and Marlboro Street have small and inconsistent sidewalk buffer widths. The lack of cycling lanes alongside these corridors is an additional limitation to cyclists, especially along Court Street and Washington Street. The Keene Industrial Heritage Trail, running parallel to Marlboro Street, makes the corridor more accessible to cycling as opposed to Court Street and Washington Street.

Keene has many of the foundations required for an effective system of alternative transportation, yet is limited by several aspects as well. Many existing sidewalks are in good condition and the existing cycling paths are, overall, effective facilities limited by a few factors which are currently in the process of being fixed by way of the North Bridge and South Bridge. Effective sidewalk buffers are perhaps one of the factors that are most lacking in Keene. Expansion of existing sidewalk buffers is an important investment for Keene as these buffers are substantial safety features for pedestrian travel. In addition, cycling lanes running alongside the roadways are virtually nonexistent. Development of such lanes along the primary corridors of Keene discussed above would greatly complement the existing cycling paths, and make the existing cycling network more accessible.

Chapter 6
Statistical Research and Community Perspective

Surveying Methodology

One essential aspect of the analysis focuses on the web of automobile streets that surround the current bike path system and sidewalk network. Naturally, the two entities hold a strong relationship constituting of similar destinations and intersecting paths. Furthermore, many of the same people who use the bike paths and sidewalks also use their vehicles to drive on the roads. These travelers possess the experience to pinpoint problematic areas such as dangerous intersections, poorly maintained surfaces, blind spots, and lack of connection. Due to the fact that these community members are those who use these amenities every day, they also have the knowledge and awareness to contribute respectable insight and opinions about the biking and walking facilities. A comprehensive survey proves to be an essential tool in the obtainment of this vital information the community holds.

In order to fully understand the public view on the different methods of transportation, the survey must be administered to a portion of the population. Ideally, the survey would be completed by those who use the bike paths, sidewalks, and streets the most. The survey results provide an indispensable community perspective, different to those views of the people involved in the Keene government's decisions regarding biking and walking facilities.

After constructing the population pyramid for the city, it became apparent that the divisions between age groups yield an obvious target population for the implementation of the survey—teenagers to young adults. A glance at the population pyramid reveals the greatest age cohort of the population of Keene lies within the group of people between 15 and 24 years of age. Usually, students enroll in a college or university right after high school (during late teenage years) and remain at that college until the student's age falls in the low to mid twenties range. Therefore, the most logical method of conducting the survey to the population of intent is to make use of the Keene State College student population.

It is impractical to survey the entire college population, therefore, the most professional way to gain an understanding of an entire population is to take a sample from the population of the college. The scientifically generated sample population provides an accurate result, exceptionally similar to that of the entire population. In order to confidently and successfully survey the students, classrooms were selected to be the setting in which the survey was administered. Ten classrooms with attendance ranging from nine to thirty students, offer a respectful number of responses. The sampling frame was an alphabetical list of every course offered by Keene State College in the 2009-2010 fall semester. To avoid a subjective class choice, a random number generator was utilized. Ten numbers, each representing a Fall 2009 course, were selected out of the total 251 courses. In this way, each student had the opportunity to be selected for the sample.

The physical survey itself underwent many design, structural, and informational changes before implementation. A pilot test gauged the comprehensiveness of the information found within the survey itself and a two sided, single sheet of paper constituted the entire survey. A formal introduction and reasoning behind the survey is found at the top of the survey instrument followed by basic question topics such as sex, school year, and living situation. Narrowing its focus to transportation, other question topics ensued, such as access to a bike, awareness of bike paths, frequency of automobile use followed by walking, biking, and public transportation. Personal opinions were also a component of the survey, requesting information on specific dangerous intersections, physical condition, aesthetics, and connectivity of sidewalks, and the influence that weather has on alternative transportation use (Appendix 2).

To acquire a large enough sample size that would correctly represent the perspective of the whole population, the goal was set at 150 students. With a group member present at each distribution point located within the randomly selected classrooms, 156 students successfully and thoroughly completed the surveys. The next step was to sort each survey by sex and living situation. This allows for a more organized collection of data and eases any future work with the data. Since the use of the *Likert Scale* gives values to each answer, every check that marked the survey transforms into a numerical value. The *Likert Scale* is a device used to convert qualitative information to quantitative information by assigning a scaled numerical value to the range of qualities under examination. To run scientifically statistical tests, the number equivalents need to be entered into *SPSSx*, a statistical computer software program available at Keene State College.

Statistical Results

The performance of basic statistical tests provides the foundation on which quality analysis can be deciphered. Referred to as descriptive statistics, the computer software instantly calculates the total, mean, range, standard deviation, and other values important for data evaluation. The program offers multiple options to set unique and specific parameters to be able to focus on a certain group of values. The results of a simple descriptive statistic test uncover a slight imbalance in surveyed students, comprising of 43 males (27.5 percent) and 113 females (73.5 percent). In comparison to the 2009 Keene State College Factbook, these numbers differ slightly from the college sex ratio of 43.9 percent male to 56.1 percent female

(Office of Institutional Research KSC Factbook 2009). Although the student ratio does weigh heavier on the female end of the spectrum, this outcome is purely coincidental.

One of the most important aspects in promoting cycling on bike paths is the level of awareness the community has about the existence of the paths. If a person fails to realize that an alternate way exists, that person cannot be expected to make use of that alternative. According to the sample population, the level of awareness among students is strong, showing that 61.5 percent have knowledge of the bike paths throughout the city of Keene. Among the male students, 30 out of 43, or 69.8 percent, claim that they are aware as do 66 out of 113 females (58.4 percent).

A good percentage of students understand that the bike paths exist, but the question of usage remains. Although almost 70 percent of all surveyed males and almost 60 percent of all surveyed females know about the bike paths, the majority of students have never set foot on one. When asked the question, "How often do you use the bike paths in Keene?", thirty men (69.8 percent) and 87 women (77 percent) confessed to rarely or never using one. This relates into a staggering 75.9 percent of college students who have rarely or never used the bike path network. Furthermore, of students that use the trails occasionally or often, 36 out of 39 (92.3 percent) are in the junior and senior class.

Despite the difference in awareness levels between sexes, further test results divulge no significant distinction in the frequency of utilization. In *SPSSx*, an *Independent Samples Test* compares the values in a selected data field to another data field. In this case, after converting the male and female choices into their numerical value equivalent, the two sets of answers were compared. According to the survey, on a one to four scale, one equals never, two equals rarely, three equals occasionally, and four equals often. The average choice is 2.0233, reflecting bike path use among Keene State College males is rare or occasional. The average choice for females is 1.7699, signifying an absent or rare frequency of utilization. To discern whether the two means are statistically different, the “Sig. (2-tailed)” value must be calculated. This value defines the level of confidence in which an analysis statement can be regarded (.05 = 95 percent confident). The resulting significance of the *Independent Samples Test* comparing male to female bicycle path use frequency was .142, which lies outside of the desired significance level indicating the difference in male to female path utilization is not statistically significant (Table 2).

***Table 2** SPSSx Independent Samples Test Results: Male vs. Female Bike Path Use*

Independent Samples Test	N	Mean	Standard Deviation	Sig. (2-Tailed)
Males	43	2.0233	.93830	.142
Females	113	1.7699	.09066	

The similarity between male and female bike path use is a negative one, reflecting the relative low frequency of bike path use. The failure to travel on bike paths could be the result of the lack of a bicycle to ride on the path. However, one out of three (33.3 percent) students claims access to a bicycle in Keene. A full 37.2 percent of males and 31.9 percent of females have access to a bike. Furthermore, the premise can be made that males and females living off-campus need a vehicle to get to and from campus and with limited auto parking, a bicycle could easily fill the role of the necessary vehicle. Descriptive statistics supports this claim, revealing that 46.7 percent of the off-campus residents have access to a bike, while only 21.0 percent of on-campus residents can easily use a bicycle. These seem like respectable percentages, but there is a potential that there is a certain group of students who would desire access to a bike, but lack the necessary resources.

The Keene State College community bicycle program called *Green Bikes* operates year round and aims to encourage bicycle use and promote sustainability on campus. Easily accessible at the library and free for everyone to use, the availability of these recycled bikes receive relatively little attention from the passing students. Of the sample population, 90.4 percent of students have never used a green bike. The idea of recycling bicycle parts to manufacture whole, operational vehicles has good intentions, yet the some of the resulting bikes appear forgotten (Figure 30).

Figure 30 *Green Bikes in the Bike Rack at Mason Library (Source: Authors).*

The *Green Bikes* routinely get left in the rain lingering long enough for rust to build and corrosion to form. The home base for the bikes is at the entrance to the Mason Library on campus and it sits half under an overhang, only slightly sheltered from the elements. The implementation of new set of more aesthetically attractive bikes would potentially appeal to a more diverse population as well as eliminate many maintenance problems, ultimately having an impact on overall ridership. Massive community bike operations, such as *Bicing* in Barcelona, possess thousands of streamline two wheelers that are mechanically simple (single gear). Almost instantly *Bicing* generated great numbers, proving extremely popular, not only from the tourist sector, but for locals as well.

Removing the test variables of “male” and “female” and replacing it with “on campus” and “off campus”, allows for a different, more geographical perspective. Off campus dwellers obviously need to travel through a portion of the city to reach an on campus destination. Descriptive *Cross-Tabulation* tests verify the difference between on campus and off campus students and their frequency of bike path usage. Fully 40 percent of all off campus students use the bike path occasionally and often while only 11.1 percent of on campus scholars marked the same choices (Table 3). Because of more frequent travel on bike paths, off campus students have built experience and retained knowledge about these paths. Due to this fact, the answers the off campus dwellers provided in the survey results can be regarded with more confidence.

Table 3 *SPSSx Cross-Tabulation Test Results: Living Situation vs. Path Use Frequency*

Living Situation	Frequency of Path Use				
	Never	Rarely	Occasionally	Often	Total
On Campus	52	20	5	4	81
Off Campus	24	21	23	7	75
Total	76	41	28	11	156

One aspect of the bike paths of which surveyed students made comments, is the need for improvement. When asked to rate personal levels of agreement to various statements, each surveyed student was presented with five options: strongly disagree, disagree, neutral, agree, and strongly agree. On the topic of improvement, the average student choice was 3.3, with about 47.4 percent of the population choosing neutral over the other options. The next highest proportion is 38.5 percent, or the students who agree with the idea that Keene's bike paths need improvement (Figure 31). This holds far more weight than the 14.1 percent who disagree with a bicycle path upgrade. Proving widely traversed, the portion of the Ashuelot Rail Trail abutting the west side of the Keene State College campus, has received recent upgrades. These include the installation of new lighting fixtures and a paved surface (more accommodating toward winter plowing). Naturally, these improvements will increase sense of safety and walking desirability. Future changes are in the works combating the safety issue associated with the use of the tunnel under Route 101 near the intersection with Main Street.

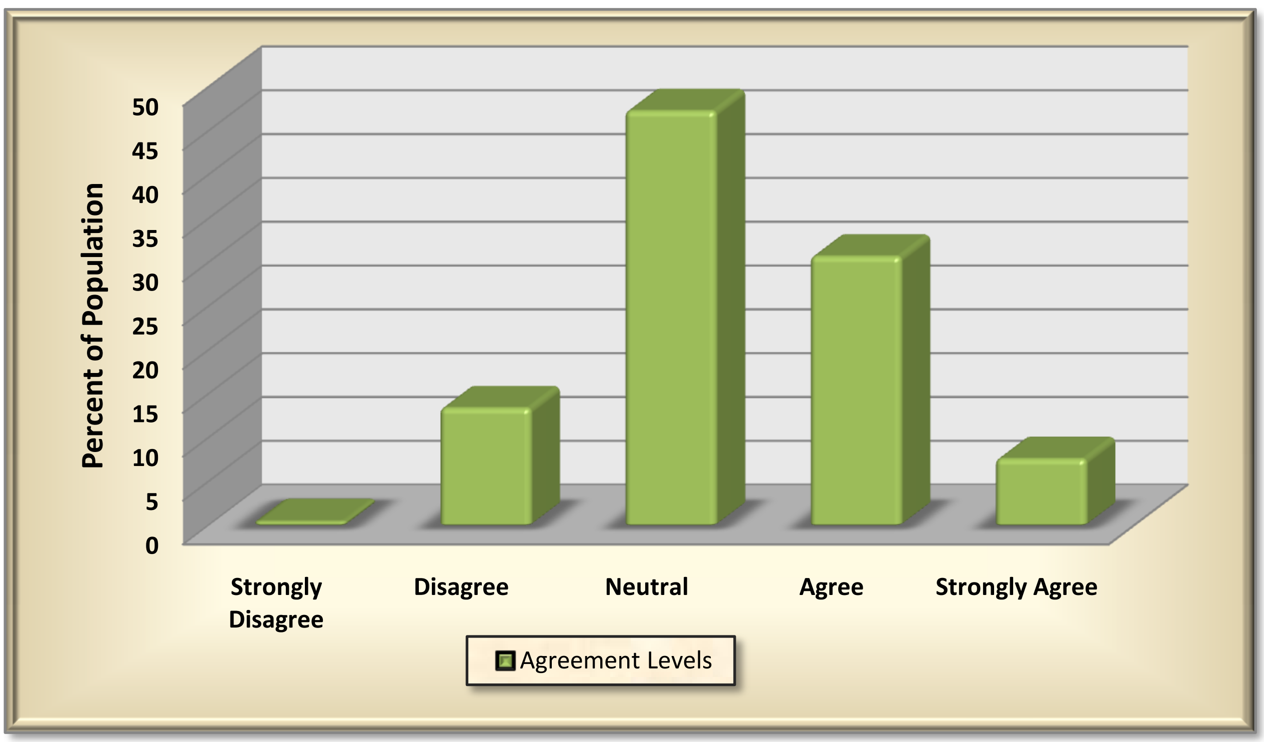

Figure 31 *SPSSx Frequencies Test: Path Improvement Agreement Levels.*

To create a more detailed picture of the true need for path improvement, the people traveling on the paths the most often need to be isolated. An *Independent Samples Test* in *SPSSx* compares two variables. In this case, the first variable is differentiation between living situations (on and off campus) because, as mentioned above, the off campus students utilize the paths the most. The second variable is the data values representing agreement levels in regards to the need for bike path improvement. Evaluating each data set using the statistic software will easily decipher the difference between on and off campus opinions on bicycle path development.

The *Independent Samples Test* compares the on campus student chosen improvement values to the off campus improvement values. The average choice of the on campus resident is 3.1358 while the mean answer for the off campus resident is 3.5067, demonstrating the off campus residents' call for further development of the bike paths. While these averages retain importance, the SPSSx test compares the two sets of values in a more scientific manner. According to the *Independent Samples Test*, the difference between on and off campus students' opinions about bike path upgrades is statistically significant with a Sig. (2-Tailed) value of .005, well within the range of acceptance (Table 4). The difference between the opinions of the two groups directly relates to the difference of path use frequency. Due to the fact that off campus inhabitants use the paths more often, their recommendations also hold more weight.

Table 4 *Independent Samples Test Results: Living Situation and Path Improvement*

Independent Samples Test	Agreement of Path Improvement and Living Situation		
	t	df	Sig. (2-Tailed)
Equal Variances Assumed	-2.868	154	.005

There exists a direct link between living situation and college year (grade) which can be seen in Table 5 below. It is common that upon reaching the upperclassmen status, students tend to move into a different residence off campus. This is reinforced by a simple frequencies test and resultant statistics table. As the grade increases, the percent living off campus also increase. A mere 5.7 percent of freshmen live off campus, along with 17.2 percent of sophomores, 52 percent of juniors, and 81.3 percent of seniors.

Table 5 *Cross-Tabulation of Living Situation by College Year*

Year	On Campus	Off Campus	Total
Freshman	33	2	35
Sophomore	24	5	29
Junior	12	13	25
Senior	12	52	64
Non-Traditional	0	3	3

As a college student climbs the four year academic ladder, the likelihood of moving off campus increases. The more frequented utilization of city property surrounding the campus, including, but not limiting bicycle paths is an undeniable consequence of moving off campus. This would directly increase knowledge and awareness levels as a student grows older. A *Cross-Tabulation* reinforces this statement, revealing a similar trend (Table 6). A full 31.4 percent of freshmen claim awareness of the biking trails, as do 55.2 percent of sophomores, 64 percent of juniors, and 81.3 percent of seniors.

Table 6 *Cross-Tabulation Test Results: Awareness and College Year*

Year	Aware	Unaware	Total
Freshman	11	24	35
Sophomore	16	13	29
Junior	16	9	25
Senior	52	12	64
Non-Traditional	1	2	3

Assuming that as a student progresses through school, that student grows more comfortable with the surrounding city and corresponding environments and infrastructure. In turn, these common series of events manually increase levels of awareness in students by providing firsthand experience with the surrounding physical environment. This "city acquaintance" method is beneficial, yet inefficient.

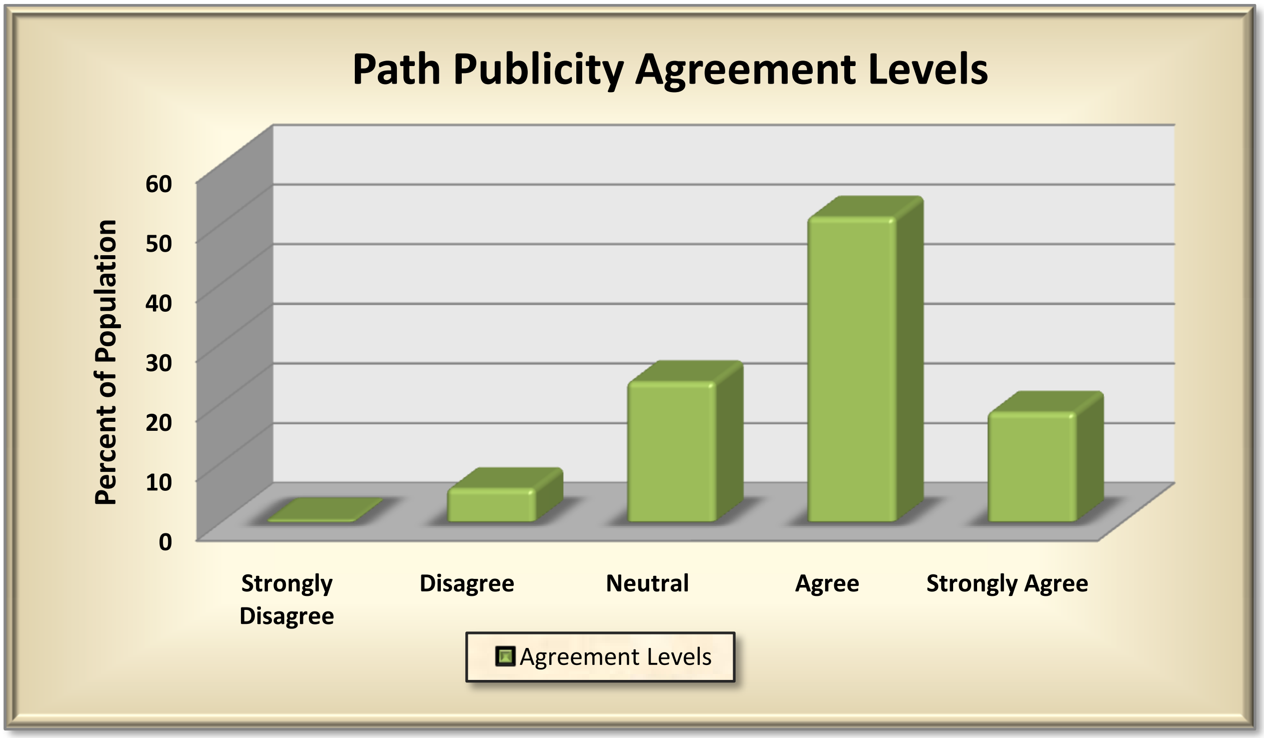

Figure 32 *SPSSx Frequencies Test: Further Path Publicity Agreement Levels.*

By proportion, freshmen claim the least awareness in comparison to the other classes. To gain awareness a student must grow comfortable enough to explore the city, a task that could take a relatively substantial amount of time. This issue reflects the college's total lack of bike path publicity aimed at the newest Keene residents; the incoming freshmen. When prompted about a need for the biking and walking paths of Keene to be more widely publicized, a huge majority of the students agreed (Figure 32). This agreement is a sign of interest among the surveyed population as well as an indication of the low awareness levels. When awareness levels rise due to publicity, a wider portion of the college population will show a curiosity and this interest will hopefully transform into physical use of the paths

A full 69.9 percent of the sample population agrees that the need for some form of further publication of the bike paths in need. This is rivaled by an encouraging 6.4 percent of disagreeing students. Such a student outcry might prompt Keene State College to amplify its green efforts by showing a deeper support of alternative transportation through the encouragement of freshmen to utilize the bike paths. Pending some form of publication campaign, direct and positive changes would occur in the aforementioned statistics, including path awareness, path frequency, and bike access. Ultimately the overall volume of riders would increase because students would begin utilizing the paths during their initial years at school, rather than the later years.

Overall, results prove the students living off campus enjoy a higher awareness level of bike paths than those living on campus. Off campus students also utilize the paths 28.9 percent more often than on campus students. Assuming that living off campus forces a student to come across a bike path at some point in time, a corresponding rise in awareness and usage levels occurs. Because off campus students hold more experience with the paths, their knowledge base is more encompassing and reliable. Regarding path improvement, all students agree that some form of upgrade is necessary. Statistically, off campus dwellers agree with a needed path improvement at a significantly higher level than their on campus classmates. Due to the fact that significantly more juniors and seniors live off campus than freshmen and sophomores, these awareness levels directly reflect the lack of path publicity to younger college students. All students agree that some form of trail publication should be instituted to promote the knowledge and use of the bicycle paths.

Jim Duffy, a Keene City Councilor at Large, also believes a higher level of path publication would move the citizens of Keene to walk and ride more often than current transportation behavior trends. Although bike use is increasing, Duffy points out these present utilization levels remains lower than desired. He also agrees with the notion that the large scale installation of bike lanes would entice more riders. Ideally, this could bring about a transportation-based culture change, ultimately helping to decrease gridlock, pollution, and promote a better “sense of place”. However, in order to get the wheels turning, Duffy thinks city staff, City Councilors, and Keene residents need to make more of an effort, speak up, and take action.

Chapter 7
The Final Step

In the United States, the urban design and development has been simply and rationally framed around existing transportation networks. When arranging and designing new transportation systems, it is vital for city planners to reflect about the existing networks and how to incorporate them into one another. The transportation systems of discussion are of course the roads, sidewalks, and bike trails that accommodate the automobiles and pedestrians. Cities like Davis, California, and Burlington, Vermont, are exemplary illustrations of what can hopefully be included into more communities around the United States. The result of this research is an attempt to enhance the likelihood of Keene, New Hampshire, being incorporated in this category of conservational distinction and the intertwining of transportation networks.

The logic behind combining transportation systems is that with additional means of transportation there is a larger prospect of people utilizing more environmentally friendly paths and sidewalks. The results lead to a surplus of beneficial consequences relating to the environment, health, social capital, and safety to the area of study. All of the previously mentioned elements are also key fundamentals for the organization that proposed "Vision 2020." The program designed to engage the citizens of Cheshire County, New Hampshire, in the process of becoming the healthiest community in the nation by the year 2020. Without "Vision 2020" being an instrument for the betterment of local and regional citizens, the research would not hold as much weight. This is due to the outcome of the research being primarily a product from the support of the knowledgeable members.

That being said, with more people having access to physically oriented modes of travel, the health issues of some citizens is reduced. The health concern of priority is of course obesity, because all areas of the United States are plagued with overweight citizens. The overwhelmingly high percentage of citizens that fall into this category experience many disabling health issues that result from obesity. Part of the objective is to reduce the amount sedentary habits that make up a portion of the culture in the United States by making other transportation methods more accessible.

All of the previously stated outcomes correlate with one another, but the two with the highest level of relativity are health and the environment. The reason for this is because with more people walking and riding bikes, opposed to driving, the environment is being benefitted exponentially. With fewer cars on the road, there are smaller quantities of carbon monoxide emissions being released into the atmosphere. There are also fewer consumers using non-renewable fossil fuels such as gasoline, diesel fuel, oil and lubricants. With reduced amounts of pollution due to fewer cars being on the road there is also a higher level of social capital developed. The reasons for this are because with a cleaner and greener environment, residents develop a higher appreciation for the town. When citizens have a raised appreciation, the majority tend to become more affiliated with the town and in turn become more involved with the economic and political systems.

The result of various means of transportation, other than vehicular, also correlates to the level of safety for the pedestrians. Similarly, with less car congestion, the possibility of being struck by a vehicle is reduced. Therefore, with higher levels of safety, concerned parents are more likely to allow children to walk and bike to school, a percentage that has reduced significantly in years past. An important element of the research was to develop GIS maps that illustrate the problem areas of accidents. This was done to provide the city with data that can help prevent further related issues. The theory behind the mapped data is to help city officials establish characteristics that correspond to the troubled areas.

Finally, the survey issued to the students of Keene State College was conducted because the highest percentage of the Keene population falls into the age cohort of the college student. The survey addressed key issues related to the bike trails, sidewalks and pedestrian safety. The statistical tests issued examined hypotheses relating to walking and biking. The product of the tests was to illustrate how aware the students were to the bike paths that are limitedly present. The outcome of which showed that upper classmen were more aware than lower classmen and that there was a higher, though not significantly, level of concern for the maintenance for the bike paths. This small scale survey can be related to a larger population, such as the city of Keene, because the current residents that have been present for a few or more years in Keene are more aware and concerned for the bike trails. Likewise, the newer residents should be informed and possibly directed to the trails. The way that this information could be dispersed more evenly throughout the population would be to create some form of advertisement or more visible markers that direct pedestrians and bikers to the trails. Without question, the City of Keene and Cheshire Medical Center are well on their way to a healthy community designed around a holistic transportation network.

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Appendix

Data	Day	Address
4/1/2009	Wednesday	
4/2/2009	Thursday	660 Lower Main Street
4/2/2009	Thursday	Route 12A
4/2/2009	Thursday	206 Main Street @ 27 Winchester Street
4/2/2009	Thursday	14 Swanzey Factory Road @ 0 Route 101
4/2/2009	Thursday	28 Cottage Street
4/3/2009	Friday	110 Court Street
4/3/2009	Friday	Route 9 @ Whitcombs Mill Road
4/3/2009	Friday	410 Winchester Street
4/3/2009	Friday	43 Arch Street
4/3/2009	Friday	320 Roxbury Street @ 5 North Lincoln Street
4/3/2009	Friday	30 Coolidge Street
4/4/2009	Saturday	502 WINCHESTER ST @ 14 MATTHEWS RD
4/4/2009	Saturday	502 WINCHESTER ST
4/4/2009	Saturday	12 EMERALD ST
4/5/2009	Sunday	46 ASH BROOK RD
4/5/2009	Sunday	173 MAIN ST
4/6/2009	Monday	SKATE PARK - COMMERCIAL STREET LOT
4/6/2009	Monday	360 WINCHESTER ST
4/7/2009	Tuesday	14 SWANZEY FACTORY RD @ 0 ROUTE 101
4/7/2009	Tuesday	524 WASHINGTON ST
4/8/2009	Wednesday	
4/9/2009	Thursday	PARK AVE
4/9/2009	Thursday	206 MAIN ST @ 27 WINCHESTER ST
4/9/2009	Thursday	351 WINCHESTER ST @ 58 KEY RD
4/9/2009	Thursday	0 SCHOOL ST @ 0 GILBO AVE
4/9/2009	Thursday	ELM STREET LOT
4/10/2009	Friday	36 MARLBORO ST @ 196 MAIN ST
4/10/2009	Friday	32 VERNON ST
4/11/2009	Saturday	118 GILSUM ST
4/12/2009	Sunday	
4/13/2009	Monday	12 MAIN ST
4/13/2009	Monday	360 WINCHESTER ST
4/13/2009	Monday	WINCHESTER ST @ ROUTE 101
4/13/2009	Monday	320 ROXBURY ST @ 5 NORTH LINCOLN ST
4/14/2009	Tuesday	
4/15/2009	Wednesday	265 WASHINGTON ST
4/15/2009	Wednesday	360 WINCHESTER ST
4/15/2009	Wednesday	0 CENTRAL SQ @ 2 MAIN ST
4/16/2009	Thursday	KEENE/SWANZEY LINE - ROUTE 10

4/16/2009	Thursday	WYMAN RD
4/16/2009	Thursday	OTTER BROOK - ROUTE 9
4/17/2009	Friday	281 WEST ST
4/18/2009	Saturday	157 GEORGE ST
4/18/2009	Saturday	0 ROUTE 12 @ 105 MAPLE AVE
4/18/2009	Saturday	160 WINCHESTER ST
4/18/2009	Saturday	21 COOLIDGE ST
4/18/2009	Saturday	MARLBORO ST
4/19/2009	Sunday	ROTARY - WINCHESTER ST @ ROUTE 101
4/20/2009	Monday	ENTRANCE TO THE PARKING GARAGE - WASHINGTON ST
4/20/2009	Monday	196 MAIN ST @ 36 MARLBORO ST
4/20/2009	Monday	ROUTE 9 @ ROUTE 101
4/21/2009	Tuesday	37 MAIN ST
4/21/2009	Tuesday	268 WEST ST
4/21/2009	Tuesday	25 LAMSON ST
4/22/2009	Wednesday	
4/23/2009	Thursday	61 COURT ST @ 76 MECHANIC ST
4/23/2009	Thursday	27 WINCHESTER ST @ 206 MAIN ST Lat: +042.934033 Lon: -072.277250
4/24/2009	Friday	2 MAIN ST @ 9 ROXBURY ST
4/24/2009	Friday	WINCHESTER ST @ ROUTE 101
4/24/2009	Friday	281 WEST ST
4/25/2009	Saturday	ANDY'S CYCLE SHOP - 165 WINCHESTER ST
4/25/2009	Saturday	BORDERS - 30 ASH BROOK RD
4/25/2009	Saturday	90 MAIN ST @ 16 CYPRESS ST
4/25/2009	Saturday	206 MAIN ST @ 27 WINCHESTER ST
4/25/2009	Saturday	317 WINCHESTER ST
4/25/2009	Saturday	PROCTOR CT
4/25/2009	Saturday	26 PROCTOR CT
4/26/2009	Sunday	IRVING GAS (CIRCLE K) - 410 WEST ST
4/26/2009	Sunday	ENTRANCE - WEST ST PLZ
4/27/2009	Monday	FULLER SCHOOL - 422 ELM ST
4/27/2009	Monday	SEARS PLZ
4/27/2009	Monday	PIZZA HUT - 333 WINCHESTER ST
4/27/2009	Monday	CHESHIRE COUNTY REGISTRY - 33 WEST ST
4/27/2009	Monday	36 MARLBORO ST @ 196 MAIN ST
4/27/2009	Monday	36 MARLBORO ST @ 196 MAIN ST
4/27/2009	Monday	BUTTERFIELD - 40 WINCHESTER ST
4/28/2009	Tuesday	HANNAHS CLOSET - ROUTE 12
4/28/2009	Tuesday	HANNAFORD SUPERSTORE - 481 WEST ST
4/28/2009	Tuesday	ELM STREET MARKET - 130 ELM ST
4/28/2009	Tuesday	KEENE HIGH SCHOOL - 43 ARCH ST

4/29/2009	Wednesday	105 MAPLE AVE @ 0 ROUTE 12
4/29/2009	Wednesday	NORTH STREET MARKET - 79 NORTH ST
4/30/2009	Thursday	SB OFF RAMP - ROUTE 12
4/30/2009	Thursday	CURRY PRINTING & OFFICE SUPPLIES - 7 EMERALD ST
5/1/2009	Friday	160 WINCHESTER ST @ 23 BUTLER CT
5/1/2009	Friday	492 MAIN ST @ 0 ROUTE 101
5/1/2009	Friday	DUNKIN DONUTS - RIVERSIDE PLZ
5/2/2009	Saturday	WINCHESTER ST @ ROUTE 101
5/2/2009	Saturday	WEST ST @ ROUTE 12
5/2/2009	Saturday	KEENE HIGH SCHOOL - 43 ARCH ST
5/2/2009	Saturday	NEAR HANNAFORD - WEST ST
5/2/2009	Saturday	CINEMA - KEY RD
5/3/2009	Sunday	ROXBURY ST
5/4/2009	Monday	
5/5/2009	Tuesday	LINDY'S DINER - 19 GILBO AVE
5/5/2009	Tuesday	0 ROUTE 101 @ 492 MAIN ST
5/6/2009	Wednesday	468 CHAPMAN RD @ 825 ROXBURY RD
5/6/2009	Wednesday	44 EAST SURRY RD
5/6/2009	Wednesday	CHESHIRE COUNTY COURTHOUSE - 12 COURT ST bx752
5/6/2009	Wednesday	36 MARLBORO ST @ 196 MAIN ST
5/6/2009	Wednesday	DUNKIN DONUTS - 191 WEST ST
5/6/2009	Wednesday	196 MAIN ST @ 36 MARLBORO ST
5/6/2009	Wednesday	19 MECHANIC ST
5/7/2009	Thursday	NEAR WHITCOMB MILL ROAD - ROUTE 9
5/7/2009	Thursday	209 COURT ST @ 158 HIGH ST
5/8/2009	Friday	CUMBERLAND FARMS - 162 MAIN ST
5/8/2009	Friday	262 WEST ST @ 11 ISLAND ST
5/8/2009	Friday	26 WASHINGTON ST @ 16 CENTRAL SQ
5/8/2009	Friday	572 WEST ST @ 10 SYMONDS PL
5/8/2009	Friday	TD BANKNORTH - 194 WEST ST
5/8/2009	Friday	ROUTE 12 @ ROUTE 32
5/9/2009	Saturday	WALIER CHEVROLET - 195 WINCHESTER ST
5/9/2009	Saturday	PUB RESTAURANT & CATERERS - 131 WINCHESTER ST
5/10/2009	Sunday	KEENE HIGH SCHOOL - 43 ARCH ST
5/10/2009	Sunday	ROUTE 101
5/10/2009	Sunday	AUTO ZONE PK LOT
5/10/2009	Sunday	WASHINGTON ST @ ROUTE 9
5/11/2009	Monday	
5/12/2009	Tuesday	ROUTE 9 @ ROUTE 12
5/12/2009	Tuesday	85 WASHINGTON ST @ 26 TAYLOR ST
5/12/2009	Tuesday	BETWEEN APPLEBEES & TARGET - ROUTE 9

5/12/2009	Tuesday	PARK AVE @ SUMMIT RD
5/13/2009	Wednesday	196 MAIN ST @ 36 MARLBORO ST
5/13/2009	Wednesday	ARCH ST
5/13/2009	Wednesday	SUBWAY - 37 MAIN ST
5/14/2009	Thursday	33 WEST ST
5/14/2009	Thursday	SEARS PLZ
5/14/2009	Thursday	28 BAKER ST @ 390 MAIN ST
5/14/2009	Thursday	DUNKIN DONUTS - WINCHESTER ST @ ROUTE 101
5/15/2009	Friday	35 WOODRIDGE RD
5/15/2009	Friday	WINCHESTER ST @ ROUTE 101
5/15/2009	Friday	EMERALD ST
5/15/2009	Friday	HANNAFORD SUPERSTORE - 481 WEST ST
5/16/2009	Saturday	WAL-MART STORE - 360 WINCHESTER ST
5/17/2009	Sunday	RT 9 ASHBROOK
5/17/2009	Sunday	463 WASHINGTON ST
5/17/2009	Sunday	RT 9 12 10 AND 101 INTERSECTION
5/17/2009	Sunday	HANNAFORD SUPERSTORE - 481 WEST ST
5/18/2009	Monday	193 WEST ST @ 9 ASHUELOT ST
5/18/2009	Monday	IRVING GAS (CIRCLE K) - 410 WEST ST
5/18/2009	Monday	423 WINCHESTER ST @ 9 FAIRBANKS ST
5/19/2009	Tuesday	156 MARLBORO ST @ 18 JENNISON ST
5/19/2009	Tuesday	CORNER NEWS - 67 MAIN ST
5/19/2009	Tuesday	ROTARY - MAIN ST
5/19/2009	Tuesday	WINCHESTER ST @ ROUTE 101
5/20/2009	Wednesday	34 WEST ST @ 17 FEDERAL ST
5/20/2009	Wednesday	WINCHESTER ST @ ROUTE 101
5/20/2009	Wednesday	PRICE CHOPPER - ASH BROOK RD
5/21/2009	Thursday	ROUTE 101 @ WINCHESTER ST
5/21/2009	Thursday	0 SCHOOL ST @ 0 GILBO AVE
5/21/2009	Thursday	44 COURT ST @ 18 SUMMER ST
5/21/2009	Thursday	7-ELEVEN - 849 COURT ST
5/21/2009	Thursday	SHAWS - RIVERSIDE PLZ
5/22/2009	Friday	STARBUCKS - 281 WEST ST
5/22/2009	Friday	KEENE CHRYSLER PLYMOUTH - 410 WINCHESTER ST
5/22/2009	Friday	196 MAIN ST @ 36 MARLBORO ST
5/22/2009	Friday	101 NEAR THE T - ROUTE 101
5/22/2009	Friday	CITGO - WEST ST
5/22/2009	Friday	67 SUMMER ST @ 99 SCHOOL ST
5/22/2009	Friday	ROUTE 101 @ WINCHESTER ST
5/22/2009	Friday	196 MAIN ST @ 36 MARLBORO ST
5/23/2009	Saturday	BASE HILL RD @ ROUTE 9

5/24/2009	Sunday	MAIN ST
5/24/2009	Sunday	394 ELM ST
5/24/2009	Sunday	22 PAKO AVE
5/25/2009	Monday	
5/26/2009	Tuesday	2 MAIN ST @ 9 ROXBURY ST
5/26/2009	Tuesday	SIMMS PORTEX - 25 PRODUCTION AVE
5/26/2009	Tuesday	PARK AVE @ SUMMIT RD
5/26/2009	Tuesday	STONE BRIDGE - COURT ST
5/26/2009	Tuesday	WAL-MART STORE - 360 WINCHESTER ST
5/26/2009	Tuesday	TIRE WAREHOUSE CENTRAL - 492 MAIN ST
5/27/2009	Wednesday	WAL-MART STORE - 360 WINCHESTER ST
5/27/2009	Wednesday	WINCHESTER ST @ ROUTE 101
5/28/2009	Thursday	PUB RESTAURANT & CATERERS - 131 WINCHESTER ST
5/28/2009	Thursday	NB NEAR LANDFILL - ROUTE 12
5/28/2009	Thursday	WAL-MART STORE - 360 WINCHESTER ST
5/29/2009	Friday	COLONY MILL MARKETPLACE - MAYO SEVEN LLC - 222 WEST ST
5/29/2009	Friday	160 EMERALD ST @ 1 RALSTON ST
5/29/2009	Friday	WALGREEN DRUG STORE & PHARMACY - 420 WEST ST
5/30/2009	Saturday	APPLEBEES RESTAURANT - 40 KEY RD
5/30/2009	Saturday	206 MAIN ST @ 27 WINCHESTER ST
5/30/2009	Saturday	117 MAIN ST @ 7 EMERALD ST
5/30/2009	Saturday	ROUTE 101 @ WINCHESTER ST
5/30/2009	Saturday	1/4 MILE UP FROM RI 101 - BRANCH RD
5/30/2009	Saturday	ROUTE 9 @ ASH BROOK RD
5/31/2009	Sunday	ROUTE 101 @ 58 OPTICAL AVE
5/31/2009	Sunday	CHESHIRE HOMES/MCD'S SIDE - 245 PEARL ST
6/1/2009	Monday	CHESHIRE MUSIC STORE - 20 MAIN ST
6/1/2009	Monday	206 MAIN ST @ 27 WINCHESTER ST
6/3/2009	Wednesday	196 MAIN ST
6/3/2009	Wednesday	281 WEST S
6/3/2009	Wednesday	360 WINCHESTER ST
6/3/2009	Wednesday	96 UNION ST @ 117 COURT ST
6/4/2009	Thursday	ROUTE 9 @ BASE HILL RD
6/4/2009	Thursday	MILLER BROTHERS NEWTON - 105 MAIN ST
6/5/2009	Friday	79 NORTH ST @ 307 ELM ST
6/8/2009	Monday	298 WEST ST
6/8/2009	Monday	RT 10 SWANZEY LINE
6/8/2009	Monday	117 MAIN ST @ 7 EMERALD ST
6/9/2009	Tuesday	354 WEST ST @ 12 PEARL ST
6/9/2009	Tuesday	ROUTE 9 @ WHITCOMBS MILL RD
6/9/2009	Tuesday	HOSPITAL GATES - ROUTE 9

6/10/2009	Wednesday	BEECH ST
6/10/2009	Wednesday	14 VICTORIA ST @ 261 WATER ST
6/10/2009	Wednesday	206 WASHINGTON ST @ 17 COOLIDGE ST
6/11/2009	Thursday	FAIRFIELD MOTORS - WINCHESTER ST
6/11/2009	Thursday	206 ROXBURY ST
6/11/2009	Thursday	354 WEST ST @ 12 PEARL S
6/11/2009	Thursday	BINGHAM HILL - ROUTE 10
6/13/2009	Saturday	ROUTE 101 @ LOWER MAIN ST
6/13/2009	Saturday	76 PARK AVE
6/14/2009	Sunday	17 MECHANIC ST
6/14/2009	Sunday	22 ASH BROOK RD
6/14/2009	Sunday	492 MAIN ST @ 0 ROUTE 101
6/15/2009	Monday	423 WINCHESTER ST @ 9 FAIRBANKS ST
6/15/2009	Monday	191 WEST ST
6/15/2009	Monday	0 ROUTE 101 @ 0 OPTICAL AVE
6/15/2009	Monday	ROUTE 9 @ WEST ST
6/16/2009	Tuesday	HOSPITAL PK LOT
6/16/2009	Tuesday	93 PARK AVE @ 17 ARCH ST
6/16/2009	Tuesday	T INTERSECTION - ROUTE 9 @ ROUTE 12
6/17/2009	Wednesday	THE OLD OTTERBROOK CENTER - ROUTE 9
6/17/2009	Wednesday	149 EMERALD ST
6/17/2009	Wednesday	WINCHESTER ST
6/18/2009	Thursday	48 SUMMIT RD
6/18/2009	Thursday	RT 12 NORTH
6/18/2009	Thursday	NEAR SAVINGS BANK - MARLBORO ST
6/18/2009	Thursday	4 CENTRAL SQ @ 38 ROXBURY ST
6/18/2009	Thursday	VIDA SOURCE - LOWER MAIN ST
6/18/2009	Thursday	8 CLARK CIR
6/18/2009	Thursday	WELLS ST. LOT-LOWER DECK
6/18/2009	Thursday	0 ROUTE 101 @ 492 MAIN ST
6/19/2009	Friday	480 WEST ST
6/19/2009	Friday	48 MECHANIC ST @ 17 ELM ST
6/19/2009	Friday	481 WEST ST
6/19/2009	Friday	268 WEST ST
6/19/2009	Friday	BORDERS - ROUTE 9
6/20/2009	Saturday	WEST ST @ ROUTE 9
6/20/2009	Saturday	ROUTE 101 @ BRANCH RD
6/21/2009	Sunday	MAIN ST @ COMMERCIAL ST
6/22/2009	Monday	26 WASHINGTON ST @ 16 CENTRAL SQ
6/23/2009	Tuesday	ROUTE 12 SOUTH @ WEST ST
6/23/2009	Tuesday	ROTARY - WINCHESTER ST

6/23/2009	Tuesday	ROUTE 101 @ WINCHESTER ST
6/24/2009	Wednesday	0 MAPLE AVE @ 14 MELODY LN
6/24/2009	Wednesday	262 WEST ST @ 11 ISLAND ST
6/24/2009	Wednesday	ROUTE 101 @ WINCHESTER ST
6/24/2009	Wednesday	379 WEST ST
6/25/2009	Thursday	422 ELM ST
6/25/2009	Thursday	122 MAIN ST
6/26/2009	Friday	NORTH OF WEST ST EXIT - ROUTE 12
6/26/2009	Friday	143 MARLBORO ST
6/26/2009	Friday	17 CHURCH ST
6/26/2009	Friday	BETWEEN WEST ST & ROUTE 9/10 - ROUTE 12
6/27/2009	Saturday	4 GILSUM ST @ 268 WASHINGTON ST
6/27/2009	Saturday	131 WINCHESTER ST
6/27/2009	Saturday	255 WEST ST
6/27/2009	Saturday	RT 9 AND 10
6/28/2009	Sunday	HIGH ST MARKET
6/29/2009	Monday	ROTARY - WINCHESTER ST @ ROUTE 101
6/29/2009	Monday	84 MARLBORO ST
6/29/2009	Monday	100 WASHINGTON ST @ 19 MECHANIC ST
6/29/2009	Monday	0 COURT ST @ 2 STARLING ST
6/30/2009	Tuesday	540 LOWER MAIN ST @ 30 MANCHESTER ST
6/30/2009	Tuesday	135 ELM ST @ 110 HIGH ST
6/30/2009	Tuesday	0 ROUTE 12 @ 105 MAPLE AVE
7/1/2009	Wednesday	267 EAST SURRY RD
7/2/2009	Thursday	46 ASH BROOK RD
7/2/2009	Thursday	121 KEY RD
7/2/2009	Thursday	480 WEST ST
7/3/2009	Friday	27 MAIN ST
7/3/2009	Friday	130 ELM ST
7/3/2009	Friday	462 WEST ST
7/3/2009	Friday	T INTERSECTION - ROUTE 12 @ ROUTE 9
7/3/2009	Friday	11 HURRICANE RD @ 81 ARCH ST
7/3/2009	Friday	105 MAPLE AVE
7/4/2009	Saturday	113 WATER ST @ 8 GROVE ST
7/4/2009	Saturday	21 ROUTE 9 @ 2 BASE HILL RD
7/4/2009	Saturday	OLD CONCORD RD @ NIMS RD
7/5/2009	Sunday	NEAR DUNKIN DONUTS - WEST ST
7/6/2009	Monday	1 MILE UP FROM COURT STREET - OLD WALPOLE RD
7/6/2009	Monday	WEST ST @ ROUTE 12
7/6/2009	Monday	262 WEST ST @ 11 ISLAND ST
7/6/2009	Monday	540 LOWER MAIN ST

7/6/2009	Monday	255 WEST ST
7/7/2009	Tuesday	5 OLIVO RD
7/7/2009	Tuesday	322 WEST ST @ 11 BRIDGE CT
7/8/2009	Wednesday	196 MAIN ST @ 36 MARLBORO ST
7/8/2009	Wednesday	141 WINCHESTER ST @ 55 RALSTON ST
7/9/2009	Thursday	14 SWANZEY FACTORY RD
7/9/2009	Thursday	RIVERSIDE PLZ
7/10/2009	Friday	4 CENTRAL SQ @ 38 ROXBURY ST
7/10/2009	Friday	ASH BROOK RD @ ROUTE 9
7/10/2009	Friday	HIGH ST
7/10/2009	Friday	ROUTE 101 @ WINCHESTER ST
7/11/2009	Saturday	64 MAIN ST @ 12 RAILROAD ST
7/11/2009	Saturday	291 WINCHESTER ST @ 199 ISLAND ST
7/11/2009	Saturday	WOODLAWN CEMETERY
7/12/2009	Sunday	RT 101 - WINCHESTER ST
7/13/2009	Monday	TRK LANES - ROUTE 12
7/13/2009	Monday	219 WEST ST
7/13/2009	Monday	2 MAIN ST
7/14/2009	Tuesday	WINCHESTER ST @ ROUTE 101
7/14/2009	Tuesday	62 MAPLE AVE
7/14/2009	Tuesday	Lat: +042.948024 Lon: -072.290124
7/15/2009	Wednesday	ROUTE 101 @ 22 ROUTE 9
7/15/2009	Wednesday	Lat: +042.916009 Lon: -072.263367
7/16/2009	Thursday	21 ROUTE 9 @ 2 BASE HILL RD
7/16/2009	Thursday	134 DAVIS ST @ 56 RALSTON ST
7/17/2009	Friday	354 WEST ST @ 12 PEARL ST
7/17/2009	Friday	WINCHESTER ST @ ROUTE 101
7/17/2009	Friday	UNDER RT 12 - WEST ST
7/17/2009	Friday	HURRICANE RD
7/17/2009	Friday	ROUTE 101 @ 14 SWANZEY FACTORY RD
7/17/2009	Friday	NEAR SEARS - WEST ST
7/18/2009	Saturday	120 MAIN ST
7/19/2009	Sunday	CENTRAL SQ
7/19/2009	Sunday	WINCHESTER ST @ ROUTE 101
7/20/2009	Monday	1/4 MILE EAST OF CHESTERFIELD HILL - ROUTE 9
7/20/2009	Monday	162 MAIN ST
7/20/2009	Monday	136A ARCH ST
7/20/2009	Monday	640 MAIN ST
7/21/2009	Tuesday	268 WEST ST
7/21/2009	Tuesday	NEAR LADY OF AMERICA
7/22/2009	Wednesday	55 MAIN ST @ 6 GILBO AVE

7/22/2009	Wednesday	CENTRAL SQ
7/22/2009	Wednesday	268 WEST ST
7/23/2009	Thursday	580 COURT ST
7/23/2009	Thursday	15 APPLETON ST
7/23/2009	Thursday	WINTER ST
7/24/2009	Friday	NORTH OF MAPLE AVE - ROUTE 12
7/24/2009	Friday	ISLAND ST
7/24/2009	Friday	COLONY MILL PARKING LOT - ISLAND ST
7/24/2009	Friday	MAIN ST
7/26/2009	Sunday	21 ROUTE 9 @ 2 BASE HILL RD
7/26/2009	Sunday	305 ROXBURY ST
7/26/2009	Sunday	480 WEST ST
7/27/2009	Monday	WALGREENS - WEST ST
7/27/2009	Monday	CENTRAL SQ
7/27/2009	Monday	ROUTE 9 UNDERPASS - ELM ST
7/27/2009	Monday	36 MARLBORO ST @ 196 MAIN ST
7/28/2009	Tuesday	LIBERTY LN
7/28/2009	Tuesday	RT 101 - WINCHESTER ST
7/28/2009	Tuesday	797 COURT ST
7/28/2009	Tuesday	69 PAKO AVE
7/29/2009	Wednesday	ROUTE 9 WEST @ ROUTE 12 SOUTH
7/29/2009	Wednesday	74 SPRING ST @ 12 BROOK ST
7/29/2009	Wednesday	ROUTE 10 NORTH @ ROUTE 9 EAST
7/30/2009	Thursday	OTTERBROOK - ROUTE 9
7/30/2009	Thursday	400 WEST ST
7/31/2009	Friday	110 HIGH ST - 110 HIGH ST
7/31/2009	Friday	ISLAND ST
7/31/2009	Friday	CHAPMAN RD
7/31/2009	Friday	193 WEST ST @ 9 ASHUELOT ST
8/3/2009	Monday	Route 101 @ Winchester St.
8/3/2009	Monday	Winchester St
8/3/2009	Monday	403 Winchester St. (Service Credit Union)
8/3/2009	Monday	849 Court St. (7-Eleven)
8/4/2009	Tuesday	410 West St @ 15 Avon St
8/5/2009	Wednesday	43 Carroll St @ 88 High St
8/5/2009	Wednesday	ER Parking Lot
8/6/2009	Thursday	459 Elm St.
8/7/2009	Friday	117 West St @ 24 School St.
8/7/2009	Friday	173 Main St. (St. Bernard's Church)
8/8/2009	Saturday	411 Winchester St @ Kit St.
8/8/2009	Saturday	62 Maple Ave. (Peerless Insurance Co)

8/9/2009	Sunday	400 WEST ST (SAVINGS BANK OF WALPOLE)
8/10/2009	Monday	107 LIBERTY LN @ 157 KENNEDY DR
8/10/2009	Monday	156 LIBERTY LN
8/11/2009	Tuesday	79 PARK AVE (SYMONDS ELEMENTARY SCHOOL)
8/11/2009	Tuesday	ROUTE 12 @ ROUTE 9
8/11/2009	Tuesday	WINCHESTER ST @ RT 101
8/11/2009	Tuesday	268 WEST ST. (CVS)
8/11/2009	Tuesday	492 MAIN ST @ ROUTE 101
8/12/2009	Wednesday	
8/13/2009	Thursday	9 ASHUELOT ST. (CHESHIRE VILLAGE PIZZA)
8/14/2009	Friday	ROUTE 12A @ SOUTH DARLING RD.
8/14/2009	Friday	24 SCHOOL ST @ 117 WEST ST.
8/15/2009	Saturday	ROUTE 9
8/16/2009	Sunday	
8/17/2009	Monday	307 ELM ST @ 79 NORTH ST.
8/17/2009	Monday	117 WEST ST @ 24 SCHOOL ST.
8/18/2009	Tuesday	91 MARLBORO @ 11 ADAMS ST.
8/18/2009	Tuesday	480 WEST ST (SEARS)
8/18/2009	Tuesday	WINCHESTER ST @ RT 101
8/18/2009	Tuesday	ROUTE 101 @ WINCHESTER ST.
8/19/2009	Wednesday	63 KEY RD. TJ MAXX
8/19/2009	Wednesday	122 WEST ST. (OCEAN BANK MAIN OFFICE)
8/20/2009	Thursday	
8/21/2009	Friday	41 CENTRAL SQ
8/22/2009	Saturday	206 MAIN ST @ 27 WINCHESTER ST.
8/22/2009	Saturday	RT 101 AND WINCHESTER ST.
8/22/2009	Saturday	KIT ST. (BEST WESTERN SOVERIGN HOTEL) HIT AND RUN
8/22/2009	Saturday	116 CHAPMAN RD
8/23/2009	Sunday	79 PARK AVE (SYMONDS ELEMENTARY SCHOOL)
8/24/2009	Monday	162 MAIN ST. (CUMBERLAND FARMS)
8/24/2009	Monday	ROUTE 9 @ PRODUCTION AVE.
8/24/2009	Monday	455 WEST ST. PLZ. (RENT A CENTER)
8/24/2009	Monday	ELM ST. (HIT AND RUN)
8/24/2009	Monday	SOUTH ST. (HIT AND RUN)
8/24/2009	Monday	ROUTE 9 @ CHESTERFIELD RD.
8/24/2009	Monday	ROUTE 101 @ WINCHESTER ST.
8/25/2009	Tuesday	602 COURT ST @ 10 WESTVIEW AVE
8/25/2009	Tuesday	OPTICAL AVE.
8/25/2009	Tuesday	MELODY LN.
8/25/2009	Tuesday	RT. 101 @ 14 SWANZEY FACTORY RD
8/26/2009	Wednesday	298 WEST ST. (PANERA)

8/26/2009	Wednesday	268 WEST ST. (CVS)
8/26/2009	Wednesday	162 MAIN ST. (CUMBERLAND FARMS)
8/27/2009	Thursday	52 RIDGEWOOD AVE @ 9 BATES RD.
8/27/2009	Thursday	580 COURT ST (CHESHIRE MEDICAL CENTER)
8/27/2009	Thursday	351 WINCHESTER ST @ 58 KEY RD.
8/27/2009	Thursday	63 KEY RD. TJ MAXX
8/28/2009	Friday	162 MAIN ST. (CUMBERLAND FARMS)
8/28/2009	Friday	43 ARCH ST. (KEENE HIGH SCHOOL)
8/28/2009	Friday	RT 101 @ 429 MAIN ST.
8/28/2009	Friday	ASHUELOT ST.
8/28/2009	Friday	MANCHESTER ST.
8/28/2009	Friday	30 MAIN ST. (E F LANE HOTEL)
8/28/2009	Friday	173 MAIN ST. (ST. BERNARD'S CHURCH)
8/29/2009	Saturday	317 WINCHESTER ST. (MCDONALD'S)
8/30/2009	Sunday	15 BRADCO RD. (FAIRPOINT)
8/31/2009	Monday	133 MAIN ST. (ATHENS)
8/31/2009	Monday	16 PINE ST. @ 154 WASHINGTON ST.

9/1/2009	Tuesday	27 WINCHESTER ST @ 206 MAIN ST
9/1/2009	Tuesday	WALGREEN DRUG STORE & PHARMACY - 420 WEST ST
9/1/2009	Tuesday	TD BANKNORTH - 194 WEST ST
9/2/2009	Wednesday	130 WINCHESTER ST @ 1 MADISON ST
9/2/2009	Wednesday	BAGEL WORKS - 120 MAIN ST
9/2/2009	Wednesday	CVS #640 - 268 WEST ST
9/2/2009	Wednesday	WENDYS - 329 WINCHESTER ST
9/2/2009	Wednesday	262 WEST ST @ 11 ISLAND ST
9/3/2009	Thrusday	T INTERSECTION
9/4/2009	Friday	KEENE AUTO BODY - 543 LOWER MAIN ST
9/4/2009	Friday	KEENE/SURRY LINE - ROUTE 12
9/4/2009	Friday	TIRE WAREHOUSE CENTRAL - 492 MAIN ST
9/4/2009	Friday	MCCUE'S BILLIARDS & SPORTS LOUNGE - 12 EMERALD ST
9/4/2009	Friday	0 ROUTE 101 @ 0 OPTICAL AVE
9/5/2009	Saturday	WAL-MART STORE - 360 WINCHESTER ST
9/5/2009	Saturday	CITIZENS BANK - MAIN ST
9/5/2009	Saturday	693 LOWER MAIN ST @ 0 ROUTE 32
9/6/2009	Sunday	ROUTE 12 @ OLD HOMESTEAD HWY
9/6/2009	Sunday	BETWEEN COLONY MILL & CVS - ISLAND ST
9/6/2009	Sunday	MADISON ST
9/7/2009	Monday	HANNAFORD SUPERSTORE - 481 WEST ST
9/7/2009	Monday	ROUTE 12 @ ROUTE 32
9/8/2009	Tuesday	158 MAPLE AVE @ 21 PAKO AVE

9/8/2009	Tuesday	828 COURT ST @ 323 MAPLE AVE
9/8/2009	Tuesday	1 RALSTON ST @ 160 EMERALD ST
9/9/2009	Wednesday	T INTERSECTION - ROUTE 9
9/9/2009	Wednesday	ROUTE 9 @ DANIELS HILL RD
9/9/2009	Wednesday	CHESHIRE MEDICAL CENTER - 580 COURT ST
9/9/2009	Wednesday	T BIRD MINI MART - 465 WEST ST
9/10/2009	Thursday	BLOCKBUSTER VIDEO - 255 WEST ST
9/10/2009	Thursday	POST OFFICE, UNITED STATES - 196 MAIN ST
9/10/2009	Thursday	559 WEST ST @ 10 PARK AVE
9/10/2009	Thursday	21 ROUTE 9 @ 2 BASE HILL RD
9/11/2009	Friday	AUTEX INC. - 94 KEY RD
9/11/2009	Friday	PUB RESTAURANT & CATERERS - 131 WINCHESTER ST
9/11/2009	Friday	TIRE WAREHOUSE PK LOT - LOWER MAIN ST
9/11/2009	Friday	SEARS PK LOT
9/11/2009	Friday	MCCUE'S BILLIARDS & SPORTS LOUNGE - 12 EMERALD ST
9/11/2009	Friday	MONADNOCK IMAGING - 6 GILBO AVE
9/11/2009	Friday	PARK AVE @ SUMMIT RD
9/12/2009	Saturday	BLOCKBUSTER VIDEO - 255 WEST ST
9/12/2009	Saturday	ROBIN HOOD - ROXBURY ST
9/13/2009	Sunday	
9/14/2009	Monday	WEST ST @ ROUTE 9
9/14/2009	Monday	YMCA - 38 ROXBURY ST
9/14/2009	Monday	DICK'S SPORTING GOODS - 42 ASH BROOK RD
9/15/2009	Tuesday	WASHINGTON ST @ ROUTE 9
9/15/2009	Tuesday	HEAD OF THE SQAURE - CENTRAL SQ
9/15/2009	Tuesday	SO OF ROTARY - ROUTE 10
9/15/2009	Tuesday	DUNKIN DONUTS - WINCHESTER ST
9/15/2009	Tuesday	391 WEST ST
9/15/2009	Tuesday	193 WEST ST @ 9 ASHUELOT ST
9/15/2009	Tuesday	WINCHESTER ST @ ROUTE 101
9/15/2009	Tuesday	TARGET - 46 ASH BROOK RD
9/16/2009	Wednesday	
9/17/2009	Thursday	135 DARLING RD
9/18/2009	Friday	KNAPPE & KOESTER, INC. - 18 BRADCO RD
9/18/2009	Friday	10 OLD WALPOLE RD @ 323 MAPLE AVE
9/18/2009	Friday	116 ROXBURY ST
9/19/2009	Saturday	ROUTE 9 @ WHITCOMBS MILL RD
9/19/2009	Saturday	OLD WALPOLE RD @ WYMAN RD
9/20/2009	Sunday	DUNKIN DONUTS - 191 WEST ST
9/20/2009	Sunday	MCDONALD'S - 317 WINCHESTER ST
9/21/2009	Monday	250 ELM ST @ 110 SPRUCE ST

9/21/2009	Monday	T INTERSECTION - ROUTE 9
9/22/2009	Tuesday	408 CHESTERFIELD RD
9/22/2009	Tuesday	MARGARITAS - 77-81 MAIN ST
9/23/2009	Wednesday	36 MAIN ST @ 16 CHURCH ST
9/23/2009	Wednesday	ROUTE 101 @ WINCHESTER ST
9/24/2009	Thursday	32 BEAVER ST
9/24/2009	Thursday	RECREATION CENTER OF KEENE - GILSUM ST
9/24/2009	Thursday	OCEAN BANK MAIN OFFICE - 122 WEST ST
9/24/2009	Thursday	193 WEST ST @ 9 ASHUELOT ST
9/25/2009	Friday	WHITCOMBS MILL RD @ ROUTE 9
9/25/2009	Friday	WALGREEN DRUG STORE & PHARMACY - 420 WEST ST
9/25/2009	Friday	NINETY NINE RESTAURANT - 360 WINCHESTER ST
9/25/2009	Friday	CITY TIRE - 124 MAIN ST
9/25/2009	Friday	MCDONALD'S - 317 WINCHESTER ST
9/25/2009	Friday	ROUTE 101 @ WINCHESTER ST
9/25/2009	Friday	BUTLER CT 414C
9/26/2009	Saturday	WEST ST SUNOCO - 354 WEST ST
9/26/2009	Saturday	SUMMIT RD @ PARK AVE
9/27/2009	Sunday	ROUTE 9 @ WINCHESTER ST
9/28/2009	Monday	28 PLEASANT ST A
9/28/2009	Monday	224 WATER ST
9/28/2009	Monday	HARMONY LANE APARTMENTS - HARMONY LN
9/28/2009	Monday	10 OPTICAL AVE
9/29/2009	Tuesday	PORTLAND GLASS - 471 WINCHESTER ST
9/30/2009	Wednesday	18 SPRING ST @ 57 WASHINGTON ST
9/30/2009	Wednesday	CAMPUS CONVENIENCE - 152 WINCHESTER ST
9/30/2009	Wednesday	196 MAIN ST @ 36 MARLBORO ST

Hello! We are Seniors in the *Keene State Geography Department* working on our Senior Seminar capstone project. This survey is designed to gain an understanding of Keene State students' opinions in regard to the current condition of alternative methods of transportation in Keene, New Hampshire. Results of this study will be presented to local cycling clubs, *Pathways for Keene*, and *Vision 2020*. Your participation in this survey would be greatly appreciated.

Please mark one:

☐ Male ☐ Female

1. Current school year:

   ☐ Freshmen ☐ Sophomore ☐ Junior ☐ Senior ☐ Non-Traditional

2. Do you live in Keene?

   ☐ Yes ☐ No, I commute

3. What is your living situation?

   ☐ On-Campus ☐ Off-Campus

4. Do you have access to a bicycle in Keene (not including Keene State College *Green Bikes*)?

   ☐ Yes ☐ No

5. How many times **per week** do you utilize the following modes of transportation to get to and from campus? (Please mark one for each category)

Automobile/Motorcycle	☐ 0-1	☐ 2-3	☐ 4-5	☐ 6-7	☐ 8+
Walking	☐ 0-1	☐ 2-3	☐ 4-5	☐ 6-7	☐ 8+
Biking	☐ 0-1	☐ 2-3	☐ 4-5	☐ 6-7	☐ 8+
Public Transportation	☐ 0-1	☐ 2-3	☐ 4-5	☐ 6-7	☐ 8+
Other*	☐ 0-1	☐ 2-3	☐ 4-5	☐ 6-7	☐ 8+

***Describe "Other" here: ______________________________

6. Please rate your opinion regarding the different aspects of **sidewalks** in Keene (circle one per category):

Aspect	**Poor**	**Fair**	**Good**	**Very Good**	**Excellent**
Physical Condition	1	2	3	4	5
Aesthetics	1	2	3	4	5
Availability of Accommodations*	1	2	3	4	5
Sense of Safety	1	2	3	4	5
Connectivity	1	2	3	4	5

**Accommodations* include park benches, informational signs, etc.

Turn Over

7. Are you aware of the biking paths throughout the city of Keene?

☐ Yes ☐ No

8. How often do you use the biking paths in Keene? (Please mark one)

☐ Never ☐ Rarely ☐ Occasionally ☐ Often

9. How often do you use Keene State College's *Green Bikes*?

☐ Never ☐ Rarely ☐ Occasionally ☐ Often

10. Please rate your level of agreement with the following statements:

	Strongly Disagree	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
Keene's biking and walking paths need improvement.	☐	☐	☐	☐	☐
Keene's biking and walking paths need to be more widely publicized.	☐	☐	☐	☐	☐
Weather conditions affect the frequency of my walking/bike riding habits.	☐	☐	☐	☐	☐
I would walk/ride a bike more frequently if more people walked/rode bikes.	☐	☐	☐	☐	☐
I would ride a bike more frequently if there were more strategically located bike racks throughout Keene.	☐	☐	☐	☐	☐
I would ride a bike more frequently if Main Street and other roads possessed bike lanes, strictly for the use of bikes.	☐	☐	☐	☐	☐
Environmental issues are an influential factor in my transportation choices.	☐	☐	☐	☐	☐
*I would **NOT** ride a bike if there was somewhere to park my car.*	☐	☐	☐	☐	☐

11. Please list any examples of dangerous sections of roads or intersections in Keene:

12. Please help our group by providing any additional comments or thoughts regarding bike paths, biking, sidewalks, and our survey:

Thank you for taking the time to complete this survey.