

Up Hill Both Ways: An Assessment of Hinsdale, New Hampshire's Walk and Bike Ability


Michelle Kelley • Katie Mann • Jake Morel • Jack Rogers
Department of Geography: Keene State College

Keene State College | Southwest Region Planning Commission | Keene State Geography | SafeRoutes

TABLE OF CONTENTS

ACKNOWLEDGEMENTS 2

ABSTRACT 3

LIST OF FIGURES 4

LIST OF TABLES 5

CHAPTER 1: INTRODUCTION 6

HISTORY OF SAFE ROUTES TO SCHOOL PROGRAMS 8
HEALTHY MONADNOCK 2020 10
REPORT OUTLINE 11

CHAPTER 2: LITERATURE REVIEW 14

IMPACTS OF WALKING AND BIKING TO SCHOOL 15
HISTORY OF CHANGE 19
INFLUENTIAL FACTORS 21
RELEVANT CASE STUDIES 23

CHAPTER 3: METHODOLOGY 26

HINSDALE, NEW HAMPSHIRE 27
HINSDALE SCHOOL DISTRICT 30
METHOD 1: GPS AND GIS DATA COLLECTION 32
METHOD 2: SURVEYS 36
METHOD 3: INTERVIEWS 39

CHAPTER 4: RESULTS AND DISCUSSIONS 41

METHOD 1: GPS AND GIS DATA COLLECTION 42
METHOD 2: SURVEYS 55
METHOD 3: INTERVIEWS 68

CHAPTER 5: CONCLUSION 71

RECOMMENDATIONS 75

REFERENCES 77

APPENDICES 82

Acknowledgements

The authors would like to express their appreciation towards the people who made this final project possible. We would like to thank Dr. Lara Bryant and Dr. Christopher Brehme of the Keene State College Geography Department for being our advisors throughout the whole project. We would also like to thank Mari Brunner and J.B. Mack of the South West Regional Planning Commission for their generous support and guidance throughout the course of this study. Additionally we like to thank the parents of Hinsdale Elementary School for taking time to fill out our survey along with other seminar groups who provided feedback along the way. We would also like to recognize the following people:

- Henry Underwood, GIS Technician, South West Regional Planning Commission
- Joseph Boggio, Principal, Hinsdale Elementary School
- Beth Corwin, Physical Education Teacher, Founder of Rock, Ride & Roll at Symonds Elementary School

Abstract

With adolescent obesity rates skyrocketing over the past decade, the need for children to get active is stronger than ever. By implementing Safe Routes to School programs in Hinsdale, New Hampshire, we can help keep kids active and reduce childhood obesity in the community. We collected data through field observations, GIS mapping, and parent and classroom surveys. Over the course of the fall 2015 semester, our group worked with both the Southwest Region Planning Commission and the Monadnock Region Transportation Management Association to produce a Safe Routes to School program plan for the Hinsdale School District in Hinsdale, New Hampshire. We evaluated the safety conditions of routes in proximity to the schools for students that choose to walk or bike to school. In addition, we surveyed the school communities on their current travel behaviors and concerns for their children's safety. Our study focused on implications as to why children aren't walking and biking to school in regards to infrastructure and safety. Our study informed Southwest Region Planning Commission and Hinsdale Public Schools about ways to implement safer routes for children and promote walking and biking to school and create a healthier community among children.

List of Figures

Figure 1: Four major impacts of walking and biking to school on students……..18

Figure 2: The downward trend of driving children to school……..19

Figure 3: Hinsdale, New Hampshire……..27

Figure 4: Hillshade map of Hinsdale, New Hampshire……29

Figure 5: Population of each age group in Hinsdale, New Hampshire……30

Figure 6: Roads around the Hinsdale campus and Main Street……..32

Figure 7: Locations of all Hinsdale School District students……43

Figure 8: Elementary school student locations within one mile of the school……..44

Figure 9: Middle school student locations within two miles of the school……45

Figure 10: High school student locations within two miles of the school……46

Figure 11: Hinsdale school campus infrastructure and amenities……..49

Figure 12: SADES results of Hinsdale infrastructure……..53

Figure 13: Major transportation routes near downtown Hinsdale……54

Figure 14: Distribution of parent surveys received……55

Figure 15: Student travel distance to school……57

Figure 16: Students most common mode of transportation to and from school……57

Figure 17: Parent survey responses on most influential factors preventing active commuting…58

Figure 18: Responses to questions 15 and 18 on the parent survey……65

List of Tables

Table 1: Group statistics showing the numbers of active commuters between Hinsdale High School/Middle School and Elementary……..61

Table 2: Independent samples test of the difference in active commuting numbers between Hinsdale High School/Middle School and Elementary……61

Table 3: Case processing summary……..64

Table 4: Perform better/Parent walk/bike as child crosstabulaion……62

Table 5: Chi-Square test……62

Table 6: Group statistics of the number of active commuters between the morning and afternoon……..67

Table 7: Independent samples test of the number of active commuters between the morning and afternoon……67

Chapter 1: Introduction

Physical Activity Guidelines for Americans recommend that youth participate in "vigorous to moderate-intensity physical activity" for at least sixty minutes every day, and yet studies show that only about half of youth meet these standards (Del Valle Cook 2013). For some youth, participating in sixty minutes of physical activity could be as easy as walking or bicycling to and from school rather than taking a bus or being driven by a parent. Unfortunately, not all children have access to safe traveling routes in their neighborhoods due to high traffic volume, pot-hole ridden sidewalks or the simple factor of distance. Other families may be willing to allow their children to walk to school, but they simply do not have the time required in their busy schedules to walk with their children and driving is more convenient.

The factors that prevent children from walking to school have caused significant declines in walking rates over the years. Data suggests that 42 percent of all trips to schools in 1969 were made by walking or bicycling. This rate dropped to a staggering 13 percent by 2001, a time when motorized vehicles were more convenient and available (McDonald and Aalborg 2009). With more families choosing to drive rather than walk, there is increased traffic in neighborhoods surrounding schools. The increased traffic poses a threat to the safety of children who do choose to actively commute to school and can also lead to environmental hazards with increased CO_2 emissions.

The decrease in active transportation to school closely coincides with the trend of increasing childhood obesity. As of 1980, 7 percent of children between the ages of six and eleven and 5 percent of adolescents between the ages of twelve and nineteen were considered obese (CDC 2015). In 2012, children between the ages of six and eleven made a drastic increase

in childhood obesity rates jumping all the way to 18 percent and 21 percent respectively (CDC 2015) (A). This issue is especially prevalent in rural settings where there is a higher rate of overweight individuals than in urban areas (Joens-Matre et al. 2008). To counter this epidemic, many schools have implemented Safe Routes to School programs that are designed to encourage local families to walk or bike, rather than drive to school by orchestrating groups of volunteers to lead group walks. Schools who do not have the appropriate funding or resources such as volunteers, established routes, infrastructure, and amenities to appropriately implement this program are able to apply for Safe Routes to School funding.

If more schools had the ability to successfully execute a Safe Routes to School program there would be benefits for nearly everyone. Even those who are not involved with local schools enjoy reduced traffic, less pollution from vehicles, and a greater sense of community (UNCHSRC 2006). Parents who are actively involved in Safe Routes to School get the opportunity to meet other families, save money on gas required to drive to and from school, enjoy physical activity, and provide services to the school and the community (UNCHSRC 2006). Most importantly, the children learn pedestrian safety with adult guidance, experience increased physical activity, socialize with friends, and above all, have fun (UNCHSRC 2006). Because of the variety of benefits that come with Safe Routes to School programs, this study is important to families with children enrolled in the public school systems and those with no direct ties to their school community whatsoever.

History of Safe Routes to School Programs

The Safe Routes to School program was initially created under the Safe, Accountable, Flexible, and Efficient Transportation Equity Act. The program is designed to encourage children to walk or bicycle to school in order to promote healthy lifestyle choices from an early age. During the fiscal years of 2004-2009, Safe Routes to School programs were to be funded $612 million in total based on the "ratio of total student enrollment in primary and middle schools in each state relative to the total student enrollment in primary and middle schools in all the states" (Fisher 2005). With the apportionment each state received, programs such as improving sidewalks, traffic diversion improvements, and all around increased pedestrian safety within two miles of primary and middle schools were created to help encourage walking and bicycling to school.

Students in low-income households need programs such as Safe Routes to School to improve and implement safer routes to school in their communities. Children from low-income families are twice as likely to walk to school as children from higher-income families even though they have a greater risk of danger. The Safe Routes to School program has the intent to "inspire nonprofit organizations, schools, and community residents to come together to implement and sustain successful, culturally sensitive, and inclusive Safe Routes to School initiatives" (SRSNP 2010). Bringing members of the community together to organize and implement a safe walking or biking route to school for students would help alleviate concerns parents have about their children walking or biking to school. The major issues that prevent walking and bicycling to school include fears of crime and violence, lack of awareness about health benefits gained through walking and bicycling, lack of planners and engineers that help

in obtaining programming funds, long distances to school due to rural settings, and high traffic volume with a lack of sidewalks, crosswalks, or other safety measures.

Safe Routes to School programs have been found to have success across the United States. In 1999 in Marin County, California, two residents initially worked with the community to reduce the amount of motor vehicles commuting to school. A year later, a $50,000 grant was given to the Marin County Safe Routes to School program. The program served 4,665 students throughout fifteen schools. After being implemented, the program reported a 64 percent increase of students walking to school, an increase of 114 percent bicycling to school and a 91 percent increase of carpooling to school. There was also a 39 percent decrease of private vehicles being a means of transportation to school (Staunton, Hubsmith, and Kallins 2003). If more programs can be created in more school districts, there will be a higher rate of children walking and bicycling to school.

Healthy Monadnock 2020

The implementation of Safe Routes to School programs is closely related to the Healthy Monadnock 2020 (HM 2020) community engagement initiative. HM 2020 was founded and developed by the Cheshire Medical Center and Dartmouth-Hitchcock in Keene, New Hampshire in 2007. The program is focused on making the Monadnock Region, which is comprised of Cheshire County and the western towns of Hillsboro County, the healthiest community in the United States by the year 2020. Like the Safe Routes to School program, Healthy Monadnock 2020 aims to increase active living, educational attainment, mental well-being, and social connections (Healthy Monadnock 2020 2014).

By partnering with local towns, businesses, school districts, and even other initiatives, Healthy Monadnock 2020 focuses on "improving quality of life and preventing the leading causes of illness and death" (Healthy Monadnock 2020 2014). HM 2020 has grouped the many indicators that lead to overall quality of life and cause illnesses into five major themes: health behaviors, health care access and quality, health status, social capital, socio-economic, and environmental. Health behaviors include rates of smoking, binge drinking, or physical activity levels. Health care access and the quality of health care refers to whether or not a person is covered by health care and whether or not a person is visiting a doctor. Health statuses include cases of cardiovascular disease, rates of diabetes, and rates of overweight or obese individuals. Social capital, one of the more positive target areas, focuses on rates of volunteerism or simply having social gatherings. Lastly, the socio-economic and environmental target area observes poverty rates, unemployment rates, education rates, and day-to-day air quality.

In an effort to increase active living, especially for youth, HM 2020 has supported the implementation of Safe Routes to School at all levels (Healthy Monadnock 2020 2014). Areas within the Monadnock Region, such as the city of Keene, have begun to develop the Safe Routes to School program within their public schools system. However, there is still more work to be done and more schools within the region need to develop Safe Routes to School programs. One of those school districts, and the focus of this report, is the Hinsdale School District in Hinsdale, New Hampshire.

Report Outline

Over the course of the fall 2015 semester, we worked with both the Southwest Region Planning Commission (SWRPC) and the Monadnock Alliance for Sustainable Transportation (MAST) to produce a Safe Routes to School program plan for the Hinsdale School District in Hinsdale, New Hampshire. We examined and evaluated the safety conditions of routes in proximity to the schools for students that choose to walk or bike to school. In addition, we surveyed the school communities on their current travel behaviors and concerns for their children's safety.

While preventing childhood obesity is the overarching goal, we focused on completing three main objectives to better the community during the course of this project. First, we developed baseline data through field observations, GIS mapping, walking route infrastructure assessments and parent and classroom surveys. This data will enable the school community to adequately assess the conditions of the travel routes within a one mile radius of the school. Field observations include counts of how many children walk and bike to school, as well as how many children are dropped off by parents in cars. Field observations away from the school campus focus on areas of safety concern such as high traffic areas or streets without sidewalks. A survey was sent to elementary school parents to fully and effectively assess their concerns with a Safe Routes to School programs being implemented in their school community. Teachers recorded tallies on multiple days regarding how their students arrived to school. Second, we developed a deeper understanding of the needs and interests of the school with regard to students walking and biking activity. This was done through extensive data analysis of both the field observations and survey answers received. Lastly, with all the necessary data collected, we

ascertained a feasible plan of action for the school to address existing and potential safety concerns in order to encourage increased physical activity within the school community.

Chapter 2:
Literature Review

There are three major themes related to Safe Routes to School: the impacts of actively commuting to school on students, changes throughout history that have led to the decline of actively commuting to school, and Safe Routes to School case studies relevant to Cheshire County, New Hampshire. Reviewing these three major themes will illustrate the challenges related to the decline in walking to biking to school and why Safe Routes to School programs are so important. Existing literature and case studies provide the groundwork for the research methods and strategies used in this project.

The Impacts of Walking and Biking to School

There are four main benefits that walking and biking to school have on students. The first is the positive relationship between actively commuting to school and physical health among students. Before discussing the benefits, it is important to review the problem itself. Unfortunately, the multitude of health benefits that come from something as simple as walking still do not seem to encourage people to be more physically active. The alarming truth is that one third of Americans are overweight (Binns et al. 2009). Obesity and overweight issues are global and affect everyone regardless of gender, ethnicity, age or financial well-being. According to a study conducted in 2008, children who live in a rural area such as Hinsdale, New Hampshire are often found to have higher average Body Mass Indexes (BMI) than those in small city or urban environments (Joens-Matre et al. 2008).

There are many different organizations and initiatives like the Safe Routes to School program that are actively combatting the obesity epidemic. There are multiple studies that

suggest a positive correlation between walking or biking to school and increasing physical health and fitness (ALR 2009; ALR 2015; Binns et al. 2009). According to Active Living Research, walking and biking to school fulfills sixteen of the recommended sixty minutes of physical activity on average (ALR 2009). Although it does not seem like a significant amount of time, sixteen minutes of physical activity may be more than a child would be exposed to if they were not encouraged to walk to school. What matters most about a child's physical activity is not necessarily the time they spend, but the types of activity and the intensity at which they participate (Edmunds, Biggs, and Goldie 2013).

Increased rates of physical activity have also been shown to reduce stress levels which is especially important for students who are faced with the challenges of standardized tests and academic grades (Edmunds, Biggs, and Goldie 2013). By simply participating in short bursts of physical activity such as a brisk ten minute walk, students experience an increase in mental alertness, increased energy, and improved mood states (Edmunds, Biggs, and Goldie 2013). Studies have suggested that increased physical activity leads to improved cardiovascular fitness and reduced risk of adulthood cardiovascular disease (ALR 2009; Barry, Lambaise, and Roemmich 2010). The Centers for Disease Control and Prevention suggests physical activity leads to other health benefits including healthy bones and muscles and reduced risk of obesity and diabetes (CDC Obesity Facts 2015).

The physical health benefits experienced by students also may lead to mental health benefits and academic improvements. Studies suggest that there is evidence of physical activity being associated with better overall mental health and academic ability (ALR 2015; Edmunds, Biggs, and Goldie 2013; Murnaghan 2009). According to the Department of Health and Human

Services, mental health includes a person's emotional, psychological and social well-being (DHHS 2015). According to Edmunds, Biggs, and Goldie, mental health affects a person's ability to develop, improve and build positive relationships and contribute to society (2013).

The issue with mental health is that it is not always easy to know when somebody is in need of help. Mental health can have numerous negative effects on a person's optimism, self-esteem, sense of purpose, ability to handle stress and even simply relating to others (DHHS 2015; Edmunds, Biggs, and Goldie 2013). Much like the physical health issue of obesity, mental health problems can affect anybody and may develop at any point throughout the course of a person's life. Major factors that contribute to mental health problems, according to the Department of Health and Human Services, include biological factors, traumatic life experiences, and family history of mental health problems (DHHS 2015).

Physical activity has also been shown to have positive effects on academic and in-class performances. According to Trudeau and Shephard, increased rates of physical activity may lead to small gains in grade point averages among students (2008). A goal of the Safe Routes to School program is to get students to class after having been physically stimulated in hopes that it will give students an opportunity to release extra energy before having to sit and be tentative in the classroom (UNCHSRC 2006).

The fourth key benefit student's get from walking or biking to school is increased social opportunities. Social skills are heavily impacted by an individual's physical and mental health. Students who are mentally fit are often more connected to their schools, tend to have more pro-social behaviors and have less oppositional behaviors (Murnaghan 2009). This means that students who are mentally fit are often more outgoing and tend to not be bullies. These skills

are important for children who participate in Safe Routes to School programs because walking to school can provide an important time for students to socialize and make personal connections that are important for cognitive development. This concept is similar to the way students develop friendships and grow through being a part of a sports team.

Overall these four benefits as a whole are very dependent on one another (Figure 1). When students participate in Safe Routes to School programs, they are engaged in physical activities that cause stress relief and increased mood states which then lead to higher cognition and less oppositional behavior in the classroom. Meanwhile, the children are spending time outdoors with their friends during the walk and create more positive community bonds within their classrooms due to positive mood states. Of course, these benefits do not work for all people and this is not a quick fix solution. Rather, this is a helpful tool that can be used to have positive impacts on the development of the whole child.

Figure 1 *Four major impacts of walking and biking to school on students*

History of Change

Although most students in the United States walked or biked to school prior to the 1980s, since then, the number of students walking or bicycling to school has sharply declined. Statistics show that 42 percent of all students between five and eighteen years of age walked or bicycled to school in 1969. In 2001 fewer than 13 percent of students walked or bicycled any distance to get to school (McDonald and Aalborg 2009). This decline is due to a number of factors, including urban development patterns, school-siting requirements that encourage school development in unpopulated areas, increased traffic, and parental concerns about safety. The situation is self-perpetuating: as more parents drive their children to school, there is increased traffic at the school site, resulting in more parents becoming concerned about traffic who therefore drive their children to school. As seen in Figure 2, this trend is deterring more and more students from walking and biking to school.

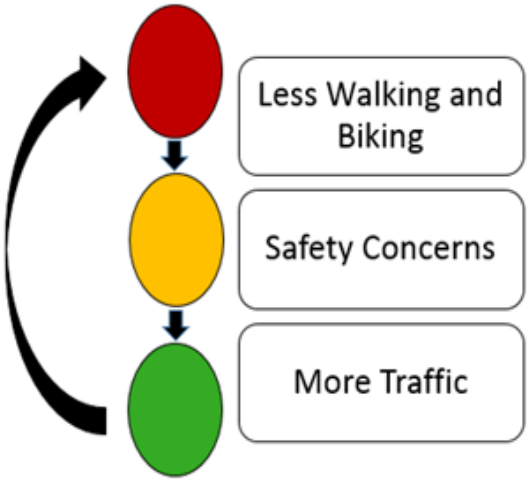


Figure 2 *The downward trend of driving children to school*

During a research study published by the Journal of the American Planning Association in 2009, researchers were able to collect data from parents by administering surveys asking questions about what they enjoyed or did not enjoy about the walking program already implemented in their school district. Questions asked about various other parental concerns and whether they felt comfortable or not allowing their child to walk to school. Analysis of these survey questions showed that 75 percent of parents driving their children less than two miles to school said they did it for convenience purposes and to ultimately save themselves time (McDonald and Aalborg 2009). Most parents also replied that they did not want their child walking even the shortest distance to school without an adult because of dangerous people living nearby. These results led the researchers of this study to implement a program that filled everyone's needs. The teachers decided to meet the students at a designated location and walk with the students to their classroom. The new program made it so it was still convenient for parents to have their kids walk but they could also feel comfortable knowing that there is adult supervision for the child walking to school.

In comparison to other first-world countries, the United States has much higher obesity rates. Approximately 17 percent or 12.5 million children and adolescents are obese in the United States (Joens-Matre et al. 2008). Supporters of pedestrian and bike friendly neighborhoods partly blame the rise in obesity rates on the drop in the number of children who walk or transport themselves to school each day. A study that was done by the *Journal of Rural Health* provides great information about children in rural and urban communities and the relationship with obesity rates in these areas. Within this study, 3,500 fourth, fifth, and sixth

grade students were recruited from a variety of rural areas, small cities, and urban areas. These children were compared using BMI and a physical activity self-assessment. According to the results of the multilevel modeling analysis, there was a higher percentage of overweight children in rural environments than urban environments, while children from small cities reported higher levels of physical activity (Joens-Matre et al. 2008). Information such as this is crucial when building support for walking and biking to school especially in rural areas such as the Hinsdale, New Hampshire school district. Information gathered in the study can also be used in comparing the rates of children's physical activity levels currently to the goals in the Healthy Monadnock 2020 plan, which is a community engagement initiative designed to foster and sustain a positive culture of health throughout Cheshire County and the Monadnock region by the year 2020. Getting children active by walking and biking to school could assist in decreasing the high childhood obesity rates in Cheshire County where 25 percent (which is higher than the national average) of the children are considered obese (Nilsen 2014).

Influential Factors

There are many factors that influenced a shift from walking and biking being the most common mode of travel for students to school to becoming the least common. Some factors that help increase walking and biking among students include a shorter distance to school, clean sidewalks, active school encouragement, and higher grade level. Also students who live within a half-mile of school were the most likely to walk and bike if there are good sidewalks or if the school encourages students to walk and bike regularly. Major road crossings, scattered

sex offender locations in the neighborhood, and severe weather were some of the deterrents (Kapell and Dill 2009)**.** The Transportation Research Board Business Office investigated the relationship between the built environment and parent's perception of the barriers of walking or biking to school. Parents were surveyed about methods of school transportation, and their opinions regarding what prevented students from biking and walking to school. These were compared to infrastructure conditions that include distance, sidewalks, bike facilities, major street crossings, slope, and crime rate, to demographic characteristics such as grade, gender, income, and ethnicity (Kapell and Dill 2009)**.** The analysis found that parental perceptions of traffic-related barriers were not actually observed and supported by objective measures of the street environment; but their perceptions of crime rates and lack of sidewalks were both supported by ground truthing. The results of this study concluded that policies promoting neighborhood schools, improving sidewalk walkability, and encouraging student involvement all help increase the number of children walking and biking to school on a regular basis.

Another factor that influences parents' decisions about whether or not to allow their children to walk to school is what they will be exposed to on their walk. For schools in urban settings, students may be subject to substances like alcohol, tobacco, or other drugs on these routes. Researchers at Prevention Science performed a study in 2013 to determine the risk of children being exposed to such dangers on their way to school. In the study, 394 urban elementary school students' addresses, school location, and alcohol outlet data were geocoded and mapped along with walking routes to school. Then the route was compared to the locations of the alcohol outlet. The association was estimated by logistic regression models and

inferred that children with an alcohol outlet on the route to school were more likely to be offered alcohol, tobacco, or other drugs as well as being exposed to drug trafficking (Milam et al. 2013). The results of this study caused parents to realize the huge risk they were taking by letting their child walk to school if they were located near an alcohol outlet.

In recent years there have been many studies that have addressed the fact that children do not walk or bike to school anymore, and many plans have been implemented in an effort to reverse this trend. For example, a study done in Putney, Vermont by the national center for the Safe Routes to School program, helped to assist Putney schools to put together their own way of getting children active within the community. In the town of Putney, children do not live close enough to the schools to safely travel to their destination. The Putney central school health committee rallied and implemented several fun activities to get families of the community, especially elementary aged children, more active. They planned many unique activities, including forest walks, a healthy snack program and an organic gardening activity (Corbett 2007). Activities such as these helped children stay active to combat obesity rates in the area and helped children and families have more fun together within their community.

Relevant Case Studies

Safe Routes to School programs are being created across the United States and for the most part, literature shows that many of the factors and barriers that discourage children from walking and bicycling to school are related to one another. In New Hampshire, Safe Routes to School programs are largely funded by the New Hampshire Department of Transportation

(NHDOT 2015). For schools to be eligible for funding they must demonstrate that their programs are specifically geared toward encouraging students from kindergarten through eighth grade to walk and bike to school. These programs must also demonstrate the “five e’s” which include evaluation, education, encouragement, enforcement and engineering. “New Hampshire has been allocated $1 million per year since 2005, most of which will be used to reimburse 100 percent of local expenses for infrastructure and non-infrastructure projects” (NHDOT 2015). If schools don't have the funding, improvements to sidewalks, paths, and signs won't be made possible.

In the area of Cheshire County, Safe Routes to School programs want to promote safer, healthier and sustainable education for children. According to *Simonds Elementary School Safe Routes to School Travel Plan,* the Central New Hampshire *Regional* Planning Commission first began to collect transportation data such as traffic count, speed and volume. Next they sent out a survey to parents to make it possible to identify why parents didn't want their kids walking or biking to school. These steps were followed while observing Hinsdale Elementary School and Hinsdale Middle/High School. It was important to collect both quantitative and qualitative data for this research in order to create an effective plan of action.

When comparing the Safe Routes to School evaluation, Simonds Elementary School in Warner, NH to Jonathan Daniels School in Keene, New Hampshire, it can be seen that both schools faced the same barriers and factors that discouraged children from active commuting to school. Once the parents were surveyed, it was found that speed, volume of cars, and the infrastructure of sidewalks were the main barriers preventing parents from allowing their children to walk and bike to school. In Keene and Portsmouth, New Hampshire, bicycle lanes

are the main focus for the Safe Routes to School programs according to the NHDOT. Once bike lanes are introduced, more signs are going to be put up to make the citizens more aware of the bike lanes and hopefully reduce traffic on those roads. Bike lanes are being introduced in these communities because of their geography. The schools are close to downtowns and around residential neighborhoods where children could be walking and biking if the infrastructure was improved. This is related to Hinsdale Schools because of their location near residential areas.

After creating and implementing Safe Routes School programs, it is important to provide incentives and motivation for students to keep walking and biking to school. At Symonds School in Keene, NH, they implemented a program called Walk, Roll, and Ride. Their goals included creating a sustainable program, evolving the school program to a neighborhood parent effort, and making active commuting a daily habit in the community. The program began with volunteers along the walk handing out apples and water, which was an effort to give an incentive to students for participating in the walk or bike to school. After creating a Safe Routes to School plan of action, it will be important to create an event that will encourage the importance of walking and biking after educating the students and parents.

Chapter 3: Methodology

This study used three major methods of data and information gathering: GPS/GIS data collection, student-tallies/parent surveys and interviews. Through these three methods, data was collected that will allow the testing of hypotheses that were developed in order to examine our initial study question regarding whether or not students are actively commuting to school in Hinsdale, New Hampshire and why.

Hinsdale, New Hampshire

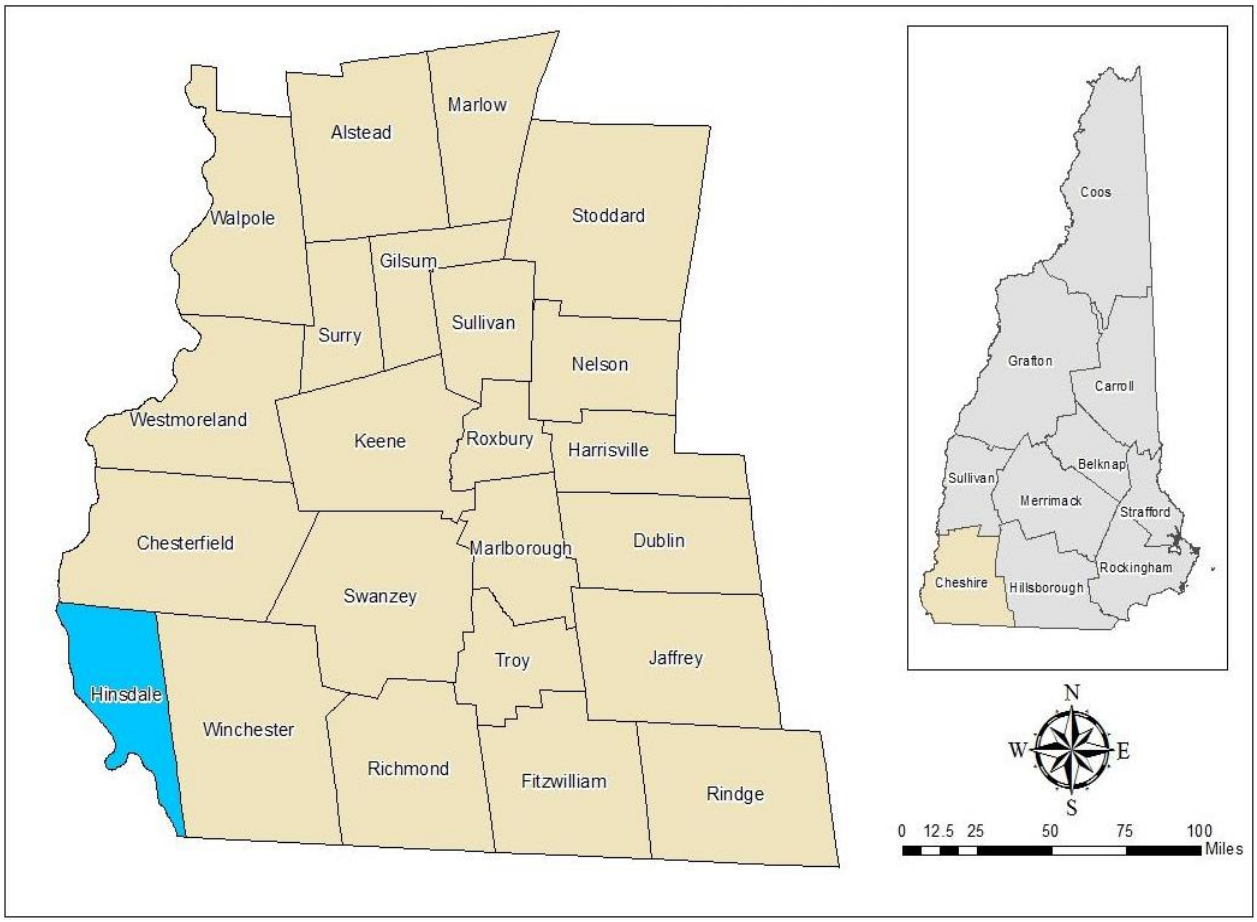


Figure 3 *Hinsdale, New Hampshire*

Hinsdale is a small, rural town in southwest Cheshire County, New Hampshire that was chartered in 1753. It is located on the borders of Vermont to the west and Massachusetts to the south. The western border of Hinsdale historically included territory west of the Connecticut River, but the borders were redrawn in the late 1700s with the establishment of the state of Vermont. Today, Hinsdale has a total land area of nearly 15,000 acres (HCIDC 2015) which is approximately 23.5 square miles and is represented in Figure 3.

The topography of Hinsdale is defined by the confluence of two major rivers: the Ashuelot and the Connecticut. Historically, these rivers provided important benefits including travel, transportation of goods, and power for the manufacturing of paper. The floodplains of the Ashuelot and Connecticut Rivers provide excellent arable lands due to the deposition of nutrient rich soils after periods of flooding. Compared to the lower river valleys to the west and southwest, the terrain of Hinsdale becomes much steeper to the north and northeast at the boundaries of Wantastiquet Mountain Natural Area and Pisgah State Park (ELMIB 2015). The varying steepness throughout Hinsdale may deter some families from choosing to walk or bike to school. These features can be seen in the hillshade map found in Figure 4.

Hinsdale's climate is typical for New England. The town experiences warm summer months between May and September with temperatures in July averaging about 71° Fahrenheit and cold winter months between December and March with temperatures in January averaging 19° Fahrenheit (Town of Hinsdale 2015; UNH 2013). On average, this area receives an annual average precipitation of nearly 44.5 inches (Town of Hinsdale 2015). Due to the cold winter months, a portion of this precipitation falls as snow which may be a deterrence for some families who choose to have their children walk to school.

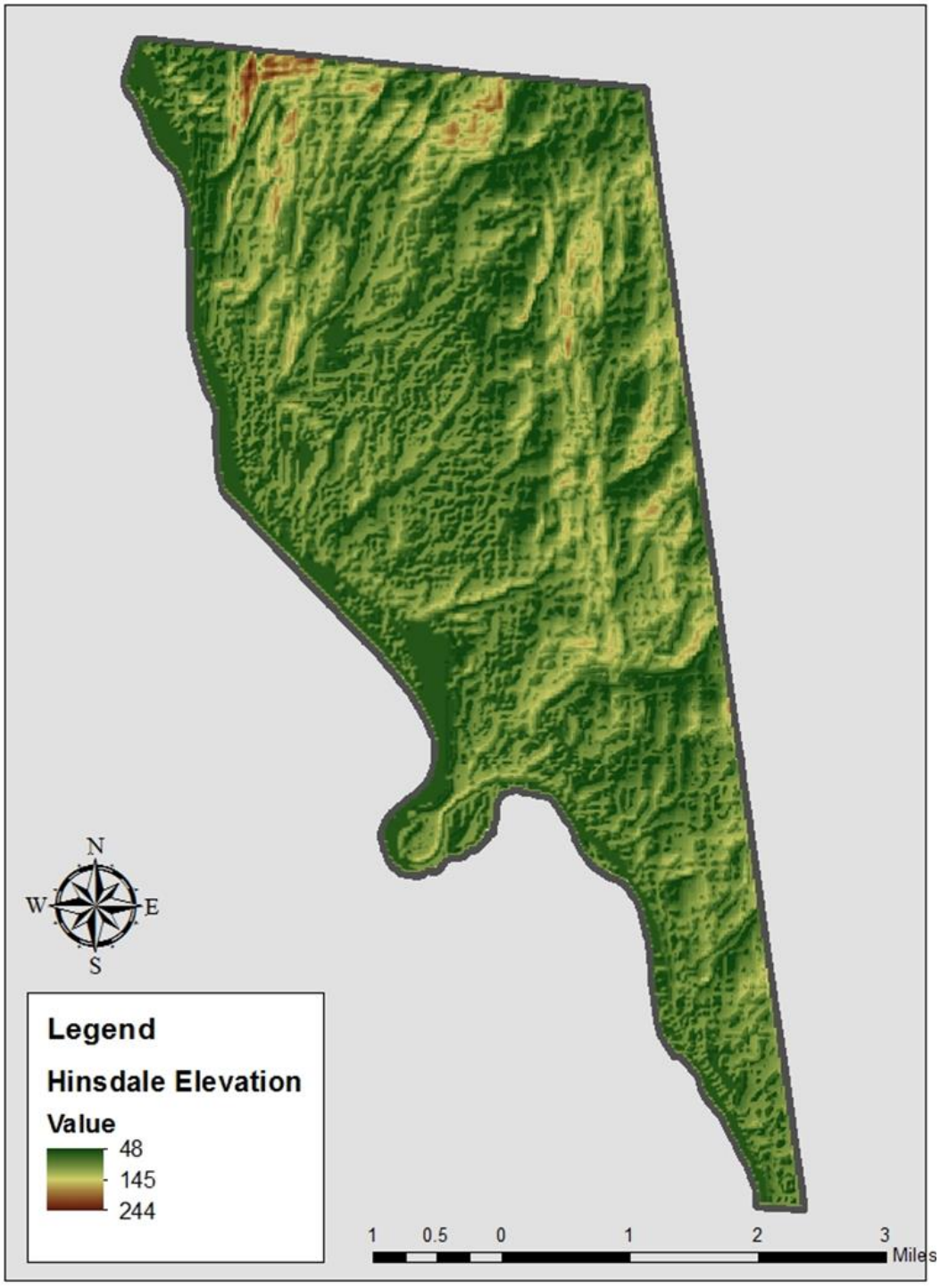


Figure 4 *Hillshade map of Hinsdale, New Hampshire*

Since the first census survey in 1790 Hinsdale's population has increased from 522 to 4,018 in 2013 (ELMIB 2015). According to the New Hampshire Office of Energy and Planning,

Hinsdale is currently the sixth largest town in Cheshire County (NHOEP 2014). The average age in Hinsdale is about forty six years old and the largest age cohort is between the ages of thirty five and fifty four (Figure 2). The next largest cohort, however, are those under the age of twenty years old. Out of the total population, there are 807 youth between the ages of zero and nineteen years old which make up about 20 percent of Hinsdale's total population (Figure 2).

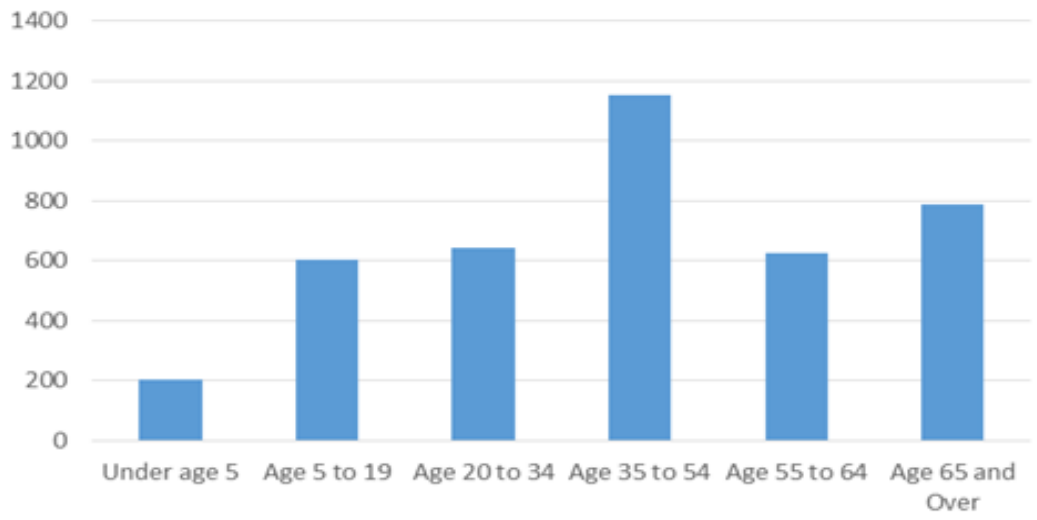


Figure 5 *Population of each age group in Hinsdale, New Hampshire (ELMIB 2015)*

Hinsdale School District

With nearly one-fifth of Hinsdale's total population being between the ages of zero and nineteen, there is a need for a few key amenities including a strong public school system. The Hinsdale School District, located west of the intersection of State Routes 63 and 119, provides valuable educational experience for nearly 550 students (ELMIB 2015). The Hinsdale School

District, with a budget of nearly $11 million (HSD 2014), is divided into two main buildings, one acting as the elementary school for students in kindergarten through 5th grade and the other acting as a middle/high school for students in 6th grade through 12th grade. There are 542 students that attend the Hinsdale Schools, 360 of whom live within two miles of the school campus which is about 66 percent of the student population. There are a total of 192 students that live within one mile of the school campus which means that active commuting to and from school could be plausible with proper infrastructure. Both Hinsdale Elementary School and Hinsdale Middle/High School are found on the same campus and share many of the same amenities and infrastructure including sports fields, parking lots and sidewalks. The town of Hinsdale does not have any private or parochial schools which makes the Hinsdale School District even more important, especially for those families who may not be able to afford to travel further distances to get their children to school or pay for enrollment (ELMIB 2015).

The school campus is located near downtown Hinsdale on School Street where there is a denser population. The area around Main Street is where most active commuting can be observed before and after school. The road map in Figure 6 was created as a reference tool when we discuss major problem roads.

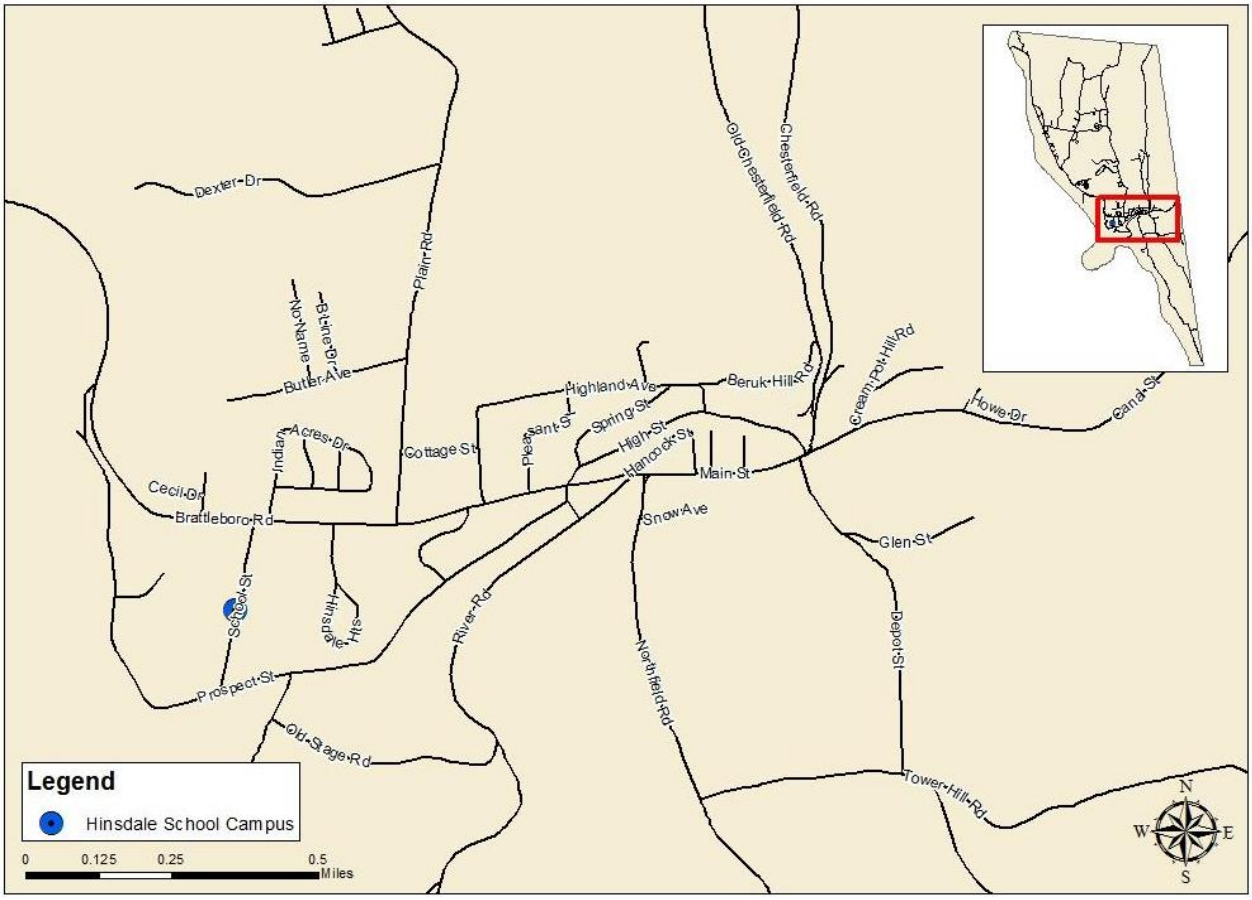


Figure 6 *Roads around the Hinsdale campus and Main Street*

Method 1: GPS and GIS Data Collection

In order to promote walking and biking to school, safety precautions along primary routes need to be addressed. While visiting the Hinsdale's schools, our group recorded the lack of the current lack of infrastructure that was being used for children walking, biking, commuting and even taking the bus to and from school. The location of sidewalks, lighting, warning/ informational signs and crosswalks that could deter or encourage one from walking and biking to school were also noted. The first step we took was obtaining GPS waypoints of features and attributes that were already existing or acknowledging potential sites of where one could exist.

We first began collecting data at the intersection of Prospect Street and School Street then made our way down to the intersection of Brattleboro Road and School Street. We observed and collected waypoints and pictures of already existing stop signs, light posts, crosswalks, no parking signs, speed-limit signs, sidewalks, bike racks, and speed bumps as well as noting potential areas that could use work.

GPS waypoints were uploaded to the computer using DNRGPS software to manage and manipulate them in ArcMap. With the collected waypoints, we created a point shapefile that was added to a base map of the area around Hinsdale Elementary and Hinsdale Middle/High School. Each attribute was assigned a symbol and put on the GPS point. A legend was created to show the meaning of each symbol. The map created shows potential needs of a sidewalk, signs and lighting improvement compared to where they already exist (Figure 6). Potential sidewalks, lights and crosswalks were decided by observing the arrival and pickups to and from school and where the heaviest of volume of students were crossing the streets. For more qualitative data, Safe Routes to School Field Review packets were completed on two separate days. These field observations took place on two separate days, once in the morning and once in the afternoon. An example of the Safe Routes to School Field Review packets is provided in Appendix A. Individual field reports were developed for each of the two schools on campus. These more detailed reports have been provided in Appendix B and Appendix C.

The next step we had to take was measuring data on pedestrian infrastructure including sidewalks, curb-ramps and crosswalks which is shown in Figure 7. Data collection was collected following the Statewide Asset Data Exchange System (SADES) provided by the Southwest Regional Planning Commission as well as a tape measure, digital level and ESRI Collector

Application on the Apple iPad. As we collected attributes of the data, the application also allowed us to take pictures of the features' conditions. For streets with no infrastructure, a separate assessment was completed using the Pedestrian and Bicycle Infrastructure Assessment form in Appendix D.

First our group started taking network attributes of the sidewalk infrastructure around a one-mile radius of the Hinsdale schools. When the application is first opened, we opened a base map and zoomed into the area of Hinsdale. Then our group noted the direction the side of the street faced whether it was north, south, east, or west based on guidelines provided by SADES. The surface material and condition of the sidewalk were then determined. The following rating scale was used: good meant no distress was found and there were no vertical displacements; fair meant narrow sidewalks cracks and sidewalk displacements less than ½" are present; and, poor meant the sidewalk had multiple cracks and vertical displacements greater than ½" present. We also recorded if the surface had defects and took notes on their location.

After assessing the sidewalk, the curb type was determined, and the condition. It received a good if there was no distress; fair if there were a low number of faults, minimal heaves and cracks on the curb; poor if there were a high number of faults, large heaves or cracks or curb face loss due to asphalt overlay; and, none meant there was nothing wrong. We then determined the curb depth by measuring from the ground to the top of the curb in inches then calculated the maximum grade percent by measuring the slope of the sidewalk. It was noted whether a buffer existed such as a grass strip, bicycle lane, parking spaces, street furniture, none or a different type of buffer.

After evaluating the sidewalk, we then we then measured curb ramps. To begin, our group had to decide the ramp type based on whether it was perpendicular, parallel, diagonal, combined or other, and the material it was made of. The condition had to be determined whether it was good, fair, poor based on guidelines of what was used to measure the sidewalk conditions. As we walked along we noted where crosswalks existed already and if the conditions of the on/off ramp were flush and free from abrupt level changes with detectable warnings like pavers or tiles. We then noted if the ramp had flared sides and if there were none, decided whether other conditions along the ramp discouraged use of it and if the ramp was outside the path of the cars. We then measured the curb ramp to see if it was at least 36" wide and the ramp running slope by measuring the rise over run, the ramp cross slope and the gutter slope.

Third, our group had to assess the crosswalks within a one-mile radius of the Hinsdale schools. We began by examining the material the crosswalk was on, and deciding if the type of paint was retroreflective, raised, flat and if the paint was faded. We then observed if speed bumps were present and raised and if there was lighting around the crosswalks as well as crossing signs or pedestrian actuated utilities present such as cross walk signs, or a light. We then measured the width and slope of the crosswalk (if raised) as well as the cross slope which is perpendicular to the direction of the travel and running slope which is parallel to the direction of travel.

Method 2: Surveys

When it comes to data collection, conducting surveys to reveal answers to specific and important questions is one of the best methods to use. The purpose of our surveys was to gain a better understanding of the ideas and concerns of parents as well as students in regards to safe walking and biking routes to school. The questions in the survey are diverse and cover a wide range of topics in order to fully encapsulate the attitude towards a Safe Routes to School program. The questions in the survey were strategically ordered and planned in order to achieve the best possible results from our survey takers.

In addition to our surveys, our Safe Routes to School project group collected field data by observing the pickup and drop off hours of students at both Hinsdale High School/Middle School and Elementary School in order to derive the major areas of concerns from their own experience and not just the experience and concerns from parents of students at the two schools. The Safe Routes to School program took these factors and concerns that they found into consideration and created two surveys which asked various questions to try and reveal what some of the major reasons were that parents had for not allowing their child to walk or bike to school, as well as some of the reasons they would allow their child to walk or bike to school.

The first of our surveys, which can be found in Appendix E, was administered to the elementary school parents by way of parent teacher conferences. We feel our return rate was so high because of how they were administered. The parents were asked to fill out the surveys for only one child per household by their parent or guardian which would take ten to fifteen minutes, then to be given back to the school for analysis by both the Southwest Regional

Planning Commission (SWRPC) and the Keene State Geography Department. This survey was a modified version of the National Center for Safe Routes to School Parent Survey about Walking and Biking to School. Five questions were added that were not originated by the National Center for Safe Routes to School, but were approved to be added to the survey by SWRPC staff. For example, "Does your child appear to perform better on mental tasks when they are physically active?" and "Does your child participate in the recommended sixty minutes of play every day?" Asking questions about mental alertness and how prepared children are at school assisted us in understanding whether or not parents and students think that walking or biking to school helps to stimulate their thinking process during or after school hours, or if there is no relationship between the two variables at all. We also asked questions about how parents perceive the sidewalks, roads, and other infrastructure factors that their children are using to and from school to see if there is a relationship.

Some of the other questions had to do with concerns parents might have about infrastructure or other problems their child might encounter on their route to school. The main factors regarding these concerns were put into one large chart where parents were allowed to check off all that apply while making their decision to let their child walk or bike to school. Influential factors such as the amount of traffic, sidewalk and path conditions, violence or crime and weather conditions. Being able to determine which factors parents are thinking about first when they decide whether or not they will allow their child to walk or bike to school will help the Safe Routes to School program prioritize changes needed to increase walkability in town. By analyzing this data, we will be able to determine if there is a relationship between the number of children walking to school and the parent's perception of infrastructure conditions.

The second survey that we used for data collection, which can be found in Appendix F, came in the form of an in-classroom tally that was completed by teachers in all grades in Hinsdale Elementary, Middle, and High School. Tallies were taken three times throughout the course of one week between Tuesday and Thursday in order to record the number of students who walked, biked, took a school bus, or drove with their family. This was completed twice a day, once in the morning and once in the afternoon to assess temporal patterns in active commuting.

The parent surveys and in-classroom tallies were used to test hypotheses that had been developed not to answer our overarching question, but to answer a series of subquestions which will be used to help support our final conclusion. The alternative hypotheses are as follows:

Hypothesis 1: There is a difference between the number of middle and high school students actively commuting to school and the number of elementary school students that are actively commuting to school.

Hypothesis 2: There is a relationship between a parent's perceptions of physical activity's benefits to mental awareness and whether or not they actively commuted to school as a child.

Hypothesis 3: There is a difference in the number of active commuters between the morning and afternoon.

Method 3: Interviews

In addition to our field review and survey analysis, we also used a series of interviews with key community members to gain a better understanding of the needs of the school district. The interview process began by identifying important individuals in the school community that would have unique insights into the walking and biking tendencies of the children. Individuals were chosen for their knowledge of the surrounding area as well knowledge of the daily habits of the children of Hinsdale. By choosing a variety of interviewees, we were able to get a fully comprehensive assessment of the needs of the community from Elementary School to High School. Through our questions, we were able to gain valuable information on commuting routes, problem areas on and off school campus, policies, funding, and what community members would like to see done differently as the Safe Routes to School program is implemented in the community.

Interviewees included a school principal, and an active Safe Routes to School program health administrator. They were all asked similar questions about their involvement in the school community, what they felt some of the problems Hinsdale has with walking and biking to school, as well as some of the benefits they see from implementing a Safe Routes to School Program. The questions were purposefully in a structured format to efficiently get the most data out of our interviewee's time.

The first individual we talked to was Joseph Boggio, Principal of the Hinsdale Elementary School. Principal Boggio has lived in the Hinsdale community for over twenty years, and has been principal of the elementary school since 2012. His extensive background with the area, as well as his ability to address daily issues with safety on campus made him the ideal candidate

for an interview. After we gained an administrative perspective to the problem at hand, we wanted to get the perspective of an active Safe Routes to School program. The final interview that was set up was with the Symonds Elementary School in Keene, a school that already has a Safe Routes to School program. This provided us with great inside information as to how the program was actually being utilized and the success the program was having. By learning about an ongoing project it helped show us how useful the Safe Routes to Program can be when executed efficiently.

Field data collection, surveys and interviews were vital pieces to accurately assess Hinsdale's walk and bike ability. By utilizing GPS/GIS technology, analyzing surveys, and interviewing key community members we were able to completely and accurately gain the results necessary to assess the validity of our hypotheses. These results will be discussed in more complete detail in the following section.

Chapter 4:
Results and Discussion

In this chapter we will be discussing the results of our three major strategies of data collection as well as some of the implications of those results. Once again, our three methods of data collection were GIS/GPS mapping, parent and in-classroom surveys, and interviews. The following information will be used in order to formulate conclusions and suggestions in the following chapter.

Method 1: GPS/GIS Data Collection

In order to analyze the walk and bike ability of Hinsdale, New Hampshire we utilized Garmin eTrex H handheld GPS units and major mapping software including ArcGIS and ArcCollector. Before making any maps, we first had to collect data. Road and political boundaries of towns and states were downloaded from the GRANIT website which is New Hampshire's statewide GIS clearinghouse. All other point and lines were gathered with GPS units and through the ArcCollector application on an iPad in the field.

Student Locations

Before analyzing any infrastructure around the Hinsdale schools, we first had to examine where the students live. After obtaining this data from the Hinsdale School District, it was possible to upload it into ArcGIS. These maps do not show the exact location of students, but it does show which streets they live on, which helped us to develop major walking routes throughout the town. Four maps were produced using this information: one that shows the locations of all students in the entire town of Hinsdale (Figure 7), one showing the locations of elementary students within one mile of the school (Figure 8), one showing the locations of

middle school students within two miles of the school (Figure 9), and one showing the locations of high school students within two miles of the school (Figure 10).

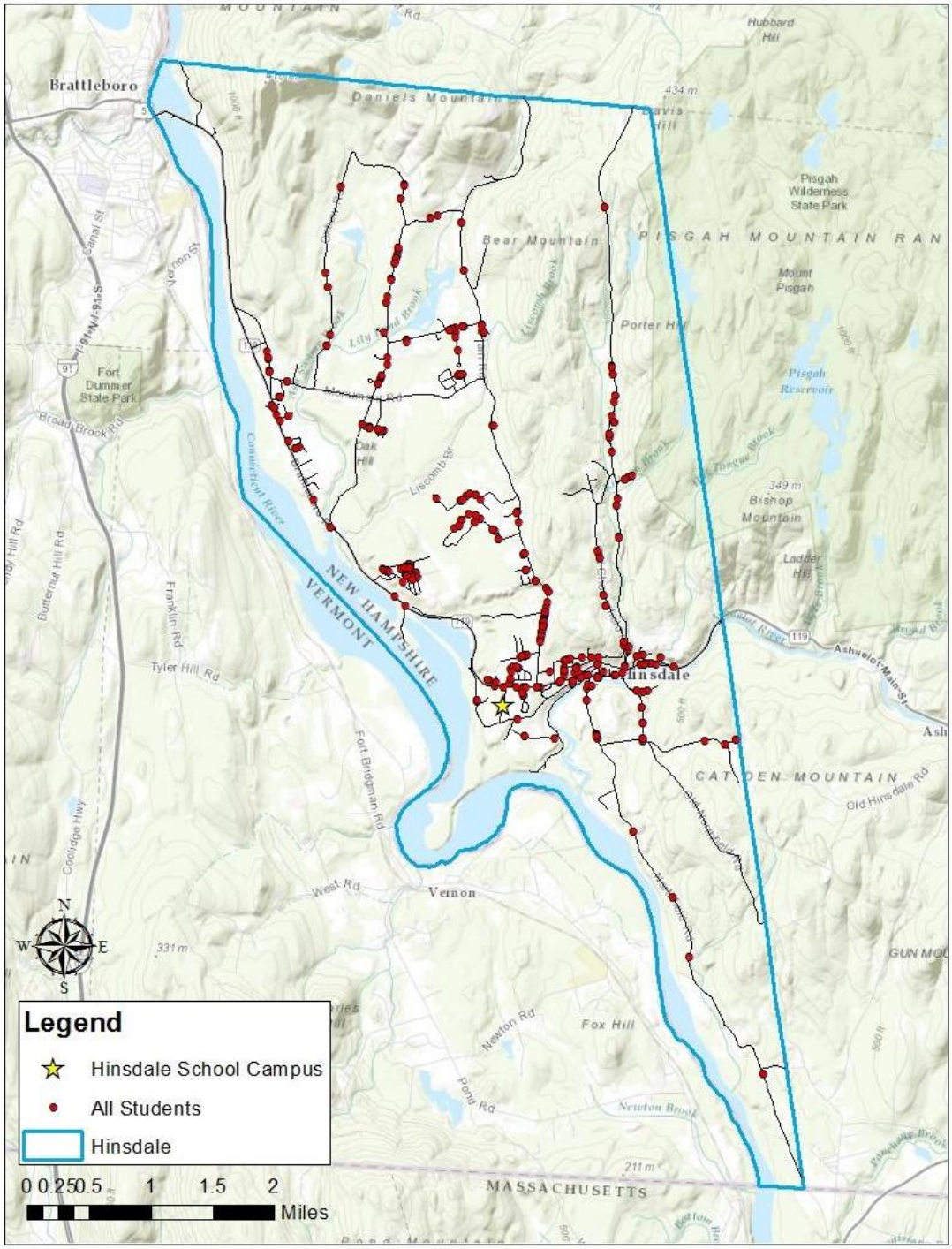


Figure 7 *Locations of all Hinsdale School District students*

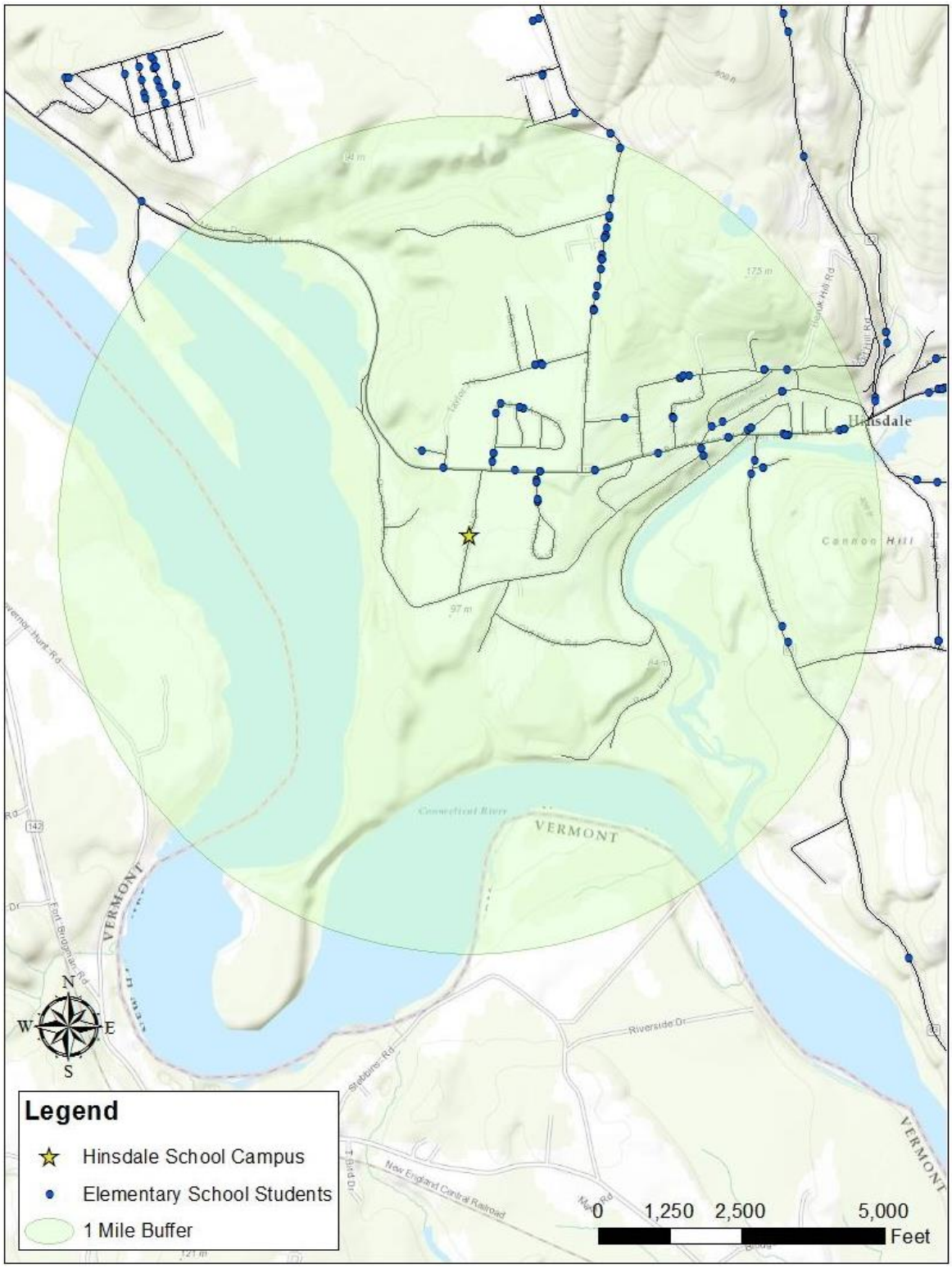


Figure 8 *Elementary school student locations within one mile of the school*

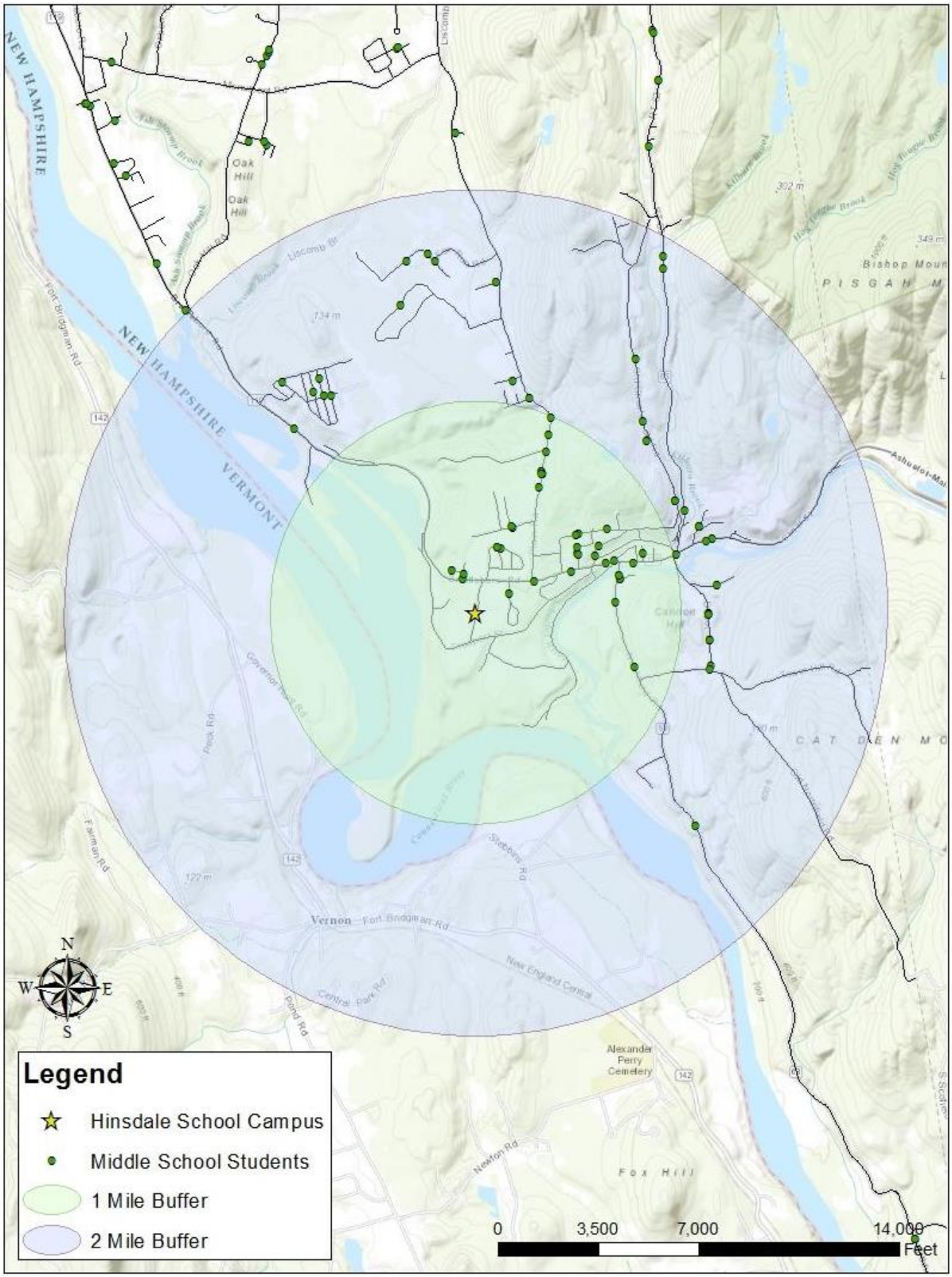


Figure 9 *Middle school student locations within two miles of school*

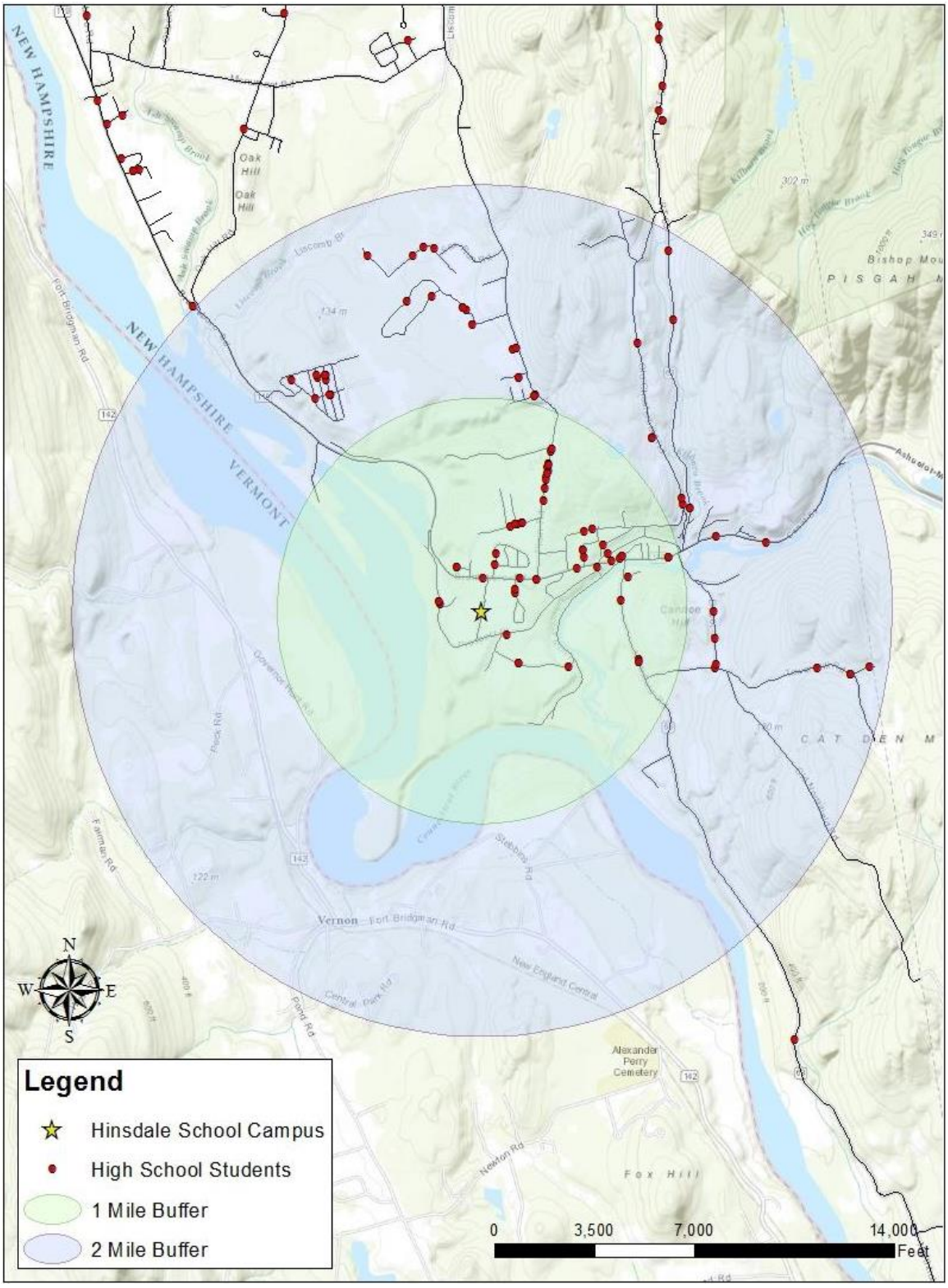


Figure 10 *High school student locations within two miles of school*

Students have been assigned different point icons in order to determine whether or not students in different schools take different routes to school. Buffers were created for 1 and 2-mile radiuses around the Hinsdale School District campus. We set these buffers because Hinsdale does not allow students to take the school bus if they live within one mile of the school. We included a two mile radius because high school students may be more likely to actively commute further distances than those in elementary or middle school. Although we did not include a three mile radius, it is generally assumed that three miles is an acceptable biking distance, but most students will likely not walk or bike to school if they live further than two miles away which is something that was taken into account during this study.

Campus Infrastructure/Amenities

GPS points for all pedestrian infrastructure and amenities on the Hinsdale School District campus were collected using a Garmin eTrex H GPS unit. Points were collected for infrastructure and amenities including sidewalks, crosswalks, lighting, signage, bike racks, speed bumps and bus and parents drop off/pick up locations, as well as light posts, bus zones, speed limit signs, and more that were related to promoting safe driving on School Street. This field study of both schools campus infrastructure revealed that there needs to be additional Bus Pickup/Drop Off areas because there is only one located on the curb of the elementary school. This area is defined as a Bus Pickup/Drop Off area by one sign in this area. In order for there to be a well organized drop off and pick up area, painted lines and arrows should be painted on the pavement to signify the direction that traffic should be flowing in at these times. On the high school campus there are no signs that signify where the Bus Pickup/Drop Off areas are for this end of School Street. There are also no arrows that signify the flow of traffic. This is a huge

safety hazard for students entering and leaving the school because they are not aware of where the busses will be picking them up as well as where they are dropping them off. This is also poses a safety concern for parents who are picking their children up from school or dropping them off because they will not be aware of whether they are in the way of busses exiting or entering the campus which could potentially cause a car accident. The information of the locations of both schools infrastructure can be found in Figure 11.

The campus infrastructure and amenities being shown on this map were gathered by a series on GPS points. Collecting these points of data were important to our study for further analysis as to where the major areas of concerns are located on school grounds.

Hinsdale posed the most areas of potential pedestrian and student concerns for walking and biking on the school campus area. The high school/middle school was the area where the majority of crosswalks were located for students to use when crossing from one side of School Street to the other side of School Street where the athletic field and parking lot were located. However, there was one location nearest to the high school/middle school where a crosswalk could have been used. This update for a new crosswalk could be placed at the end of School Street closest to Prospect Street where students were crossing from the end of the sidewalk on the side of the street that the school was on then walking across to the corner of School Street and Prospect Street. There is however, a sign that signals pedestrians crossing at the corner of School Street and Prospect Street, but there is no crosswalk to reinforce that the pedestrians crossing the street have the right of way.

Figure 11 *Hinsdale School campus infrastructure and amenities*

The high school/middle school did have one speed limit sign that clearly stated the allowed speed during school hours which was 15 miles per hour. This speed limit sign was located at the end of School Street right before the sign that signaled pedestrian crossing in this area. At the end of School Street where Prospect Street began, there was a speed limit sign that showed a 25 miles per hour speed limit on this street. Prospect Street is still in what is considered to be the school zone area, so the speed here should match the speed limit on School Street. Where these two streets meet is a serious area of concern when it comes to traffic leaving and entering the school zone. Cars that are going 25 miles per hour are not going to be able to stop for a pedestrian at a crosswalk as quickly as a car that is moving 15 miles per hour. Between the high school/middle school and elementary school there was also a sign that stated that School Street was to be used as a one-way street during school hours. Indication of School Street being a one-way street during school hours should be shown at the beginning of School Street rather than closer to the end. Painting arrows on the ground to signal the direction of the one-way street during school hours would be a useful correction to this area of campus as well. Seeing these signs was a good indicator that the school was concerned with people's speed limit on school grounds and were enforcing it so that no one gets hurt. Although there are signs that indicate these rules, there is certainly potential areas for many more signs that enforce these rules, as well as painting lines and arrows on the ground to show the direction of traffic.

Having a campus where parents feel comfortable sending their children and where their children are comfortable being is crucial. Our group was able to determine that both elementary school and high school grounds were relatively safe to be in because of the large

number of safety amenities that we found between the both campuses. Some safety features are more important than others such as having a well lit campus. Having a campus that is well lit at night is a major concern for some people and to have it be light around there at night or at dusk makes people feel much safer on school grounds. There are also the locations of the bike racks at both schools. The locations of both bike racks were outside of the school buildings on grassy patches. There was no overgrown shrubbery in this areas which made it easily accessible for students to get to their bikes. Spot lights at both schools were placed in the corners of the buildings so that students could find their bike after dusk if they were across the street participating in a sporting event. The bike rack at both the elementary school and high school/middle school were able to hold sixty bikes.

Sidewalk infrastructure at the high school/middle school was in much better shape than the sidewalks that lined the elementary school. The Elementary School sidewalks should be considered for an upgrade. The elementary school also had three speed bumps evenly spaced between one another in front of the school. There were no speed bumps in front of the high school/middle school. Having another speed bump or two outside the high school/middle school would not be a bad idea considering that would help reduce the speed traveled in the school zone.

Much like the high school/middle school, the elementary school could use some more crosswalks. There is an area of the school zone where students are crossing the road that leads to the parking lot in the back to get to the side parking lot where their parents are parked for pick up. There is a stop sign at the end of the road where children are crossing but this might be a great place for a new pedestrian crossing sign as well as a crosswalk.

Overall, both schools did not properly show the direction of traffic that was to flow through the school zone. People said they were dropping their child off where they were because they were informed by the school in person or by a newsletter that went home with their student. Although this seems to work for Hinsdale, there are many areas for updates that would make the school zone a much safer area for students to walk or bike to and from school. The two major updates that should be made to this campus are more crosswalks at the locations where students are actually crossing the street. On School Street near both the elementary school and high school/middle school there are a number of crosswalks that were drawn in areas where students are not crossing. These crosswalks need to be removed and put in places where they are more crucial for students' safety. There should also be more signs that show where drop off and pickup bus zones are, as well as where car pick up and drop off zones are located on both campuses as well as more signs to signify that School Street is to be considered as a one way street during school hours. The lack of signs that show the direction of traffic as well as the speed limit are a major concern and should be updated in order to keep drivers as well as students safe while driving and walking down School Street. Additional field reports have been written for both the Hinsdale Elementary School and the Hinsdale Middle/High School which can be found in Appendices D and E respectively.

Statewide Asset Data Exchange System (SADES)

The Statewide Asset Data Exchange System (SADES) is a data exchange system used as a geospatial transportation asset inventory of transportation related infrastructure including sidewalks and crosswalks. This data was collected through ArcCollector, an application downloaded on tablets which allows the user to directly draw line and point files onto a base

map file and used to create Figure 11. Through SADES, it was concluded that the vast majority of sidewalks and crosswalks are within 1 mile of the school campus which can be seen in Figure 12.

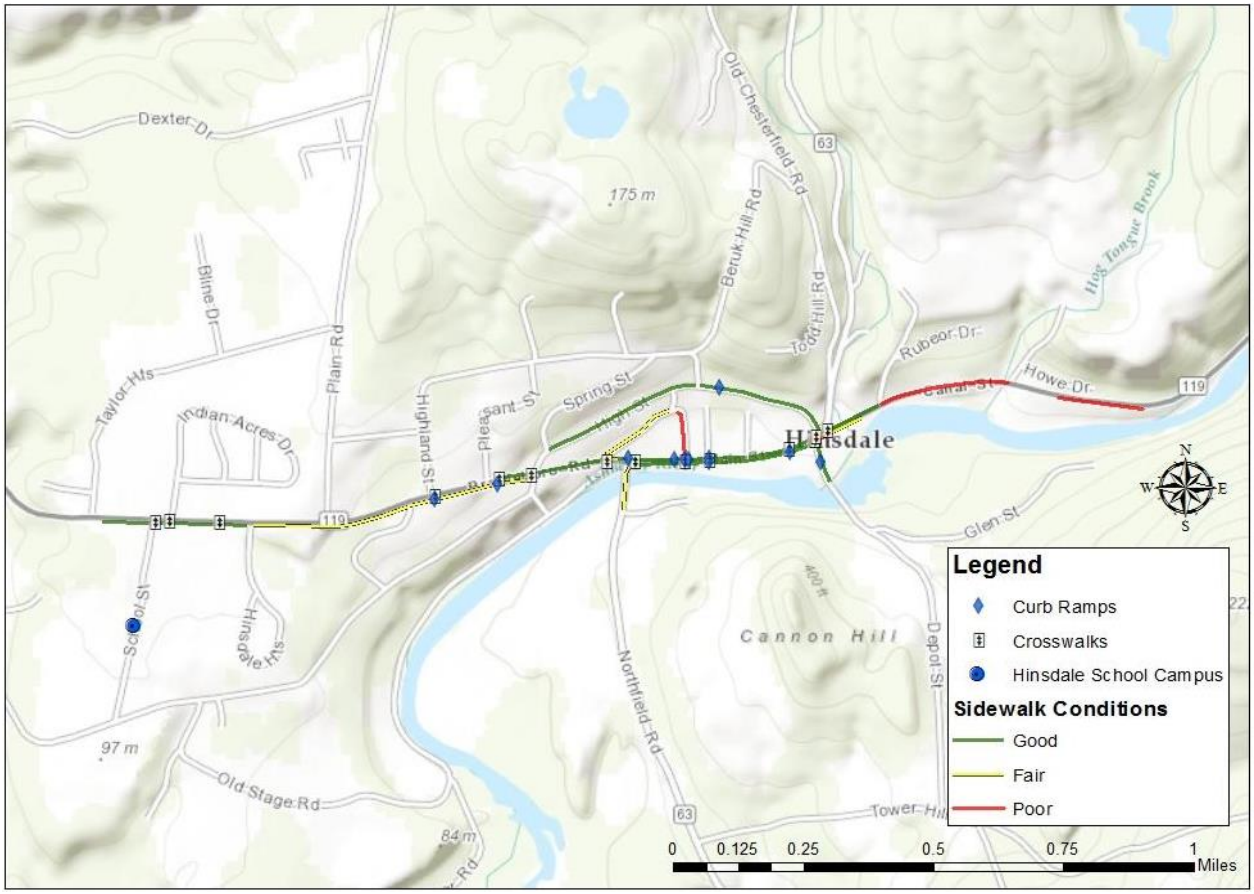


Figure 12 *SADES results of Hinsdale infrastructure*

Using the map that was created in SADES, we traveled around the area of Hinsdale collecting data on crosswalks and sidewalks. We created a map of Hinsdale with one and two mile radius buffers around the schools so we knew which areas needed to be examined and which areas had more children in the area. We determined if roads were safe by looking at the sidewalks and locations of crosswalks. If roads were wide, in good condition and had a buffer in-between the road and sidewalk we determined they were safe enough for children to

Figure 13 *Major transportation routes near downtown Hinsdale*

commute on those roads to school. If roads didn't have convenient and useful sidewalks, no crosswalks and the speed limit was high, we determined they were unsafe. Only a few roads within the one mile radius had sidewalks including High Street and Hancock Road. Plain Road and Brattleboro Road were determined to be unsafe roads for walking and biking but were also areas with a high density of children. Both of these roads were not lined with sidewalks or a lane for bikers. The speed on these roads were 55 miles per hour and were areas of major concern that parents had while allowing their child to walk or bike to school. Plain Road and Brattleboro Road are two main routes and are both shown in Figure 13.

Method 2: Surveys

This method of surveying proved successful and yielded us with one hundred completed surveys. These one hundred parent surveys were completed as the second collective data method and was entered into a spreadsheet where the results could be further analyzed. As seen in Figure 14, 7 percent of survey responses were of student in grades 7-12, while 20 percent of responses came just from the third grade classrooms alone.

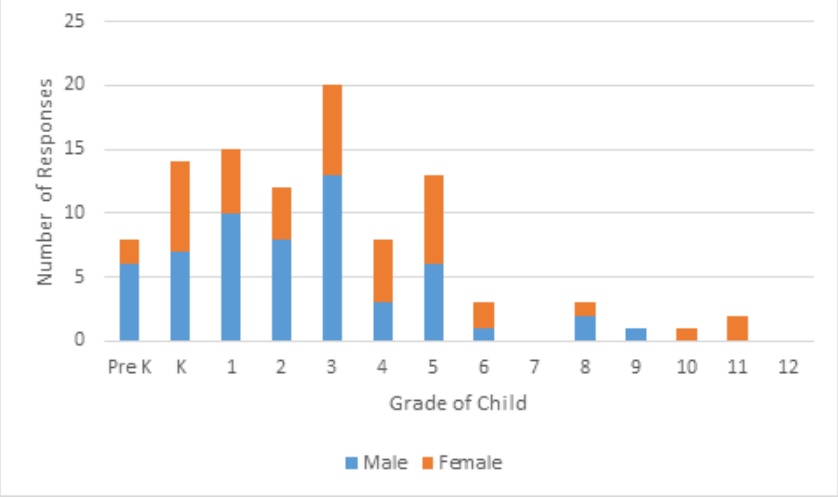


Figure 14 *Distribution of Parent Surveys received*

Parents were asked a wide variety of questions to get at most of the basic details of why/why not they do/do not let their child walk or bike to school. The survey sample is skewed due to a majority of high school parents not attending parent/teacher conferences and therefore did not have a chance to fill out the survey. The distribution of male and female responses was favored to the males with fifty-seven male responses and forty-three female responses for an even total of one hundred responses. Specifically speaking about the distribution of surveys between both schools, the majority of the surveys that were completed were from the elementary school. We analyzed seventy-four surveys from the elementary school and a mere twenty-five from the high school/middle school. From Figure 14 on the previous page, it is obvious that the majority of the surveys completed by parents were from elementary school aged children. On the other hand, parents of the high school/middle school students did not fill out anywhere close to the younger student's parents did.

One of the first questions that parents were asked on the survey was about how far they live from the school. It was found that 34 percent of students live within one mile of the schools, while 39 percent of students live more than two miles from the school making it increasingly difficult for those students to actively commute to school. The breakdown of these distances can be seen in the pie chart, Figure 15. While these distances may influence, the way students are actually getting to school, it does not shows us if these distances have any influence on the number of students who are actively commuting to and from school. Figure 16 displays the ways that students are most often commuting to and from school. The data shows

that an overwhelming majority of students in Hinsdale are either driven to school or take the bus, with a staggering 55 percent taking a car and 40 percent taking the bus to school that leaves a lacking 5 percent of students who choose to actively commute to school most days. Of the 34 percent of respondents that live within one mile of the school, only 5 percent actively commute leaving 29 percent of students living within one mile of the schools that could be potential active commuters if the problem areas of the town were dealt with to incorporate a Safe Routes to School program.

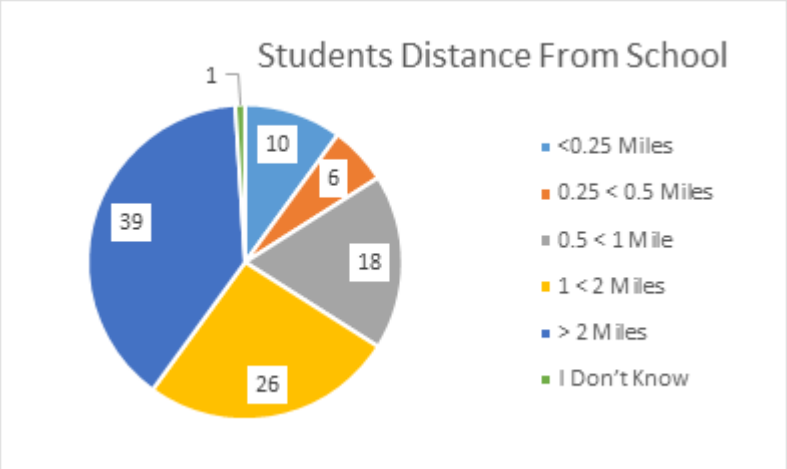


Figure 15 *Student travel distance to school*

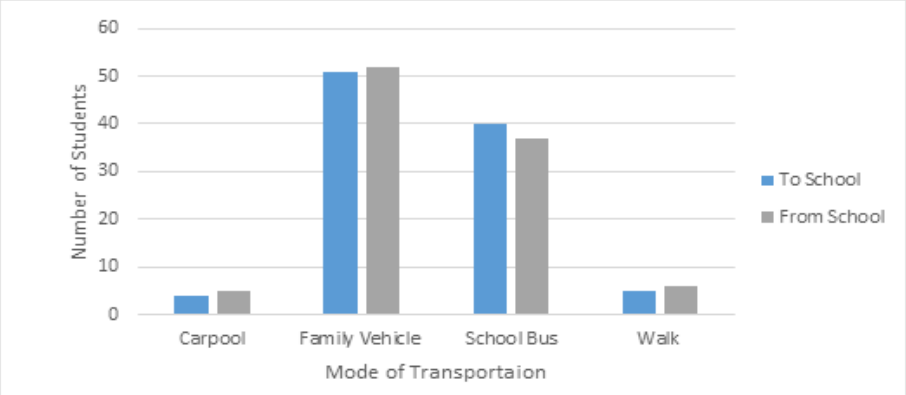


Figure 16 *Students most common mode of transportation to and from school*

The next set of questions asked about the influential factors that parents thought played a role in their decision to either let their child walk or bike to school using in Question 11 on the Parent Survey. The parents were asked to pick from a list of fifteen influential factors and

choose as many or as few of them as they deemed appropriate. To quantify these responses we counted each tally on every category and found several interesting results. The results to this question can be seen in the bar chart in Figure 17, organized with the top concerns at the top and the least influential factors at the bottom.

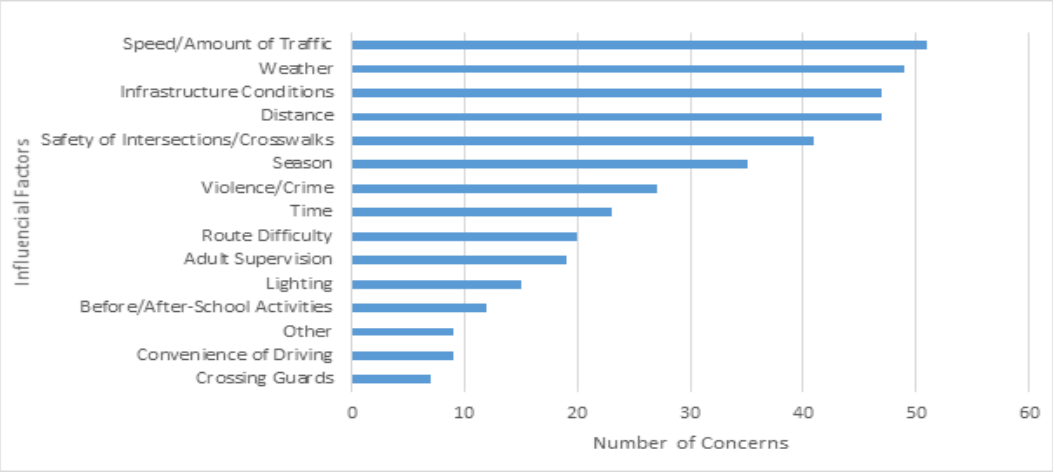


Figure 17 *Parent survey responses on most influential factors preventing active commuting*

As seen in Figure 17 parents were most concerned about the speed and amount of traffic that is present on the major roads in Hinsdale. Brattleboro Road as well as Plain Road were of the utmost concern for parents, with speed limits of over 30 miles per hour and very little to no room on the shoulder of the roads to safely walk. Infrastructure conditions were also a very large concern for parents due to the lack of sidewalk and crosswalks on the major commuting routes. The lack of infrastructure leads to drastic safety risks that parents are just not willing to take with their child leading to less and less active commuting to school. This was somewhat surprising considering crossing guards could provide a safer traffic environment for students as they make their way to or from school. When the Hinsdale Schools on campus pick up/drop off routines were observed, one crossing guard was seen at the intersection of

Brattleboro Road and School Street for only a total of fifteen minutes helping children cross the busy street. If more crossing guards were implemented and for a longer period of time, maybe parents would begin to feel more comfortable with the busy intersections near the school.

The last set of questions that were asked of parents were a set of Yes, No, and I do not know responses. Question number twelve asked parents if their child had access to a bike, and an outstanding 90 percent of respondents said that their child did have access to a bicycle they could use. Next parents were asked if their child participates in at least sixty minutes of physical activity every day in question number fifteen. Sixty minutes is the recommended amount of activity every child should have every day in order to live a healthier lifestyle. It was positive to see that 88 percent of respondents said that their child did receive the recommended sixty minutes of physical activity every day. Another result that was determined from the survey data was that 59 percent of respondents participate in some form of after school activities including sports, dance, various clubs, or after school activities. This could be why we see a decrease in the number of children riding the school bus home from school and an increase in the number going home in a family vehicle.

The data collected in the parent survey was vital to the analysis of the walking and biking conditions of the Hinsdale area. The responses helped solidify the major themes in our report by providing quantifiable data that could be used to either prove or disprove our hypotheses through more in depth statistical analysis. By first looking at the descriptive statistics of our data it provided us with a strong base to then apply our hypotheses directly to the focus areas.

Hypothesis 1

Generally, people might assume that high schoolers and middle schoolers would be more likely to walk to school than elementary school age students given the fact that they are older and have a better understanding of safety. This assumption was formed early on in this study from collecting data through field observations, parent surveys, and in-classroom tally sheets that were completed by teachers in the classrooms of all elementary, middle and high school classrooms that kept track of how their students commuted to and from school in both the morning and afternoon on specified days during a one week period. In order to test if whether high school and middle school students are walking more or less than students in the elementary school, two hypotheses were formed:

Null Hypothesis: There is no difference between the number of middle and high school students actively commuting to school and the number of elementary school students that are actively commuting to school.

Alternative Hypothesis: There is a difference between the number of middle and high school students actively commuting to school and the number of elementary school students that are actively commuting to school.

An independent samples t-test was used in order to examine the difference in the number of walkers between the high school, middle school, and elementary school. Running an independent samples t-test provided the information that is required in order to accept one of the previously stated hypotheses. The in-classroom tally sheets used by teachers in all three schools provided the data required for running this test by counting the number of active commuters and non-active commuters each day. The data was categorized by the number of

active commuters in the Hinsdale Elementary School and the number of active commuters in both Hinsdale Middle School and Hinsdale High School and then entered into an Excel sheet that was used in SPSS, statistics software. The results from the statistical analysis are shown in the Tables 1 and 2 below.

Table 1 *Group statistics showing the numbers of active commuting between Hinsdale High School/Middle School and Elementary School*

	V4	N	Mean	Std. Deviation	Std. Error Mean
Walkers	1	96	.948	.8750	.0893
	2	90	1.167	1.3678	.1442

The value that is important to determining whether there is a statistical significance between both variables is the Sig. (2-tailed) number in these results which can be found in Table 2. In the table that was created when the test was ran in SPSS, a value of .193 was our level of significance. This value shows that both variables are not significant because the results of the data are greater than the .05 value which is considered to be significant. In this case, our study chose to accept the null hypothesis that was formed from gathering this data which stated that: There is no difference between the number of middle and high school students actively commuting to school and the number of elementary school students that are actively commuting to school.

Table 2 *Independent Samples Test of the difference in active commuting numbers between Hinsdale High School/Middle School and Hinsdale Elementary School*

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Walkers	Equal variances assumed	30.033	.000	-1.307	184	.193	-.2188	.1673	-.5488	.1113
	Equal variances not assumed			-1.290	149.748	.199	-.2188	.1696	-.5539	.1164

In conclusion to these results, we are able to say with confidence that there is no significant difference between the number of students walking and biking in the Hinsdale High School/Middle School and the elementary school. Students at both schools are walking around the same amount as the other. The statistical results from the test support the decision to accept the null hypothesis in this study.

Hypothesis 2

One main topic of interest for this study was the relationship between physical activity levels and mental awareness. Generally this relationship is examined through the use of brain scans, which was not a technology available for use in this study. Instead, this relationship was

examined by asking the question “Do parents who actively commuted to school as children think that physical activity improves their child’s mental awareness more than parents who did not actively commute as children?” The data used for this test were derived from Questions 15 and 18 of the parent survey. Question 15 asked “Does your child participate in after school activities?” and Question 18 asked “Did you walk and/or bike to school as a child?” The hypothesis for this test are as follows:

Null Hypothesis: There is no relationship between a parent’s perception of physical activity’s benefits to mental awareness and whether or not they actively commuted to school as a child. *Alternative Hypothesis*: There is a relationship between a parent’s perception of physical activity’s benefits to mental awareness and whether or not they actively commuted to school as a child.

With the responses to the parent survey questions it was possible to run a Pearson’s Cross-Tabulation test in SPSS. Pearson’s Cross-Tabulation is a Chi-square one-sample nonparametric test that determines if the number of occurrences across multiple categories is random. The independent variable in this test is whether or not the parent answering the survey actively commuted to school. The dependent variable in this test is whether or not the parent has noticed improvements in their child’s mental awareness after any amount of physical activity. The results of this test can be seen in Tables 3-5.

Table 3 *Case Processing Summary*

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Perform Better * Parent Walk/Bike as Child	88	100.0%	0	0.0%	88	100.0%

Table 4 *Perform Better * Parent Walk/Bike as Child Crosstabulation*

		Parent Walk/Bike as Child		
		No	Yes	Total
Perform Better	No	2	6	8
	Not Sure	11	16	27
	Yes	16	37	53
Total		29	59	88

Table 5 *Chi-Square Tests*

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	1.153[a]	2	.562
Likelihood Ratio	1.143	2	.565
N of Valid Cases	88		

Table 3 is simply a summary of the number of responses which is represented by N, which in this case is eighty-eight. Table 4 shows the number of parents who answered “Yes”, “No”, or “I do not know” on Question 15 in the parent survey based on whether or not the parent answered “Yes” or “No” on Question 18. In this instance, there were twenty-nine parents who did not actively commute as a child and fifty-nine parents who did walk as a child. There were eight respondents who answered “No”, twenty-seven who answered “I do not know” and fifty-three who answered “Yes”. Parents, regardless of whether or not they personally actively commuted to school, most commonly answered “Yes” to Question 15 and

least commonly answered “No” to Question 15. This information is also presented in the bar graph in Figure 18.

Table 5 provides the information that supports one of the previously stated hypotheses. The asymptotic significance for the Pearson’s Chi-Square is .562 which is not significant because it is significantly larger than the critical value which was set at .05. Because this number is not significant, we accept the null hypothesis which assumes that there is no relationship between a parent’s perceptions of physical activity’s benefits to mental awareness and whether or not they actively commuted to school as a child.

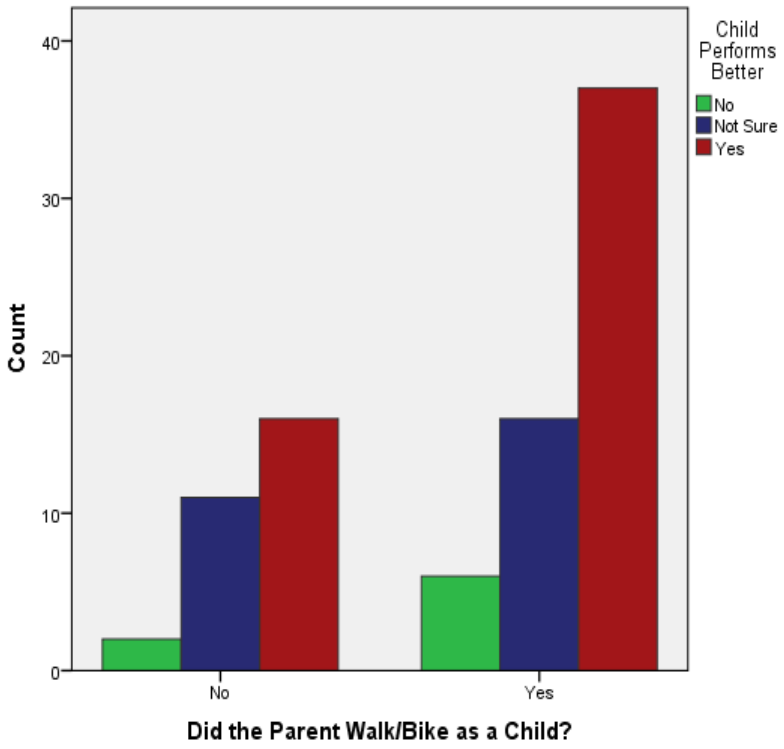


Figure 18 *Responses to Questions 15 and 18 on the parent survey*

Hypothesis 3

Our group wanted to determine if the time of day affected when students were more likely to be active commuting to school. Convenience of time, distance to school, and after school programs could play a role in determining if a student would rather ride a bike or walk compared to a school bus or being pick up or dropped off by a parent. In order to determine whether or not the time of day affected if children were actively commuting, we developed two hypotheses:

Null Hypothesis: There is no difference in the number of active commuters between the morning and afternoon.

Alternative Hypothesis: There is a difference in the number of active commuters between the morning and afternoon.

Across the course of three days, teachers from the elementary school, middle school and high school collected tallies during the morning and afternoon in order to determine how students arrived at school and how they planned to get home. With these tallies, a spreadsheet was created with two independent groups: the number of students actively commuting during the morning and the number of students actively commuting in afternoon. With this spreadsheet created, it was then possible to run an independent t-test in SPSS to determine if there is a statistical difference.

An equal variance of 95 percent was assumed with a threshold of .05. The t-test showed that the Sig. (two tailed) value was .095, higher than .05. Since .095 is higher than .05, we accept the null hypothesis which assumes that there is not a significant difference in the amount of active commuters during the day compared to the afternoon. An error not

accounted for was the weather on the days the tallies were taken because this could have prevented students from actively commuting. The results of this test can be found in Tables 6 and 7.

Table 6 *Group Statistics of the number of active commuters between the morning and afternoon*

	V5	N	Mean	Std. Deviation	Std. Error Mean
Walkers	1	93	.914	1.0285	.1066
	2	93	1.194	1.2359	.1282

Table 7 *Independent Samples Test of the number of active commuters between the morning and afternoon*

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Walkers	Equal variances assumed	5.090	.025	-1.677	184	.095	-.2796	.1667	-.6085	.0494
	Equal variances not assumed			-1.677	178.122	.095	-.2796	.1667	-.6086	.0494

Method 3: Interviews

After compiling the information from our two interviews, we analyzed the responses from each subject. Since we interviewed one subject from a school that is attempting to start a Safe Routes to School program in Principal Boggio, and another from a school that has an already existing program in place, Beth Corwin. It gave us a great contrast of answers in order to see where the Hinsdale School system could make the most improvements.

We found very similar ideas, problems, and concerns while talking with our interviewees. The first interviewee, Principal Boggio, has been an active member the of Hinsdale community for twent-three years since 1991. He has worked for the town department, as well as a Math teacher at several different grade levels. This gives him a very comprehensive knowledge of the town's major issues as well as tendencies of the children over an extended period of time. Principal Boggio was hired as the Hinsdale Elementary School principal in November of 2012, making this his fourth year as principal. Over the past years Principal Boggio has showed a strong interest in achieving a healthier school environment. He has attempted to implement a “Healthy Habits” program into the daily lives of the students, encouraging healthy snacks, more physical activity, and more constructive socialization of the children to promote stronger psychological habits as well.

When Principal Boggio was asked about his opinion of the pickup/drop off areas surrounding the Elementary school he had some great ideas for improvement. At both the before school pick up location on School Street and the Elementary School pick up around the back side of the school, traffic is a huge problem. This was observed during our Field Report where several cars lined up, sometimes thirty to forty-five minutes early, blocking the access

roads to other cars that want to come through. When asked what could be done Principal Boggio stated, “Some more signs directing parents into designated locations would be very helpful.” During the Field Report we had observed an obvious lack of signage on campus, with a few signs even facing the wrong direction due to years of weathering and erosion without being replaced. During the next part of the interview, Principal Boggio began talking about some of the problem streets and amenities of the surrounding area. One area he mentioned as needing improvement was Route 119, which runs directly through the middle of Hinsdale connecting most of the town to each other. He suggested a bike lane be added on the road in order to give riders a safer commute than on the narrow shoulder of the road. He thought this could be of great use with several students living on or very close to Route 119. The last section of the interview gave insight to some of the overarching policies the school has on children walking and biking to school. During this we found out that the elementary school does not have a written rule on who can and cannot walk or bike to school but teachers and parents are constantly on the lookout for children who seem to be on their own or in unsafe situations. This illustrates just how a close knit a rural town like Hinsdale truly is.

Our second interview was with Beth Corwin of the Symonds Elementary School in Keene, New Hampshire. Mrs. Corwin is the comprehensive physical education teacher at the elementary school and has been for the past twenty one years. This interview was quite different than the first since Symonds already has a very active walking program they call the Symond’s Walk, Roll, and Ride program. This program has been extremely successful in getting students to actively commute to or from school in some way or another. Mrs. Corwin was the founder of this program for the Symonds school but it was not an easy journey. She first

created a “district wide and School Administrative Unit (SAU) wide wellness committee to start working to stem the tide, and change our culture, so that we could reduce childhood obesity, improve the practices in our schools that support our health curriculum, and healthy living.” Since Symonds has had this program implemented, they have a multitude of ways of getting children more active during the school day. From activity breaks during class time, mandatory recess, and running and walking programs to level the playing field to get all children involved not just a select group. One of the most interesting programs she has implemented is the “5,2,1, 0, +10 wellness message” which breaks down to: five servings of fruit/vegetables a day, two or less hours of screen time, one hour or more of physical activity, zero sugar added beverages, and ten or more hours of sleep. Mrs. Corwin strongly believes in this message and promotes it vigorously to all her students. The amount of time and effort that Mrs. Corwin has put into the program shows tremendously throughout the school community. From kids being excited about walking or biking to school, to tackling childhood obesity issues Mrs. Corwin has changed the entire culture of a community over her time at Symonds Elementary. In order for the Hinsdale program to flourish quite like the Symonds program has, someone from inside the school must step up like Mrs. Corwin has in order to lead the effort. We hope the Hinsdale program can learn from Symonds on how to successfully run a Safe Routes to School program.

Chapter 5: Conclusion

Through the use of surveys, interviews, and field data collection we were able to thoroughly examine the active commuting trends of the Hinsdale School District. This analysis was conducted in order to develop suggestions for implementing a Safe Routes to School Program to encourage walking and biking to school. This kind of program can provide students with the opportunity to be more physically active and also leads to safer school zones due to less traffic during pickup and drop-off times. We were also able to highlight some major problem areas including areas with high traffic speed or areas that lack important transportation related infrastructure. Acknowledging these problems may be important in the future when implementing a Safe Routes to School Program.

We found that the school campus is well equipped with transportation infrastructure including signage, sidewalks, speed bumps, and lighting. Transportation infrastructure is also present throughout downtown Hinsdale on Brattleboro Road, as well as the residential areas within High Street and Hancock Street. The sidewalk on Brattleboro Road travels east over one mile away from the school making it a major route for nearly all students.

Outside of the downtown area, however, we found that there were hardly any sidewalks. Roads such as Plain Road and Brattleboro Road on the west side of the school, which could be major walking and biking routes for children, simply do not have any transportation infrastructure necessary for a safe commute. The lack of sidewalks coupled with increased speed will make these two roads exceptionally large challenges when encouraging families that live north of the school to actively commute. This was also a major theme that was discussed during our interview with Principal Boggio. We had hoped to find any possible trails that would

allow students who live further from the school to bypass some of the high traffic roads but we were unable to locate any major trails.

Through our parent surveys we were able to determine some of the determining factors that influence a parent's decision to have their child actively commute to school or not. Infrastructure conditions, safety of intersections and crosswalks, and amount and speed of traffic made up three of the five most common influences. This shows that the lack of transportation infrastructure on key routes such as Plain Road or Brattleboro Road may actually be directly affecting whether or not a family allows their child to walk to school.

The other two major influences that influence whether or not parents allow their children to walk or bike to school included weather and distance, two factors that would be very difficult to overcome with the use of a Safe Routes to School program. These were two major variables that we had assumed would be highly influential factors from the beginning of our research due to the climate and geography of Hinsdale.

Perhaps the biggest surprise of this study was the lack of statistical significance in all three of our hypotheses. We discovered that within our sample there was no statistically significant differences in the number of active commuters between the two schools, that there is no difference in the number of active commuters between the morning and afternoon and that there is no significant relationship between whether or not a parent walked to school and whether or not they think that physical activity benefits their child's mental awareness. We were not surprised that there was no difference between active commuters in the morning and afternoon because we assumed that if a child were to bike to school in the morning then they would have to bike back for example. The other two conclusions were rather surprising though

because we assumed that the older middle and high school aged students would walk or bike at a higher rate because their parents might trust them to be safe during their commute to and from school. We were also surprised that there was no significant difference in perceptions about physical activity's effects on mental awareness because our prior research had suggested that there were strong ties between the two variables.

While these hypotheses conclusions were not ideal, they do give us some insight as to planning for the future. Because there is no difference in the number of morning and afternoon active commuters, then it will be important to have monitors outside of the school to ensure child safety which is a major concern for parents. The fact that there is no difference in active commuters between schools means that it will be important to encourage active commuting at all age levels and there does not need to be a special focus on just one school.

Different conclusions may have been drawn if there were more classes to increase the sample sizes for student tallies and more parent survey responses. We had also developed a high school student survey that was not used for this study. Had we been able to collect data directly from students we may have been able to draw different conclusions. We also may have benefitted from an earlier field data collection date so that we could have made observations during warmer days when children may have been more inclined to actively commute. Collecting data in October meant that we were making field observations during cold mornings and we faced time constraints due to earlier sunsets. Most of our information was also highly based on perception rather than real fact which means that most of our information comes from the opinions of survey takers not hard data.

Recommendations

After examining the issues and possibilities that revolve around developing a Safe Routes to School program, we believe that it is still beneficial to further pursue this subject. Comments from parent surveys suggest that there is interest in a program like Safe Routes to School. Not all major influential factors can be fixed by a Safe Routes to School program, but we have developed a few recommendations that may make a big difference in providing students the means necessary to actively commute to school.

These recommendations include widening shoulders and installing sidewalks on major transportation routes such as Plain Road and Brattleboro Road west of the Hinsdale schools. Improving transportation related infrastructure on these two major roads will provide students who live further distances north of the campus with more safe means of transportation. Along with the installation of transportation related infrastructure, we believe that speed limits should be reevaluated near the school campus. For example, Brattleboro Road to the west of the Hinsdale campus does not have any sidewalks, shallow shoulders and a speed limit of 50 miles per hour. It simply is not safe for the students who live further north on Brattleboro Road to actively commute to school with these factors present.

We have also developed a few recommendations for Hinsdale to consider when implementing a Safe Routes to School program. Because there is interest for a Safe Routes to School program in the community, it may be appropriate to encourage parents to volunteer to assist in the day-to-day operations. Other schools that have implemented this kind of program have found success in designating meeting locations where parents can drop their children off to walk to school under adult supervision. This allows for parents to allow their children to

enjoy the benefits of active commuting while knowing that their child is safe with a responsible adult. Similarly, because the safety of crosswalks and intersections are such a large concern among surveyed parents, we believe parents would be more comfortable with allowing their children to actively commute to or from school if teachers or volunteer parents were assigned to monitor major intersections and crosswalks. Many parents also claimed that other individuals were a major concern when letting their children commute to school. We believe that involving local police departments may help ensure that students are safe in every way possible. Having a higher police presence during times when students are most commonly walking to or from school may help parents feel that their child is less susceptible to dangerous situations.

References

Active Living Research. 2009. *Walking and biking to school, physical activity and health outcome: building evidence to prevent childhood obesity and support active communities*. San Diego State University. http://www.rwjf.org/content/dam/farm/reports/issue_briefs/2009/rwjf40524.pdf (last accessed 29 August 2015).

---. 2015. *Impact of safe routes to school programs on walking and biking*. San Diego, CA: Active Living Research. http://activelivingresearch.org/sites/default/files/ALR_Review_SRTS_May2015.pdf (last accessed 1 August 2015).

Barry, H., M. Lambaise, and J. Roemmich. 2010. Effect of a simulated active commute to school on cardiovascular stress reactivity. *Medicine & Science in Sports & Exercise* 42(8): 1609-1616.

Binns, H., J. Foreman, C. Karr, K. Osterhoudt, J. Paulson, J. Roberts, M. Sandel, J. Seltzer, and R. Wright. 2009. The built environment: Designing communities to promote physical activity in children. *Journal of Pediatrics* 123(6): 1591-1598.

Boggio, J. Principal. *Hinsdale Elementary School*

Center for Disease Control and Prevention. 2015. *Childhood obesity facts*. Washington DC: Center for Disease Control and Prevention. http://www.cdc.gov/healthyschools/obesity/facts.htm (last accessed 23 September 2015).

Centers for Disease Control and Prevention. 2015. *Physical activity facts*. Atlanta, GA: Centers for Disease Control and Prevention. http://www.cdc.gov/healthyschools/physicalactivity/facts.htm (last accessed 13 September 2015).

Corbett, P. 2007. *Putney, Vermont: Encouraging healthy living*. National Center for Safe Routes to School. http://www.saferoutesinfo.org/program-tools/success-stories/putney-vermont-encouraging-healthy-living (last accessed 29 August 2015).

Corwin, B. Physical Education Department. *Symonds Elementary School*

Del Valle Cook, H. 2013. *Educating the student body: Taking physical activity and physical education to school.* Washington DC: Institute of Medicine of the National Academies. http://iom.nationalacademies.org/~/media/Files/Report%20Files/2013/Educating-the-Student-Body/EducatingTheStudentBody_rb.pdf (last accessed 4 September 2015).

Department of Health and Human Services. 2015. *What is mental health?* Washington D.C.: Department of Health and Human Services. http://www.mentalhealth.gov/basics/what-is-mental-health/ (last accessed 14 September 2015).

Economic and Labor Market Information Bureau. 2015. *Community profiles: Hinsdale, NH*. Concord, NH: New Hampshire Employment Security. http://www.nhes.nh.gov/elmi/products/cp/profiles-htm/hinsdale.htm (last accessed 27 October 2015).

Edmunds, S., H. Biggs, and I. Goldie. 2013. *Let's get physical: The impact of physical activity on wellbeing*. London, England: Mental Health Foundation. http://www.mentalhealth.org.uk/content/assets/pdf/publications/lets-get-physical-report.pdf (last accessed 1 August 2015).

Fischer, J. 2005. *Safe, accountable, flexible, efficient transportation equity act – A legacy for users*. Washington D.C.: Congressional Research Service. http://wadot.wa.gov/NR/rdonlyres/D3DF664F-7456-4877-9788-7E62EFC8F51E/0/CongressionalResearchServiceOverviewTLU.pdf (last accessed 29 August 2015).

Healthy Monadnock 2020. 2014. *About Healthy Monadnock 2020*. Keene, NH: Healthy Monadnock 2020. http://www.healthymonadnock.org (last accessed 11 September 2014)

---- 2015. *Healthy Monadnock 2020 magazine*. Keene, NH: Cheshire Medical Center/Dartmouth-Hitchcock. http://www.heathymonadnock.org/wp-content/uploads/2014/20/HM2020-update-booklet-Nov-20141.pdf(last accessed 11 September 2015).

Hinsdale Commercial and Industrial Development Corporation. 2015. *Welcome to Hinsdale, New Hampshire*. Hinsdale, NH: Hinsdale Commercial and Industrial Development Corporation. http://www.hinsdaledevelopment.net/abouthinsdale.html (last accessed 27 October 2015).

Hinsdale School District. 2014. *2014 Annual meeting budget information*. Hinsdale, NH: Hinsdale School District. http://www.hnhsd.org/HSDOld/info/FinInfo/BudgetInfo14.pdf (last accessed 27 October 2015).

Joens-Matre, R., G. Welk, M. Calabro, D. Russell, E. Nicklay, and L. Hensley. 2008. Rural-urban differences in physical activity, physical fitness, and overweight prevalence of children. *The Journal of Rural Health* 24(1): 49-54.

Kapell, H., and J. Dill. 2009. Factors affecting walking and biking to elementary school: Urban form, parental attitudes, and school characteristics. *TRB 88th Annual Meeting Compendium of Papers.* Washington, DC: Transportation Research Board.

McDonald, N., and A. Aalborg. 2009. Why parents drive children to school: Implications for safe routes to school programs. *Journal of the American Planning Association* 75(3): 331-342.

Milam, A., Furr-Holden, C., Cooley-Strickland, M., Bradshaw, C., and Leaf, P. 2013. Risk for exposure to alcohol, tobacco, and other drugs on the route to and from school: the role of alcohol outlets. *Prevention Science* 15(1) 12-21.

Murnaghan, D. 2009. *Prince Edward Island provincial results: Mental fitness, physical activity and healthy eating*. Prince Edward Island, Canada: University of Prince Edward Island. http://www.gov.pe.ca/photos/original/eecd_shape08_09.pdf (last accessed 15 August 2015).

New Hampshire Office of Energy and Planning. 2014. *2013 Population estimates of New Hampshire cities and towns*. Concord, NH: New Hampshire Office of Energy and Planning. http://www.nh.gov/oep/data-center/documents/population-estimates-2013.pdf (last accessed 27 October 2015).

New Hampshire Department of Transportation. 2015. Planning and community assistance: Safe routes to school. https://www.nh.gov/dot/org/projectdevelopment/planning/srts/ (last accessed 1 May 2016).

Safe Routes to School National Partnership. 2010. *Implementing safe routes to school in low-income schools and communities: A resource guide for volunteers and professionals*. Oakland, CA: Safe Routes to School National Partnership. http://www.saferoutespartnership.org/sites/default/files/pdf/LowIncomeGuide.pdf (last accessed 1 August 2015).

Staunton, C., D. Hubsmith, and W. Kallins. 2003. Promoting safe walking and biking to school: The Marin County success story. *The Journal of Public Health* 93(9): 1431-1434.

Town of Hinsdale. 2015. *Welcome to our website*. http://hinsdale.govoffice.com/ (last accessed 27 October 2015).

Trudeau, F., and R. Shephard. 2008. Physical education, school physical activity, school sports and academic performance. *International Journal of Behavioral Nutrition and Physical Activity* 5(10): 1-12

University of New Hampshire. 2013. *Climatic averages for selected New Hampshire cities and towns*. Durham, NH. UNH. http://www.unh.edu/stateclimatologist/nh_data_summary.htm (last accessed 27 October 2015).

Appendices

Appendix A: Safe Routes to School Field Review Packet

SAFE ROUTES TO SCHOOL FIELD REVIEW

DATE:_____ TIME: _____ LOCATION:_____
REVIEWER:_____

BUSES (please identify/label location and flow of Bus Loading Areas on map)				
1. Are bus loading and drop off zones clearly defined?	Yes	No	Other:	Map ID:
2. Is school staff assigned to bus loading areas?	Yes	No	Other:	Map ID:
3. Is access to bus loading areas restricted to other vehicles during loading/unloading?	Yes	No	Other:	Map ID:
4. Are non-authorized vehicles present in bus loading area?	Yes	No	Other:	Map ID:
5. Is there traffic/congestion in the bus loading area?	Yes	No	Other:	Map ID:
6. Other conditions to note:				
PARENT DROP OFF / PICK UP (please identify/label location and flow of Parent Pick Up/Drop Off Areas on map)				
7. Are parent pick up and drop off locations clearly defined?	Yes	No	Other:	Map ID:
8. What is the average wait time for parents to drop off student?	Yes	No	Other:	Map ID:
9. Is staff assigned to parent drop off/pick up areas?	Yes	No	Other:	Map ID:
10. Do drivers appear distracted?	Yes	No	Other:	Map ID:
11. Is there traffic/congestion in the parent pick up and drop off area?	Yes	No	Other:	Map ID:
12. Is there a smooth flow of traffic in and out of drop off/pick up area?	Yes	No	Other:	Map ID:
13. Are there any potential safety concerns or pedestrian/vehicle conflict areas (if so, mark location on map)?	Yes	No	Other:	Map ID:
14. Are vehicles lined up in the street during parent pick up and drop off?	Yes	No	Other:	Map ID:
15. Other conditions to note:				
SPEED				
16. Are there are traffic calming devices present such as speed bumps, speed tables, pedestrian signals to restrict vehicle speed?	Yes	No	Other:	Map ID:
17. Mark where these devices are located on the map and what type of device they are.	Yes	No	Other:	Map ID:

18. Is there noticeable speeding in school zone?	Yes	No	Other:	Map ID:
19. If so, on which routes is speeding occurring?	Yes	No	Other:	Map ID:
20. Are speed limits clearly marked?	Yes	No	Other:	Map ID:
21. What is the speed limit of routes leading into and on school property (mark speed limits on map)?	Yes	No	Other:	Map ID:
22. Other conditions to note:				
LIGHTING				
23. Is there adequate lighting around the school building?	Yes	No	Other:	Map ID:
24. Is there lighting along the sidewalks and pedestrians routes leading into and on the school?	Yes	No	Other:	Map ID:
25. Are there areas where lighting is needed (mark location of these areas on map)?	Yes	No	Other:	Map ID:
26. Other conditions to note:				
WAYFARING				
27. Are entrances and exits to the school clearly marked?	Yes	No	Other:	Map ID:
28. Are walking and biking routes clearly defined (if so, mark sign locations on map)?	Yes	No	Other:	Map ID:
29. Are there signs indicating vehicle speed limits (if so mark location on map)?	Yes	No	Other:	Map ID:
30. Are there signs indicating pedestrians crossing (if so mark location on map)?	Yes	No	Other:	Map ID:
31. Other conditions to note:				
BIKE FACILITIES				
32. Are bicycle racks are present (if yes, mark on the map)?	Yes	No	Other:	Map ID:
33. If yes, how many bicycles could be parked at each rack?	Yes	No	Other:	Map ID:
34. Are racks in a secure location?	Yes	No	Other:	Map ID:
35. Are there any bicycles parked at rack(s)?	Yes	No	Other:	Map ID:
36. How many bicycles are locked to the rack?	Yes	No	Other:	Map ID:
37. Are there bike lanes present (if so, mark where on the map)?	Yes	No	Other:	Map ID:

38. Are there any students biking to school (if yes, how many?)?	Yes	No	Other:	Map ID:
39. Are parents biking with students to school (if yes, how many?)?	Yes	No	Other:	Map ID:
40. Are there shoulders present along routes leading into and on school property?	Yes	No	Other:	Map ID:
41. What is the width and material (e.g. pavement, gravel, sand, grass) of the shoulders?	Yes	No	Other:	Map ID:
42. Is it safe for students biking to school to enter and exit school property?	Yes	No	Other:	Map ID:
43. Are there any signs present about sharing the road or watch out for bicyclists (mark location on map)?	Yes	No	Other:	Map ID:
44. Other conditions to note:				
SIDEWALKS				
45. Are sidewalks present (if so, mark the location on the map)?	Yes	No	Other:	Map ID:
46. If so, what condition are the sidewalks in?	Yes	No	Other:	Map ID:
47. What material are sidewalks made of?	Yes	No	Other:	Map ID:
48. Are sidewalks maintained in the winter?	Yes	No	Other:	Map ID:
49. Do sidewalks and paths stop in inconvenient locations?	Yes	No	Other:	Map ID:
50. Are sidewalks blocked by any obstructions such as dumpsters, poles, shrubs, etc (if so, ID obstruction and mark location on map)?	Yes	No	Other:	Map ID:
51. Are students using the sidewalks or pedestrian paths available?	Yes	No	Other:	Map ID:
52. Are sidewalks and pedestrian paths lighted?	Yes	No	Other:	Map ID:
53. Do parked vehicles block shoulder of bike path or walking route (if so, mark location on map)?	Yes	No	Other:	Map ID:
54. Other conditions to note:				
TRAILS				
55. Are there walking paths/trails present (if yes, mark location on map)?	Yes	No	Other:	Map ID:
56. What condition are walking paths/trails in?	Yes	No	Other:	Map ID:
57. Are students walking on paths/trail present (is so, how many)?	Yes	No	Other:	Map ID:
58. Do paths and trails lead directly to the school or sidewalk (mark where	Yes	No	Other:	Map ID:

trails/paths end on map)?				
59. Other conditions to note:				
CROSSINGS				
60. Are there crosswalks present (if yes, mark location on map)?	Yes	No	Other:	Map ID:
61. Is there a crossing guard present (if yes, mark location on the map)?	Yes	No	Other:	Map ID:
62. What are the hours of the crossing guard?	Yes	No	Other:	Map ID:
63. Are there areas where crosswalks should be present (mark location on map)? If yes, why?	Yes	No	Other:	Map ID:
64. Do vehicles stop for pedestrians trying to cross (if no, mark where on the map)?	Yes	No	Other:	Map ID:
65. Are there any sight obstructions making it difficult to see vehicles before/during crossing (parked cars, shrubbery, trees, etc) (if so, ID obstruction and mark on the map)?	Yes	No	Other:	Map ID:
66. How long does it take students to cross roadways at marked crossings (is there enough time for students to cross?)?	Yes	No	Other:	Map ID:
67. Are curb ramps present at crosswalks (if so, mark the locations)?	Yes	No	Other:	Map ID:
68. Other conditions to note:				
DRIVER BEHAVIOR				
69. Did drivers back out of driveways or turn onto roads without looking?	Yes	No	Other:	Map ID:
70. Did drivers yield to pedestrians crossing the road (if no, mark where on map)?	Yes	No	Other:	Map ID:
71. Did drivers make U-turns in middle of road or turn into private driveway (if yes, mark where on map)?	Yes	No	Other:	Map ID:
72. Other driver behavior to note, please describe:				
ENVIRONMENTAL CONDITIONS:				
73. Is noise an issue (if yes, mark where on map)?	Yes	No	Other:	Map ID:
74. If automobile exhaust an issue (if yes, mark where on the map)?	Yes	No	Other:	Map ID:
75. Are the walking routes clear of litter?	Yes	No	Other:	Map ID:
76. Are the walking routes pleasant to walk?	Yes	No	Other:	Map ID:
77. Other conditions to note:				

POLICIES				
78. Are friends, relatives or non-custodial parents required to have written permission to pick up a student from school?	Yes	No	Other:	Map ID:
79. Are bike locks available for students at the school?	Yes	No	Other:	Map ID:
80. Are helmets required for students biking to school?	Yes	No	Other:	Map ID:
81. Are helmets available for students to use at the school?	Yes	No	Other:	Map ID:
82. Other policies to note:				

Appendix B: Elementary School Field Review

Hinsdale Elementary School Field Review Fall 2015

During the month of October, students from the Keene State College Geography Department visited Hinsdale New Hampshire several times to examine and evaluate the safety conditions of routes in proximity to the school for students who choose to walk and/or bike to school. The students were also looking to grasp a better understanding of the needs and interests of the school community to increase biking and walking ability. These observations took place for both morning drop off and afternoon pick up at the elementary school. The most important findings in these observations are addressed in this document.

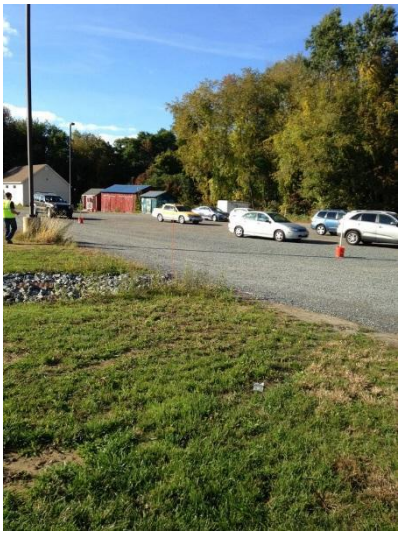
Parent drop off/Pick up of children

- In the morning parent drop off wait time was anywhere between 1 minute to 7 minutes.
- Drop off zones were not clearly marked but parents knew where to go from "word of mouth".
- Some parents dropped their child off at the front entrance of the school which was the loading zone and bus zones were located, not drop off zone (signs are facing the school).

Right: "Bus Zone" sign facing the wrong direction of traffic.
Left: "Loading Zone" in front of school clearly marked.

- There was slight traffic congestion after slowing down from the speed bumps before cars turned the corner to go around the back of the school for drop off.
- Flow of traffic was smooth because School Street is a one-way street during school hours (7:00am-4:00pm).
- In the afternoon parent pick up took anywhere from 1 minute to 15 minutes.
- Parents drove their cars around the back of the school where they formed a line around the parking lot.

- There is a potential safety concern at the right turn to go behind the school to wait in the pickup line because students are crossing the road there to get into cars waiting in the parking lot along the field.



Right: Right turn off of School Street to enter back of the school where students are crossing to cars waiting in the parking lot by the field where parents are waiting for pickup.
Left: Parents starting pickup line in the back of school (no specific direction).

Bus drop off/Pick up of children

- Bus loading and drop off zones are not clearly marked with paint, there is one sign that says “Bus Drop/Pickup”.
- In the morning the drop off/pickup zone is marked with orange traffic cones to show where the buses will pull up to the sidewalk curb.
- In the morning it took 4 minutes to unload all students off of the bus and into the school.
- The afternoon took 6 minutes to load all students on to the bus that were not being picked up by their parent.
- The school principal and three teachers stood at the entrance of the school as students got onto the bus in the afternoon.
- Four teachers, the school principal, and one Hinsdale Police officer stood at the entrance of the school as students got off of the buses in the morning.
- The bus drop off/pickup zone are restricted to other vehicles by the “School Bus Only” sign.

- One crossing guard stood to assist students in crossing the road at the intersection of School Street and Brattleboro Road at 3:10pm when school was let out and stayed for approximately 10 minutes.

Right: The only "Bus Drop/Pick up" sign on the sidewalk in front of the school
Middle: Orange traffic cones during morning drop off to dictate bus drop off area
Left: "School Bus Only" sign to show restriction of other vehicles at the sidewalk in front

Speed

- Three speed bumps are present at entrance of School Street, in the middle, and one at the end of the street.
- Traffic is slow because of speed bumps out front of the elementary school but cars are driving faster by the high school because speed bumps are mostly located in front of the elementary school.
- Speed signs are located near the beginning of School Street on Brattleboro Road (15 mph) and there is also a speed sign located at the end of School Street when taking a right on to Proctor Street (25 mph).

Wayfaring

- Neither the entrance to School Street nor the exit are clearly marked. People seem to be making their own routine from the sign that indicated a one-way street during school hours.

- Walking and biking routes in the school zone are defined by sidewalks. There are no signs.
- There are no crosswalks in the elementary school area, sidewalks are only located by the high school.
- No indication of speed limit signs on school grounds. The only speed limit signs are located on the streets off of School Street (Prospect Street and Brattleboro Street).

Right: Only sign posted about direction of school zone traffic.
Left: Speed limit sign posted on Proctor Street at the end of School Street

Lighting

- Lights are on the sides of the buildings but no street light posts are present.
- There are street lights on both main roads leading to School Street (Brattleboro Street and Prospect Street).

Bike use/Facilities

- Bike rack is located in between the main school building and the gymnasium.
- There are 60 spots available for bikes and it is located in a secure area where they can be monitored by anyone on school grounds.
- There were no bicycles parked at the bike rack when the school ground was surveyed.
- No bike lanes are present for bikers, they just ride along School Street in any direction.
- Both the entrance from Brattleboro Street and Prospect Street are sharp turns and since there are no signs indicating bikers this could be dangerous to bikers entering or exiting the school grounds.
- Bikers are required to wear helmets if they are biking to the elementary school.

Elementary school bike rack showing no bikes present on this day.

Sidewalks

- Sidewalks located on school grounds but are in fair condition and made of concrete.
- Grassy shoulder is on one side of the sidewalk that interferes with walking path only slightly, but it is still very walkable
- Sidewalks in this area have curb ramp transitions and are handicap friendly.
- Sidewalk stops right in front of the high school where a new sidewalk begins that is in much better condition than the elementary school sidewalks.
- Sidewalk is interrupted by the entrance to the school playground in the back.
- Sidewalks are also only located on one side of School Street (East).
- On the day that was observed, students and parents and teachers at the elementary school made very good use of the sidewalks that were present.

Right: Sidewalk in fair condition out front of elementary school.
Left: Poor sidewalk that strops at playground entrance

Crossings

- There is one crosswalk past the elementary school gym and just before the high school that connects both parking lots together.
- There is no sign that indicates pedestrian crossing.
- There was no crossing guard present of the first day that we observed but on our second trip there was a crossing guard that was located on the corner of School Street and Brattleboro Road at 3:10pm when school was let out and stayed for approximately 10 minutes.
- Vehicles on school grounds seemed to always be stopping for pedestrians crossing that were not in a crosswalk.

Driver Behavior

- On the day that was observed, many cars were parking in front of the school at the "Loading Zone" signs and would quickly back out without looking.
- Drivers followed a single line of traffic to exit and enter School Street.

Environmental Conditions

- Noise of cars and traffic was not an issue.
- Buses were turned off instead of idling while they waited for students.
- Most parents kept their cars on while they were waiting to drop off or pick their child up, less parents shut their engines off while they waited in line.

Policies

- Non-custodial parents are allowed to pick students up as long as the school is notified of this change.
- Bike locks are not available for student at the school but they are allowed to bring their own to lock their bike to the bike rack.
- Helmets are required for students to wear while riding their bike to school but are not supplied by the school.
- Extensive afterschool program is offered that contains 80-100 children and varies each week.

Appendix C: Hinsdale High School Field Review

Hinsdale Middle/High School Field Review Fall 2015

During the month of October, students from the Keene State College Geography Department visited Hinsdale New Hampshire several times to examine and evaluate the safety conditions of routes in the proximity to the students who choose to walk and/or bike to school. The students were also looking to grasp a better understanding of the needs and interest of the school community to increase biking and walking ability. These observations took place for both morning drop off and afternoon pick up at the middle/high school. The most important findings in these observations are addressed in this document.

PARENT DROP OFF / PICK UP OF CHILDREN

- Parent drop off and pick up route and location is not clearly defined, however parents loop to the front of the building.
- The average wait time for pick up and drop off was around 1 minute. There were parents who arrived at the school 30 minutes before it ended.
- One staff was present during pick up and drop off. There could have been more supervision for the amount of children present.
- After students were dropped off or picked up, parents seemed to be more in a rush when leaving the school.
- Safety concerns included no signs or designated area for pick up and drop off and lack of crosswalks presents where children were leaving the school

Left photo: Bus drop off lane.
Right photo: Parent drop off location.

BUSES

- Bus drop off and pick up was located right in front of the school across from parent pick up and drop off. This area was used by cars before buses arrived.
- This area was not clearly marked by signs.
- One staff member was present during drop off and loading.
- Three buses were present during pick up and drop off.
- Safety concerns include the only pedestrian crosswalk leading commuting children through the loading and unloading area

SPEED

Right photo: Speed limit sign posted on Prospect Street.

- Speed limit signs were located on Prospect Street and Brattleboro Road that both have an entrance to School Street which the elementary and middle/high schools are located on.
- There are two speed bumps entering the school zone by the elementary school and few stop signs.
- The speed limit on Brattleboro Road and Prospect Street are 25 mph, however cars seemed to be going 30-40 mph on those roads.
- Turning onto School Street from Brattleboro Road there was one speed limit sign of 15 MPH. After the speed limit sign, there was another sign that said that the street was one way during the hours of 7 AM and 4 PM. This sign however was very small and had a lot of wording.
- Buses seem to follow the speed limit signs compared to cars.
- In front of the school there were no traffic calming devices other than a crosswalk from the parking lot and one right before the school coming from the side of Brattleboro Road. The school could benefit from speed bumps in front of the school to slow parents down after their child gets out of the car.

WAYFARING

- Entering and exit signs to the school are clearly defined.
- There are no signs for walking and biking routes.
- There are no signs to indicate where children will be crossing the road.
- There are no signs that indicate where the busses drop children off and that cars aren't allowed in that area.

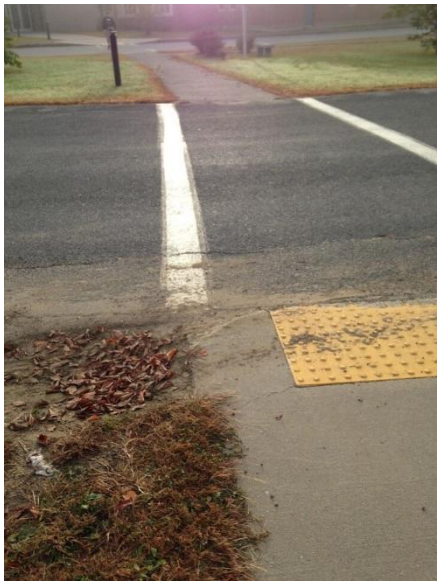
LIGHTING

- In the parking lot across from the school, there are six lights.
- School Street had lights.
- Prospect Street lacked lighting.
- Lighting on Brattleboro road was apparent

Top photo: Do not enter sign to the bus loop.
Below photo: Bike rack located by the gym.

BIKE USE/FACILTIES

- There is one bike rack located which could hold a total of 15 bikes.
- On the date that the site was surveyed there were 8 bikes at the bike rack, however the number of people who bike will vary depending on the weather and the day.
- Out of the 8 bikes only one was locked.
- It was only safe for children coming from Brattleboro Road to cross the street with the crossing guard at the crosswalk. There wasn't a crosswalk or sidewalk located on Prospect Street.
- There were no signs on Brattleboro Road or Prospect Street alerting drivers to the presence of bicyclists.
- Students will most likely ride on the sidewalks because of the heavy flow of traffic on the road and the speed limit outside of the school zone.



SIDEWALKS

- Students were using sidewalks along School Street in front of the school however they were a little bit faded.
- There is not a sidewalk present along Prospect Street.

- Along Brattleboro Road the sidewalk was in decent condition.

CROSSINGS

- There was a crosswalk from Brattleboro road to School Street and a crossing guard present for about 10 minutes before and after school.
- No crosswalk was present on Prospect Street.
- Cars stop for children crossing from student parking lot to go into the school.
- One crosswalk could be present leaving the gym where many students exit from to go to the athletic fields.
- There are curb ramps at the end of all cross walks.
- More students may walk if crossing guard is present longer.

Top photo: Crosswalk from the front of the school building to the parent drop off and student parking.
Below photo: Caution sign that children will be crossing but no crosswalk present.

ENVIRONMENTAL CONDITIONS

- Noise was not an issue in the area.
- Parking areas were clean but not clearly marked.
- School grounds were kept very clean.
- Idling did seem to be an issue when parents were waiting to pick up their children. A "No Idling" sign in the pickup and drop off area could help to prevent this problem.

DRIVER BEHAVIOR

- Parents seemed to be paying attention to children crossing roads.
- Once the child was dropped off, parents seemed to drive faster.
- Once pulling out onto Prospect Street, parents seemed to follow the speed limit.
- No U-Turns or driving the wrong way in the one way section was apparent.

POLICIES

- Bike locks were not provided by the school. One bike had a lock.
- Officer enforces wearing helmets but only one was at the bike rack.
- The student must provide their own helmet and must wear one.
- All students outside of a 1 mile radius of the school have an option for bus pickup.

Appendix D: Non-Sidewalk Infrastructure Assessment Sheet

HINSDALE SAFE ROUTES TO SCHOOLS

Pedestrian & Bicycle Infrastructure Assessment

In addition to the sidewalk data collected through the Statewide Asset Data Exchange System (SADES), please collect the following data regarding bicycling conditions and roadway conditions for streets without sidewalks. Use your field maps to create a unique ID for each road being assessed, and fill out a form for each road. Please take pictures with the tablets provided by SWRPC and enter Map ID and other useful information in the comment field.

Road Name: _____ **Map ID:** _____

All roads: For each road along the walking/biking route, please collect the following information (including roads with sidewalks and without sidewalks):

- ☐ Posted speed limit (if there isn't a sign, indicate "none"): _____ mph
- ☐ Paved road width (edge to edge): _____ feet
- ☐ Presence of painted center line(s): Y / N
- ☐ Travel Lane width (if painted center line is present): _____ feet
- ☐ Number of travel lanes in each direction: _____ and _____
- ☐ Presence of painted fog/shoulder line: Y / N
- ☐ Presence of paved shoulder: Y / N
  - Width of shoulder at narrowest point from fog/shoulder line to edge of pavement (to nearest half foot): _____ feet
  - Shoulder condition based on potholes, cracks, obstructions, etc.: Good / Fair / Poor
- ☐ Presence of unpaved shoulder: Y / N
  - Width of shoulder at narrowest point from pavement to vegetation (to nearest half foot): _____ feet
  - Shoulder condition based on surface evenness, obstructions, etc.: Good / Fair / Poor
- ☐ Presence of bicycle "share the road signage" or "Bicycle route" signage: Y / N
- ☐ Presence of on-street parking: Y / N
- ☐ Present of drainage grates Y / N
  - Grates flush with the road surface: Y / N
    - If no, record maximum vertical deviation from surface of road: _____ inches
  - Bars of grate parallel to the road: Y / N
  - Are grates Bicycle-safe?* Y / N

    **Bicycle safe means that the bars of the grate are NOT parallel to the road/traffic flow, which can lead to a bike tire getting stuck.*

Roads without Sidewalks: For roads without sidewalks, please collect the following information (in addition to information above):

- ☐ Narrowest width between edge of travel lane and obstruction that blocks walking (i.e. tree, post, etc.): _____ feet
- ☐ Presence of street lights: Y / N
  - Spacing between street lights (if present): _____ feet
- ☐ Whether walking paths or alternative walking route exists nearby: Y / N
  - If yes, please mark on field map

Appendix E: Parent Survey

PARENT SURVEY ABOUT WALKING AND BIKING TO SCHOOL

Dear Parent or Caregiver,

Your child's school wants to learn your thoughts about children walking and biking to school. This survey will take about 10 minutes to complete. We ask that each family complete only one survey per school your children attend. If more than one child from a school brings a survey home, please fill out the survey for the child with the next birthday from today's date.

After you have completed this survey, please send it back to the school with your child or give it to his/her teacher. Your responses will be kept confidential and neither your name nor your child's name will be associated with any results. Results will be analyzed by students in the Keene State College Geography Department as part of their senior capstone project.

Thank you for participating in this survey!

PLEASE WRITE CLEARLY ON THE LINES PROVIDED OR PLACE AN "X" IN THE CHECK BOX.

1. **What is the grade of the child who brought home this survey?** _____ Grade (K,1,2,3,…)

2. **How many children do you have in Kindergarten through 8th grade?** _____

3. **Is the child who brought home this survey male or female?**

- Male
- Female
- Prefer not to answer

4. **How far does your child live from school?**

- Less than ¼ mile
- ¼ mile up to ½ mile
- ½ mile up to 1 mile
- 1 mile up to 2 miles
- More than 2 miles
- Don't know

5. **On most days, how does your child travel to and from school? (Select one choice per column)**

Arrive to school	Leave from school
• Walk	• Walk
• Bike	• Bike
• School Bus	• School Bus
• Family vehicle (only children in your family)	• Family vehicle (only children in your family)
• Carpool (with other families)	• Carpool (with other families)
• Other (skateboard, scooter, etc.)	• Other (skateboard, scooter, etc.)

6. **How long does it normally take your child to get to/from school? (Select one choice per column)**

Travel time to school	Travel time from school
• Less than 10 minutes	• Less than 10 minutes
• 11-20 minutes	• 11-20 minutes
• More than 20 minutes	• More than 20 minutes
• I don't know	• I don't know

7. Has your child asked you for permission to walk or bike to/from school in the last year?

- Yes
- No

8. At what grade would you allow your child to walk or bike to/from school without an adult?

_____ Grade (K, 1, 2, 3, …) OR ☐ I would not feel comfortable at any grade

9. Which of the following issues affect your decision to allow, or not allow, your child to walk or bike to/from school? ***(Check ALL that apply)***	**10. Would you probably let your child walk or bike to/from school if this problem were changed or improved?** ☐ My child already walks or bikes to/from school		
• Distance	• Yes	• No	• Not sure
• Convenience of driving	• Yes	• No	• Not sure
• Time	• Yes	• No	• Not sure
• Child's before or after-school activities	• Yes	• No	• Not sure
• Speed/Amount of traffic along route	• Yes	• No	• Not sure
• Adults to walk or bike with	• Yes	• No	• Not sure
• Sidewalk/pathway/trail conditions	• Yes	• No	• Not sure
• Lighting along walkways	• Yes	• No	• Not sure
• Safety of intersections and crossings	• Yes	• No	• Not sure
• Route difficulty (steepness, flatness, etc.)	• Yes	• No	• Not sure
• Crossing guards	• Yes	• No	• Not sure
• Violence or crime	• Yes	• No	• Not sure
• Weather Conditions	• Yes	• No	• Not sure
• Time of year (fall, winter, etc.)	• Yes	• No	• Not sure
• Other (please write):	• Yes	• No	• Not sure

11. **Which of the factors from question 9 is the *most influential* in your decision to allow or not allow your child to walk to school?**

    (Please choose only one factor):

    _____

12. **Does your child have access to a bicycle?**

- Yes
- No

13. **Does your child participate in 60 minutes of physical activity every day?**

- Yes
- No

14. **Does your child participate in after school activities?**

- Yes
- No

15. **Does your child appear to perform better on mental tasks after he/she is physically active?**

- Yes
- No
- I do not know

16. **In your opinion, how much does your child's school encourage or discourage walking and biking to/from school?**

- Strongly Encourages
- Encourages
- Neither
- Discourages
- Strongly Discourages

17. **In your opinion, how much fun is walking or biking to/from school for your child?**

- Very Fun
- Fun
- Neutral
- Boring
- Very Boring

- Yes
- No

18. **Did you walk and/or bike to school as a child?**

19. **Please provide any additional comments below.**

    _____

    _____

    _____

    _____

Appendix F: Teacher Tally sheet

Safe Routes to School Students Arrival and Departure Tally Sheet

+ CAPITAL LETTERS ONLY – BLUE OR BLACK INK ONLY +

School Name: | Teacher's First Name: | Teacher's Last Name:

Grade: (PK,K,1,2,3...) 0 2 | Monday's Date (Week count was conducted) M M D D Y Y Y Y | Number of Students Enrolled in Class: 1 5

- Please conduct these counts on **two of the following three days Tuesday, Wednesday,** or **Thursday.** **(Three days would provide better data if counted)**
- **Please do not conduct these counts on Mondays or Fridays.**
- Before asking your students to raise their hands, please read through all possible answer choices so they will know their choices. Each student may only answer once.
- Ask your students as a group the question "**How did you arrive at school today?**"
- Then, reread each answer choice and record the number of students that raised their hands for each. **Place just one character or number in each box.**
- Follow the same procedure for the question "**How do you plan to leave for home after school?**"
- You can conduct the counts once per day but during the count please ask students both the school arrival and departure questions.
- Please conduct this count regardless of weather conditions (i.e., ask these questions on rainy days, too).

Step 1.
Fill in the weather conditions and number of students in each class

Step 2.
AM – "**How did you arrive at school today?**" Record the number of hands for each answer.
PM – "**How do you plan to leave for home after school?**" Record the number of hands for each answer.

Key	Weather	Student Tally	Walk	Bike	School Bus	Family Vehicle	Carpool	Transit	Other
	S= sunny R= rainy O= overcast SN=snow	Number in class when count made	–	–	–	Only with children from your family	Riding with children from other families	City bus, subway, etc.	Skate-board, scooter, etc.
Sample AM	S N	2 0	2	3	6	3		3	1
Sample PM	R	1 9	5	3	8	1	2	2	
Tues. AM									
Tues. PM									
Wed. AM									
Wed. PM									
Thurs. AM									
Thurs. PM									

Please list any disruptions to these counts or any unusual travel conditions to/from the school on the days of the tally.

+ +