Safe Routes to School:
Houghton Elementary & Middle School

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Department of Social Sciences

Michigan Tech
Social Sciences

HOUGHTON GREMLINS

Safe Routes to School

Executive Summary

This report is a result of a collaborative project between Houghton Elementary and Middle Schools and a team of students at Michigan Technological University to support a Safe Routes to School program. The purpose is to document how students currently get to and from school, identify barriers to walking and biking, and to make some recommendations for improvements that would promote safe walking and biking in the City of Houghton. The team mapped student addresses, surveyed students and parents, conducted walking audits of routes around each school, hosted a community meeting to gather feedback, and created a public online map where people can review the results and make their own observations of barriers and add suggestions for improvements. The full report and online map are available at www.houghtonsaferoutes.com.

Currently, only 3-5% of Houghton Elementary and Middle School students walk or bike to school, even in good weather. This is well below the national average (13%). Safe Routes to School is a federal program that is implemented by states (including Michigan) to promote safe active transportation among K-8 students. Active transportation promotes student health, reduces obesity, improves learning and classroom behavior, saves schools and families money, and reduces carbon emissions and air pollution from vehicles. Moreover, kids say they would prefer to walk or bike than to take the bus or be driven in a vehicle.

Key findings include:

- Kids, especially elementary age, say they want to walk or bike to school if they could. Parents, however, generally don't feel safe allowing them to walk or bike.
- About half of Houghton K-8 students reside outside of the district, meaning bus transportation is not available and it is too far to walk or bike. 102 of these students live in the City of Hancock.
- A large number of students (n=415) ride to school in a personal vehicle each day, even in good weather (early October). This means 65% of elementary students and 73% of middle school students arrive in a personal vehicle. This increases the amount of traffic coming/going from each school, adds to air pollution students are exposed to on school grounds, and reduces the ability of others to safely walk/bike.
- 141(40%) of elementary students live within a 20-25 minute walk to the school, with 80 living within half a mile. Only 16 current middle school students live within a short walk to school, but this number will increase in the next few years as students who are currently in the elementary school age into middle grades.
- There are few safe places to cross major streets in Houghton, including those close to both schools. This is a core problem with providing pedestrians access to schools and to the downtown.
- There are few maintained sidewalks in Houghton that are separated from street traffic, curbed, and kept clear of snow and ice. This limits safe places for children to walk, especially in winter.
- There are gaps in street lighting in neighborhoods near the schools. Given the few sidewalks and lack of pedestrian signals at crossings, lighting is important for the morning commute, especially near intersections.

- There is a general culture of prioritizing automobile traffic and disregard for pedestrians/bikers in the broader community that contributes to pedestrians and bikers feeling unsafe. This extends to the schools themselves, which most parents don't feel promote active transportation.

Recommendations

Altogether, there are multiple barriers to active transportation. It will take a long-term sustained effort to address all of them. Here, our team makes six recommendations for places to start. Ultimately, school and city leadership will need to work with parents, students, and community members and organizations to decide how to proceed and which improvements to pursue. The more people involved in this decision-making process, the more likely to achieve broad buy-in and the level of support and engagement necessary to change culture, programs, and infrastructure that support active transportation.

1. **Improve Safety on Sharon Avenue.** Install sidewalks separate from the road with green space on both sides of Sharon Avenue and paint lines and maintain the current bike shoulder. This would offer bike and walking access to both schools and connect residential areas to recreational bike trails. Lighting along this road should also be improved, particularly at intersections. Intersections of Sharon with Gundlach/Portage and Military/Superior should be improved with pedestrian islands or full stoplights with pedestrian signals added to replace 4-way stops.

2. **Safe Crossings on Bridge Street.** Currently zero elementary students living east of Bridge St. walk or bike to school. Parents of children living in East Houghton and near the elementary, say they would allow their kids to walk or bike if routes were improved to be safer, especially increasing the safety of crossings and adding sidewalks. There is currently no safe way for kids to cross Bridge Street. There are 52 students who live east of Bridge St. and within the Active Transport Zone and several more students living in Agate St. neighborhood just outside the Active Transport Zone who could be impacted by adding crossing guards or pedestrian signal.

3. **Facilitate Active Transport in West Houghton**. 58 elementary students live in West Houghton proximate to the school, yet only 38 of them report that they sometimes walk or bike. Several improvements could be made in this neighborhood to make active transport safer and more available. Walking school buses are a low-cost, high-impact solution that would group students together and offer adult supervision along the route. Sidewalks and lighting should also be improved.

4. **Create Drop Sites for Distant Students.** Students living out-of-district or farther from schools, could walk to school if there were defined and supervised drop sites from which students could safely walk. This would increase access to active transport and reduce the number of personal vehicles on school grounds, thus reducing congestion, air pollution, and increasing safety of walking/biking for other children. Drop sites should be conveniently located for parents driving into Houghton for work.

5. **Implement No-Busing and Idle-Free Zones**. One way to incentivize active transport is to not bus students who live proximate to the school. This is a common practice in school districts across the country, including several in northern climates like Minnesota and Wisconsin, where some

no-busing zones extend as far as two-miles. Eliminating busing within a half-mile distance from the elementary school would impact 80 elementary students, including 39 who currently primarily bus. This could be enough to eliminate a bus route, saving the school district approximately $37,000 annually (funds which could potentially be used to hire walking school bus leaders, crossing guards, or drop site attendants). Restricting idling on school district property (among buses and personal vehicles) would reduce air pollution that students are exposed to.

6. **Start an Active Transport Champion Program.** Create a community-driven volunteer organization to help sustain Safe Routes to School programs over time, to organize for improvements, and to address the culture of disregard for pedestrian.

The report was written by a team of undergraduate and graduate students at Michigan Technological University taking Advanced GIS (with Dr. Don Lafreniere) or Communities and Research (with Dr. Richelle Winkler) during Fall semester 2019. The broader Core Planning Team also includes school and local community leaders. The Core Planning Team invites additional members of the general public, K-12 students, teachers, and parents to get involved. Please contact them to learn how you can contribute.

The students who wrote this report included:

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We sincerely thank the many people who have provided information and helped us to collect and understand the information included in this report.

With questions or concerns, please contact:

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Table of Contents

I. Introduction

Safe Routes to School (SRTS)

Of students living within one mile of their given schools nationally in 2009, approximately 35% walked or biked to school, compared to the 89% that did in 1969, indicating that the preference for active transport methods has decreased over time[1,2]. In Houghton, only 5% of students are actively traveling to school. This corresponds to an increasing number of students who are now traveling to school in personal vehicles the US Department of Transportation notes that nationally, 10%-14% of car trips during morning rush hour are for school travel."[3] In Houghton, 69% (n=415) of elementary and middle school students commute to school by a personal vehicle. Experts recommend that children participate in physical activities for at least 60 minutes each day[4], utilizing active transportation methods in their commutes to and from school has been widely identified as a way to improve both physical and mental health[5-8]. In addition, utilizing active travel methods reduces pollution from personal vehicles that would otherwise be traveling to school. Despite these benefits, over the last several decades, more built and social barriers to using active travel have become prevalent across the country, such as worries about safety, lack of chaperones to travel with, and insufficient infrastructure[9-11].

Only **5%** of students in Houghton are actively traveling to school

Safe Routes to School (SRTS) is a federal program within the U.S Department of Transportation, with the goal of creating communities where both children and parents feel safe using active transportation and are encouraged to travel actively to and from school. They do so by providing educational programming and funding opportunities according to the Six E's Framework: Education, Encouragement, Engineering, Enforcement, Evaluation, and Equity[12], which will be elaborated on later in this report (**see page 27**). To accomplish this, the U.S Department of Transportation partners with individual states to fund major projects such as infrastructure and active travel programming. In Michigan, the Michigan Fitness Foundation administers the SRTS grant program with major initiative funding of up to $200,000 per school for infrastructure and $8,000 per school for active travel educational programming. This report represents the background research done in order to better-inform Houghton Elementary and Middle schools in their pursuit of funding. The goal of this grant is to significantly increase the number of children utilizing active transport as well as the safety of those children in their commutes to and from school.

Report Overview

This report represents a synthesis of the data collected and analyzed by the research team from the Department of Social Sciences at Michigan Technological University regarding the current conditions and perceptions of active transport in Houghton from both parents and students. By conducting research in a community-focused manner, we were able to identify several main structural and cultural barriers to children using active transport methods. Using this research, we have provided several recommendations (**see page 32**) on how to efficiently address current barriers to active, safe travel to school.

Core Planning Team

The Core Planning Team consists of the key stakeholders identified in this project, including contacts at the Michigan Fitness Foundation, officials from the City of Houghton, the Western UP Planning and

Development Region, the Michigan Department of Transportation, both school principals, and representatives from local walking and biking advocacy groups. This team was compiled and will serve as the community representatives that will utilize the finding within this report to make final proposal and intervention decisions.

II. Methods

The following methods were used by the MTU research team to collect data from a wide range of stakeholders, including HPTS students, parents, school administrators, and the general public.

Teacher Tallies

For three days in October 2019 (October 1-3 for the Elementary School and October 8-10 for the Middle School), teachers in all grades (K-8) completed a tally of students transportation choices to school. Teachers counted the number of students who walked, biked, rode in a school bus, used a family vehicle, carpooled, or used public transit to get both to and from school. The template for the teacher tallies can be found in **Appendix 3**.

Student Surveys

An online student survey was distributed to students in 3rd through 8th grades in October 2019 during their computer class. The purpose of this survey was to understand the students' perceptions and opinions regarding active transportation. The survey asked students questions about how they normally travel to and from school as well as their feelings about different transportation methods in order to understand: student perceptions and opinions of active transport, whether parents would allow them to walk or bike to school, and whether they would walk or bike to school if improvements were made so that they felt safer. For the 3rd, 4th, and 5th grade student survey periods, members of the Michigan Technological University research team helped proctor the survey, aiding students in understanding the survey questions. The template for the student surveys can be found in **Appendix 4**.

Parent Surveys

The national SRTS program has a standardized survey for school-aged parents to complete at home. These surveys were sent home with each child in grades K-8 and emailed to parent listserves in October 2019. This survey was designed to gain an understanding of parent perceptions of active transport, the environments around their homes, the school, and the routes to school with particular emphasis on the barriers to active transport their children face. The template for the parent surveys can be found in **Appendix 5**.

Walking Audits

Five walking audits were completed for each school in October 2019, with audit teams comprised of elementary and middle school students, parents, local policy makers, and members of the MTU research team. The audit routes were determined by the MTU research team by calculating the likely most-traveled routes by students (as determined by geospatial analysis) between student home locations and their school. During these audits, researchers recorded the observations and discussions by participants and took photographs of walkability and infrastructure issues and potential improvements along the routes. A synthesis of the walking audits can be found on **page 19** and a full report per route is in **Appendix 1 & 2**.

Community Meeting

The MTU research team facilitated a meeting for community members at Houghton High School on October 21st, 2019. The meeting included a presentation of the SRTS program and preliminary results from the walking audits and travel tallies in addition to roundtable discussions among community members about topics of concern and opportunities to improve active, safe travel to school for students. Community members used printed maps to document areas of concern and opportunities.

Spatial Analysis

The MTU research team applied multiple geospatial techniques to support the analysis and recommendations of this study using geographic information science (GIS). These techniques include: 1) mapping student and parent addresses using survey data; 2) estimating probable student routes to identify walking audit routes using network analysis; 3) creating slope-adjusted pedestrian active travel zones for each school; and 4) digitizing and analyzing walking audit and community meeting observations in order to identify areas of concern and support recommendations within an interactive web map application.

The Houghton Elementary and Middle Schools provided the MTU research team with anonymized student address data which was mapped and linked to student and parent survey data. This data is the foundation on which the geospatial analysis was conducted. Knowing where the students live is critical to determining how best to facilitate walking conditions and maximize outreach efforts. This sensitive address data was aggregated to street segments allowing for student sums to be calculated and to protect the anonymity of the students.

The mapped student addresses, represented as street segment student sums, allowed the research team to identify the walking routes students were most likely to use to and from school. Network analysis was conducted to determine the shortest route distances between students and their school and was synthesized with the street segment student sum data to determine the 10 walking audit routes.

Houghton Elementary and Middle Schools are both positioned near or at the top of a prominent valley ridge, begging the question, "Does topography impact a student pedestrian's route choice?" Under the assumption that topography and steepness of slope does play a role in route choice, the research team constructed slope-adjusted pedestrian active travel zones for each school, drawing on methodologies from similar projects (see **Appendix 6** for details). These active travel zones assumed a 1-mile networked distance as an appropriate walking distance for elementary and middle school students based on data from other SRTS projects. These active travel zones allow for quick assessment of how many students reside within the zone that are or are not walking to school and provide insights for the research team to make educational and infrastructural recommendations.

Utilizing the walking audit results and community meeting feedback, the research team digitized the observations in order to inform various recommendations. This synthesized data was mapped and published in an interactive web map application (available at www.houghtonsaferoutes.com) with the intent of providing the core planning team analysis tools to answer relevant questions (e.g., how many community members are concerned about the lack of sidewalks) and facilitating additional community feedback via the web map application.

III. Maps of Student Locations

Student addresses were obtained from school administrative records. Students were mapped to the closest street segment to protect student confidentiality.

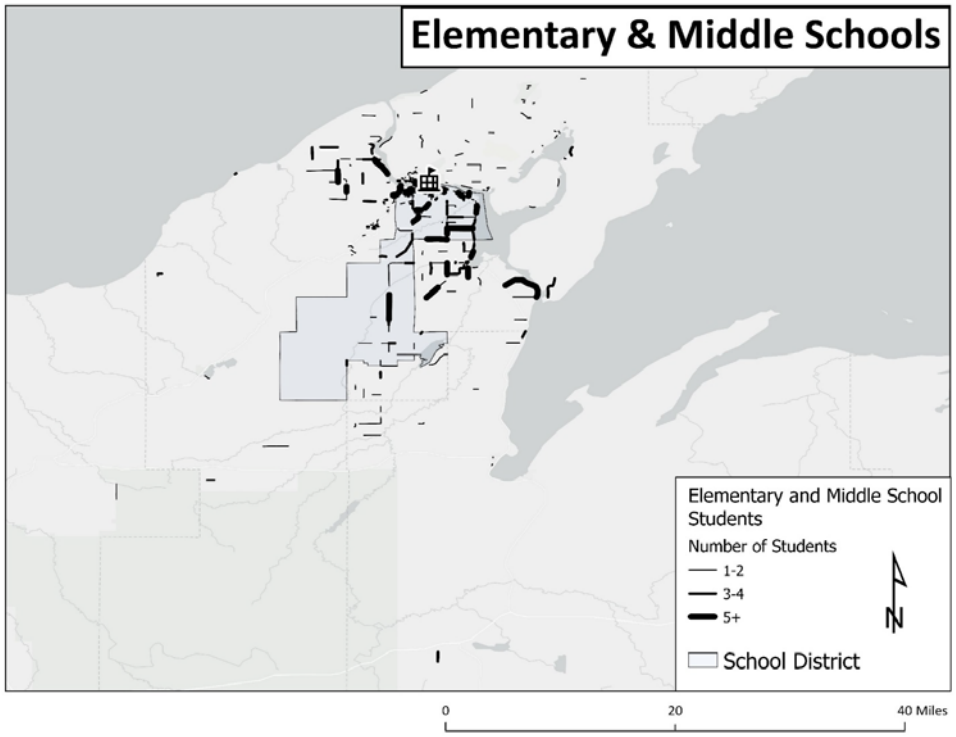


Figure 1: Map of student locations derived from administrative records, mapped to nearest street segment.

Elementary and Middle School students live across Houghton and Baraga counties. Nearly half of elementary school (46.5%) and middle school (50.3) students live outside of the school district. Even fewer live within walking distance of their respective schools.

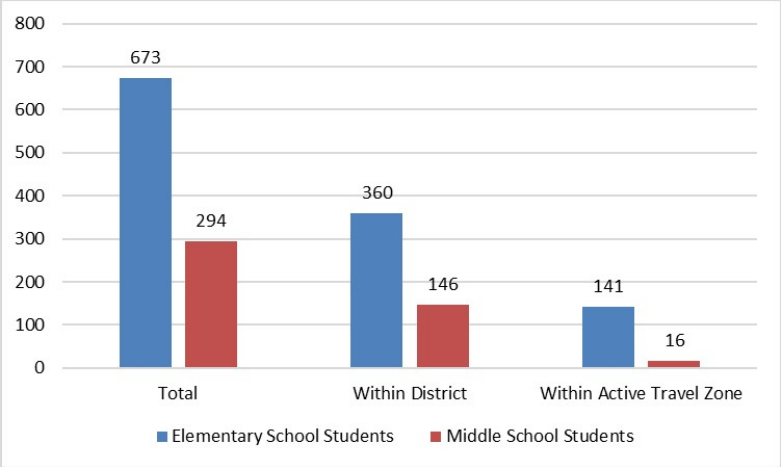


Figure 2: Student locations relative to school

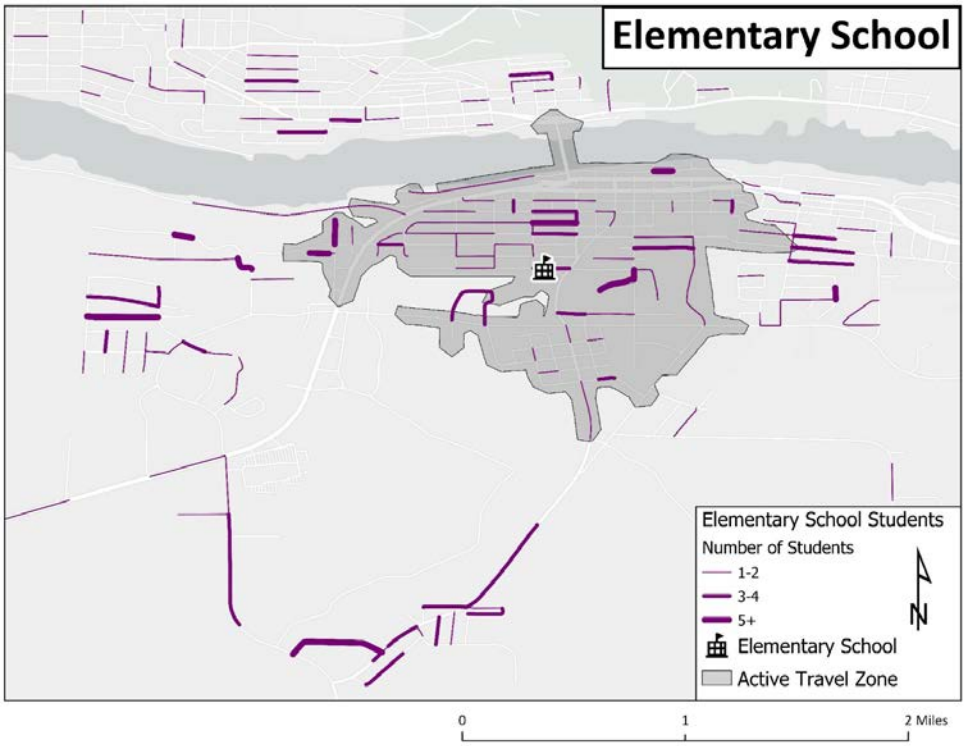


Figure 3: Elementary School student locations near the Elementary School

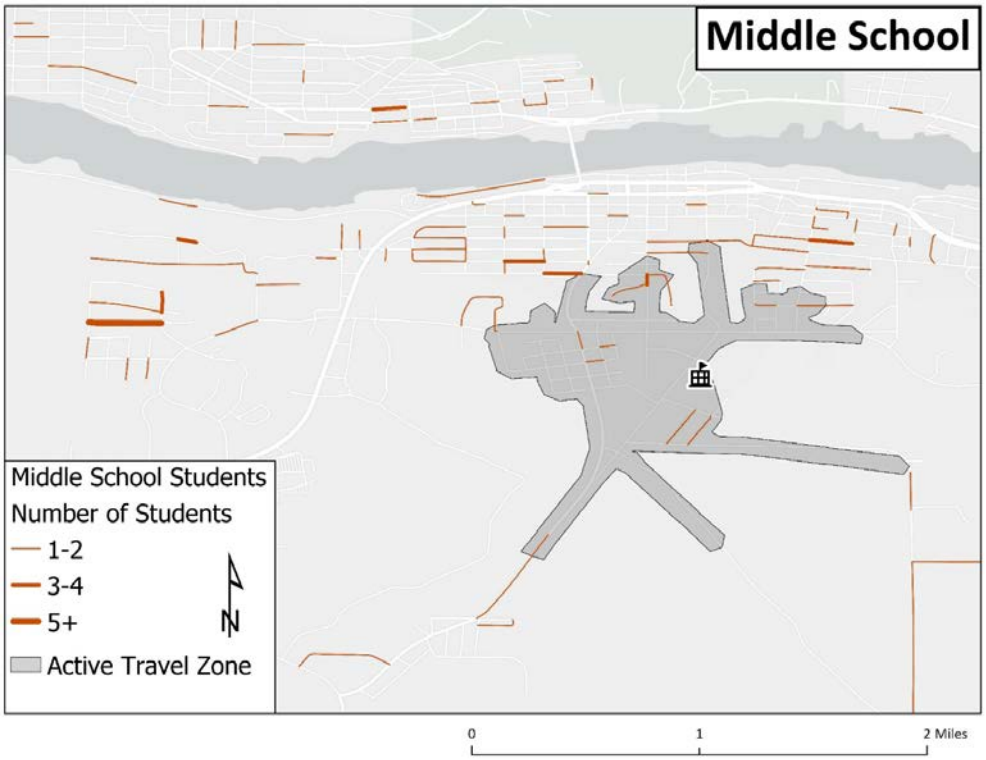


Figure 4: Middle School student locations near the Middle School

IV. Survey Results

Response Rates

The MTU research team collected three types of survey data in order to understand students' current travel modes, barriers that may be preventing students from walking or biking, and student and parent perceptions of active transport (see **Methods** section above).

Response Rates			
	Respondents	**Total**	**% Response**
Teacher Tallies			
Elementary	412	660	**62.4%**
Middle	278	311	**89.4%**
Student Surveys			
Elementary	323	326	**99.1%**
Middle	297	311	**95.5%**
Parent Surveys			
Elementary	154	660	**23.3%**
Middle	60	311	**19.3%**

Figure 5: Response rates to data collection methods

Response rates were similar to national and state averages. It is advised that interpretations of the parent survey data should be made carefully, recognizing that these relatively low response rates may not appropriately reflect the experiences and attitudes of all parents in this area.

Current Student Travel Methods

Teacher tallies indicated that only about 30 of 604 of tallied students walked or biked to or from school over the collection period. Compared to the estimated 13% of 5- to 14-year old children nationally that walk or bike to school[13], **only 5% of the tallied Houghton Elementary and Middle School students walked or biked to school over the given period**.

Arrival and Dismissal Tally Analysis							
Grade	**Time**	**Dates**	**Total Tallied**	**Walk**	**Bike**	**Bus**	**Vehicle**
Y5 thru 2nd	AM	10/1/2019-10/3/2019	145	3	0	53	90
Y5 thru 2nd	PM	10/1/2019-10/3/2019	145	0	0	69	76
3rd thru 5th	AM	10/1/2019-10/3/2019	192	8	0	54	130
3rd thru 5th	PM	10/1/2019-10/3/2019	183	7	0	80	96
6th thru 8th	AM	10/8/2019-10/10/2019	267	6	0	67	195
6th thru 8th	PM	10/8/2019-10/10/2019	266	13	2	73	179

Figure 6: Results from the Teacher Tallies

The majority of students rode in personal vehicles or school buses to get to and from school. In fact, **65% of Elementary School students and 73% of Middle School students rode in a personal vehicle**. This much personal vehicle traffic around the schools leads to congestion, delays, increased traffic (which makes it more difficult for others to walk or bike), and air pollution around the schools. Many of those riding in personal vehicles live out-of-district (school choice students) and so are not eligible for bus transportation.

The results of the Elementary School student survey indicate that the few students who walk or bike to or from school live within close proximity to the Elementary School in West Houghton neighborhoods. Figure 7 shows the number of Elementary School students who responded that they walked or biked to school on the day they completed the student survey. Students who indicated that they used passive travel methods such as a personal vehicle or bus are shown in red. Thicker lines represent more students living on that section of street. The active travel zone, shown in gray, indicates a conservative easy walking zone to the Elementary School that factors in the slope of the roads. Students living within this zone should be able to walk to the Elementary School in under 20 minutes. **No students living east of Bridge Street or West of M-26 indicated that they used active transport methods**.

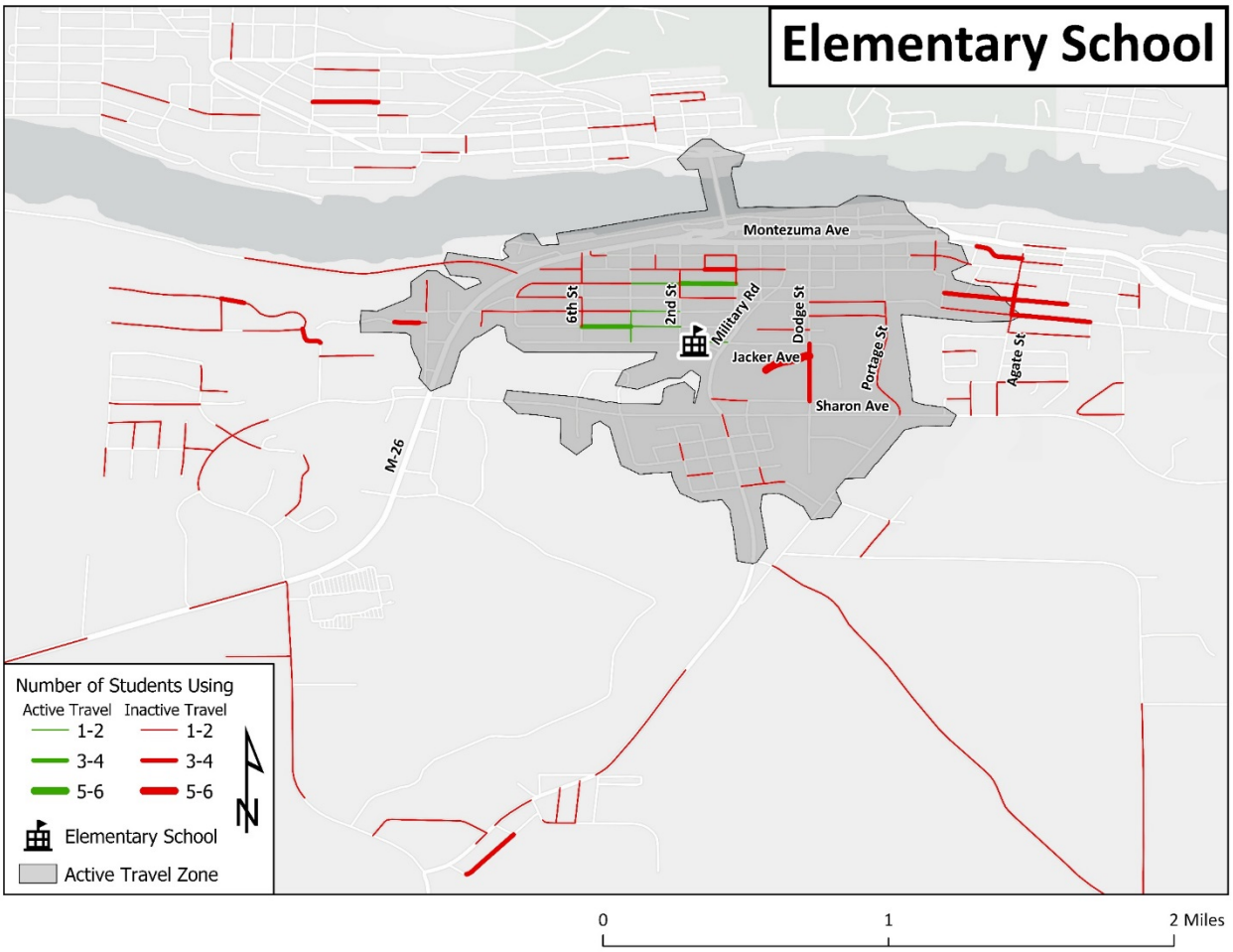


Figure 7: Number of Elementary School students using active and passive travel

Similarly, the results of the Middle School student survey show that the few students who walk or bike to or from school also live within close proximity to the Middle School. Figure 8 shows the number of Middle School students who responded that they walked or biked to school on the day they completed the student survey by their street of residence. The active travel zone, shown in gray, indicates locations where students should be able to walk to the Middle School under 25 minutes. There are very few students living north of Sharon Avenue and west of Bridge Street who indicated that they used active transport methods.

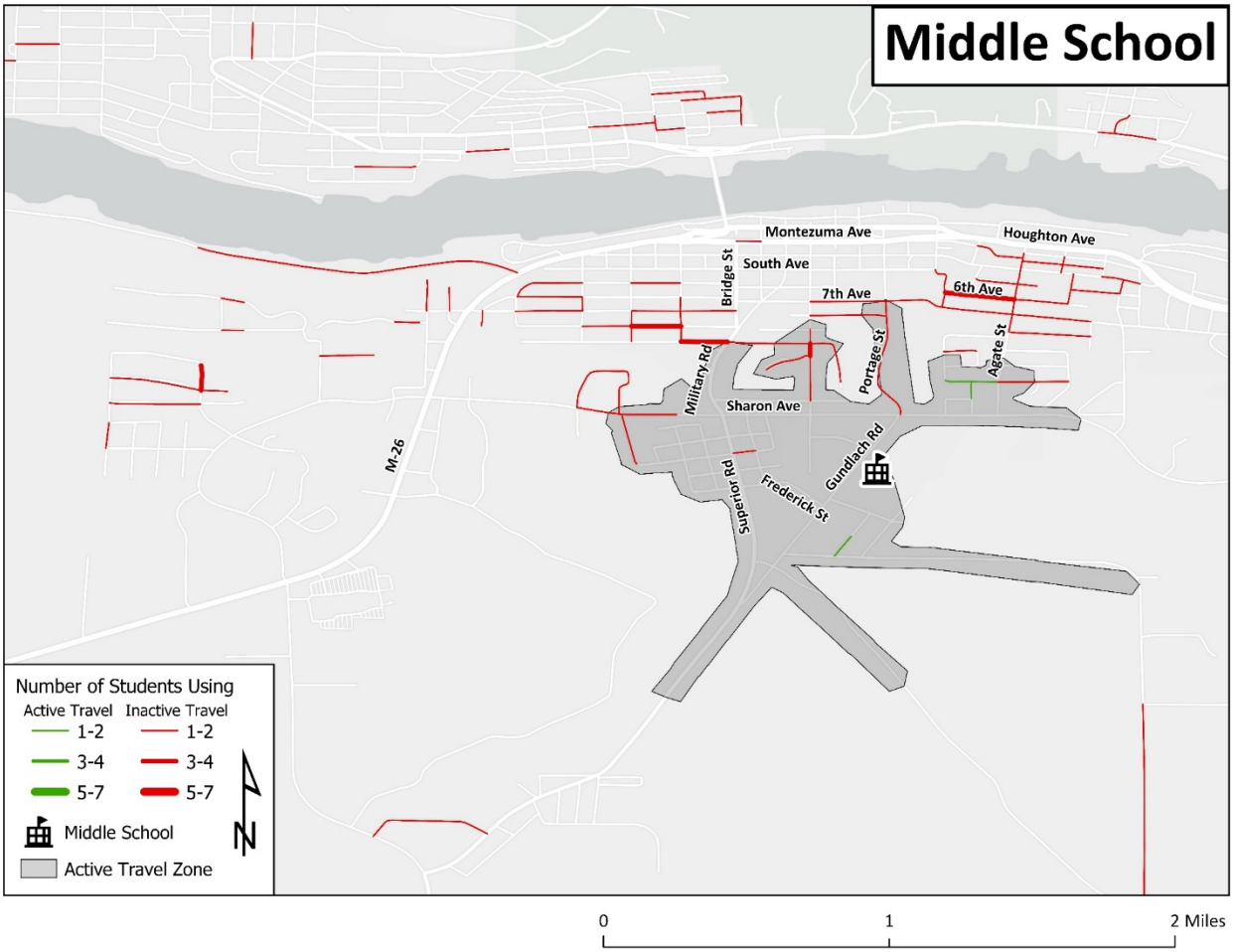


Figure 8: Number of Middle School students using active and passive travel

Perceptions of Active Travel

Before interpreting reasons as to why students are not using active transport methods to get to and from school, it is important to understand whether they even want to walk or bike. In the parent survey, parents were asked "Has your child asked you for permission to walk or bike to/from school in the last year?" Out of the Elementary School students that live within the active travel zone of the Elementary School, **59% of parents responded that their children have asked to walk or bike to school**. In addition, students were asked in the student survey "If you had a choice, how would you most like to get to school?" Out of the Elementary School students who live within the active travel zone of the Elementary School, students reported wanting to walk most frequently (45.87%), followed by biking

(41.28%), be driven by their parents (33.03%), or ride the school bus (17.43%). Out of the Middle School students who live within the active travel zone of the Middle School, most reported wanting to bike (48.15%), followed by wanting to be driven by their parents (44.44%), walk (37.04%), or ride the school bus (29.63%).

The maps below show where students who have asked their parents for permission to walk or bike to school live in green ("Yes"). Red ("No") represents street segments where students who live there have not asked, and yellow ("Mixed") represents street segments where some parents living in that area reported "Yes", others "No", and some "Not Sure" or "Don't Know". Note that only parents who responded to the parent survey are mapped here, so many students are not represented. Important observations can still be drawn however. **Most of those children who have asked to walk or bike live within the active travel zone of their respective schools**, meaning that it is a feasible request. For the Elementary School, it is common for students living east of Bridge Street to ask to walk or bike, and some kids living west of M-26 have also asked. **This is noteworthy given that no students in these neighborhoods currently report using active transport**.

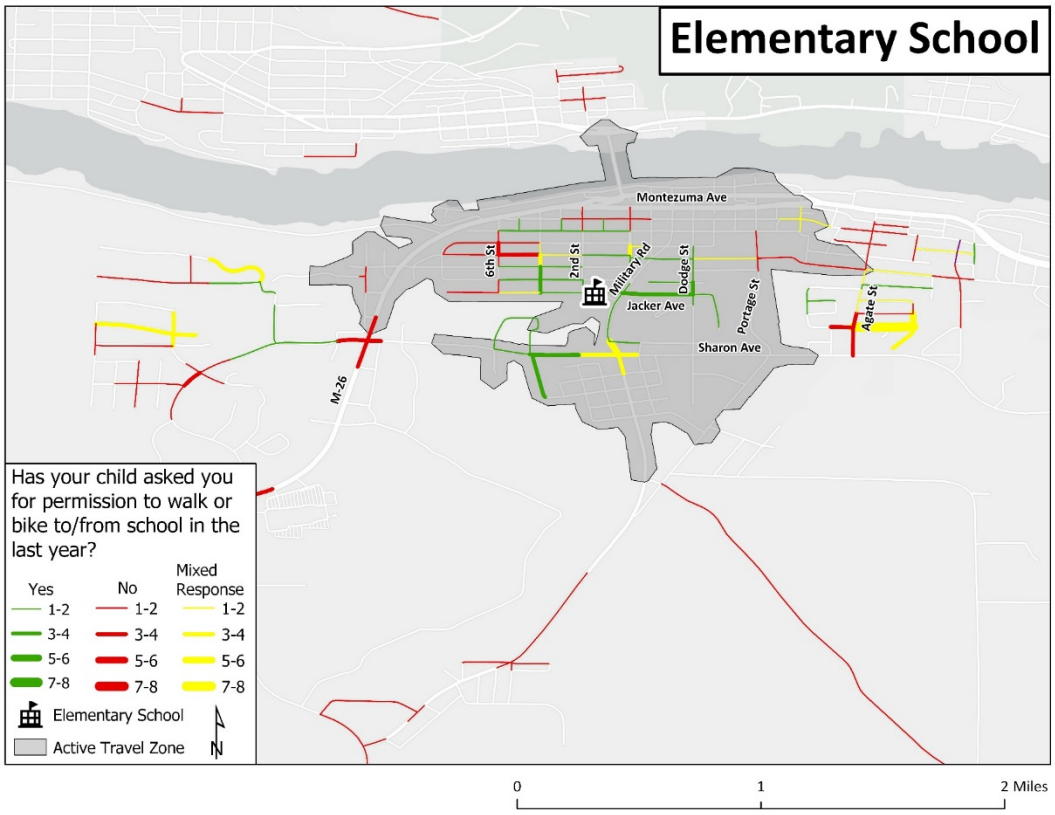


Figure 9: Number of Elementary School students who have asked permission to walk or bike for school commutes

For the Middle School, most parents who responded to the parent survey reported that their children have asked to walk or bike, including several who live marginally outside the active transport zone. **This suggests that Middle School students may be more interested in biking or that they might accept walking longer distances to school**. Several Middle School students living near the Elementary School have also asked for permission to walk or bike to school, in addition to a large group living near Agate Street. Middle School students living in these neighborhoods would need to cross and walk along Sharon

Avenue, which is currently an area of concern as noted in the Walking Audit and Community Meeting information described later in this report.

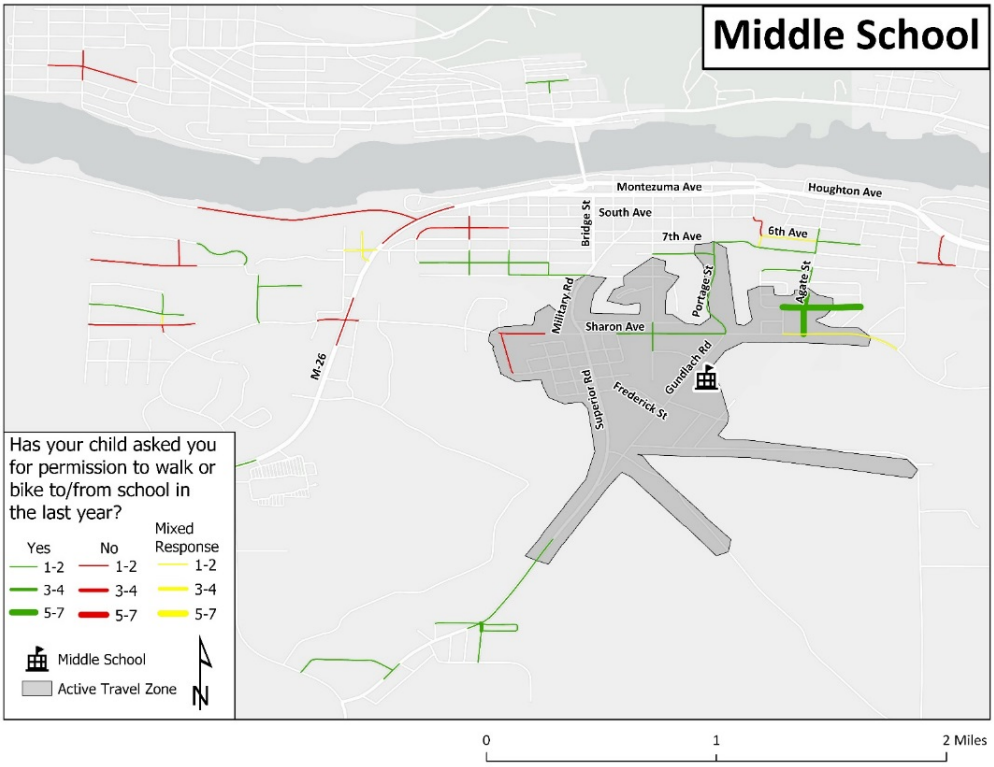


Figure 10: Number of Middle School students who have asked permission to walk or bike for school commutes

Responses to the parent and student surveys show that children do in fact have an interest in utilizing active transport methods to get to and from school. Despite this, very few students currently walk or bike to school.

Parents' Top Concerns—

The most commonly cited barriers that impact parents' decisions about allowing their children to walk or bike to school include speed and amount of traffic, the safety of intersections and crossings, available infrastructure such as sidewalks and pathways, and crossing guards to assist with walking or biking to school.

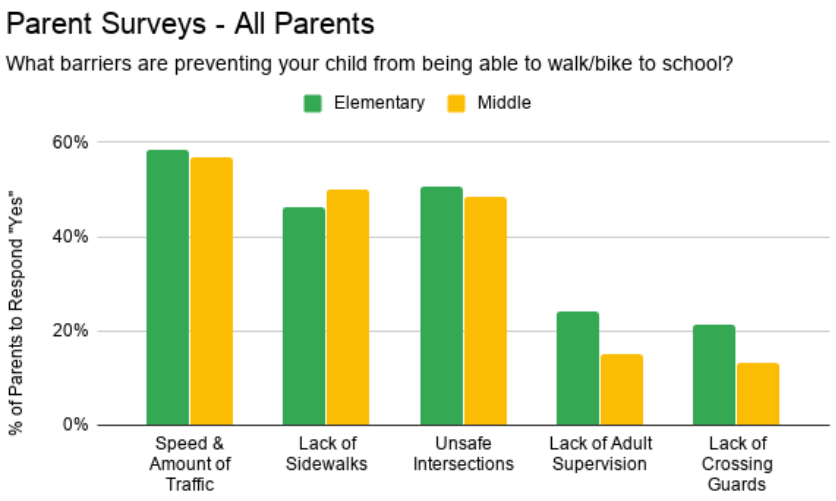


Figure 11: Top barriers preventing parents from allowing their children to walk or bike to school

Thinking about possible improvements that could be made, parents were asked if they would allow their child to walk or bike to school if specific kinds of improvements were made. **The improvements that had the largest impact on parents' willingness to let their children walk** were infrastructure improvements such as adding sidewalks or pathways or improving the safety of intersections and crossings, decreased speed and amount of traffic, and adding crossing guards or other adults to assist with walking or biking to school.

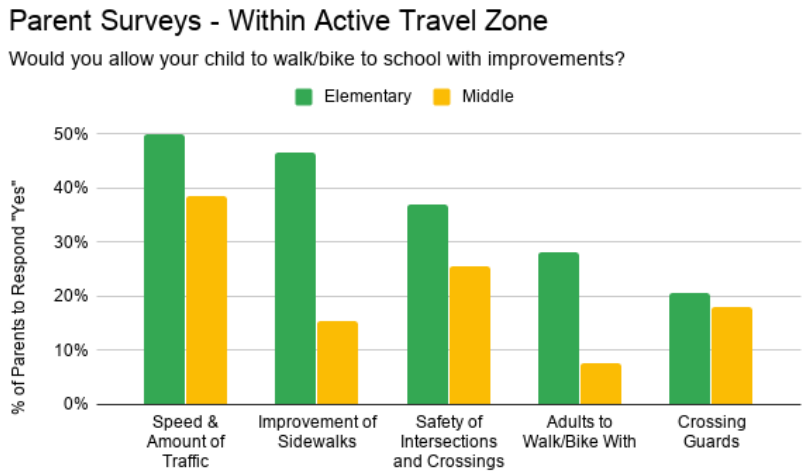


Figure 12: Top improvements parents would like to see before allowing their children to walk or bike to school

Students are even more optimistic about walking and biking to school if the safety of their route was improved. Of the Elementary School students that live in the active travel zone, 75% responded that they would walk or bike to school if their route to school was improved so that they felt safer, and an additional 24% said they might. Of the Middle School students living in the active travel zone, 56% would walk or bike if improved, and an additional 37% might. This means **that 99% of Elementary School students (n= 108) and 93% of Middle School students (n=25) living in the active transport zone would or might walk or bike to school if their route was improved**.

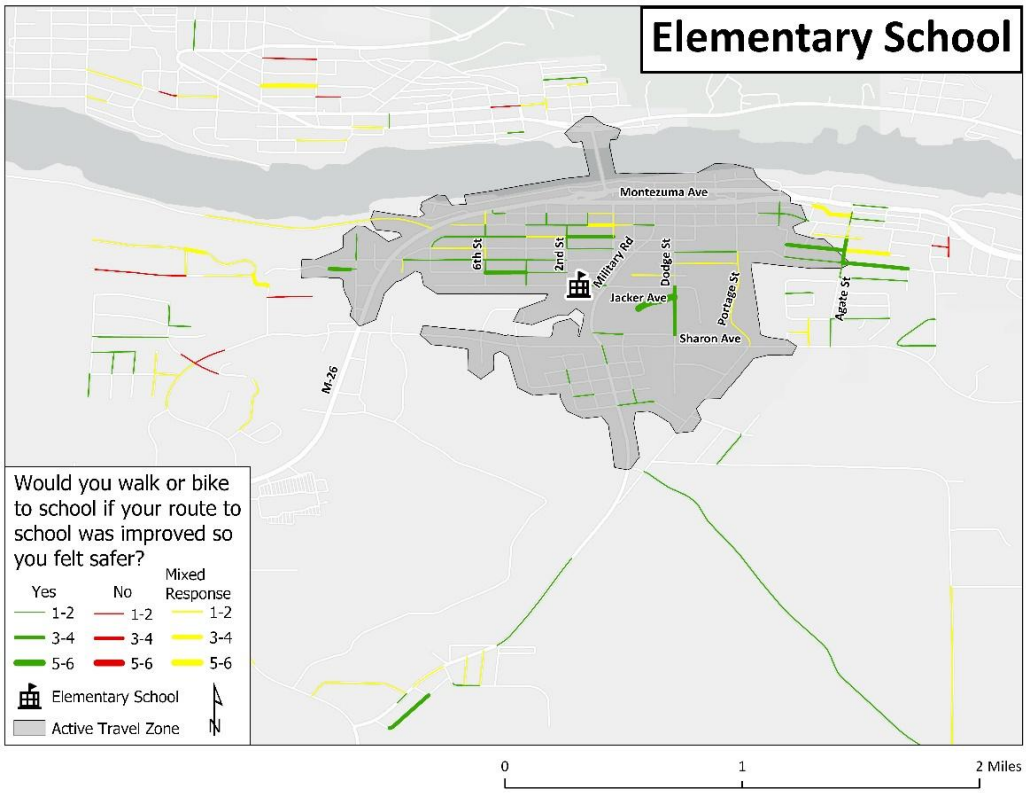


Figure 13- Elementary school students in active travel zone who would walk to school with route improvements

Although there are fewer Middle School students who live in the Middle School active travel zone, the majority of those students who do live within walking distance of the Middle School would or maybe would walk or bike to school if their route was improved. Several others just outside of the active travel zone would also walk or bike to school.

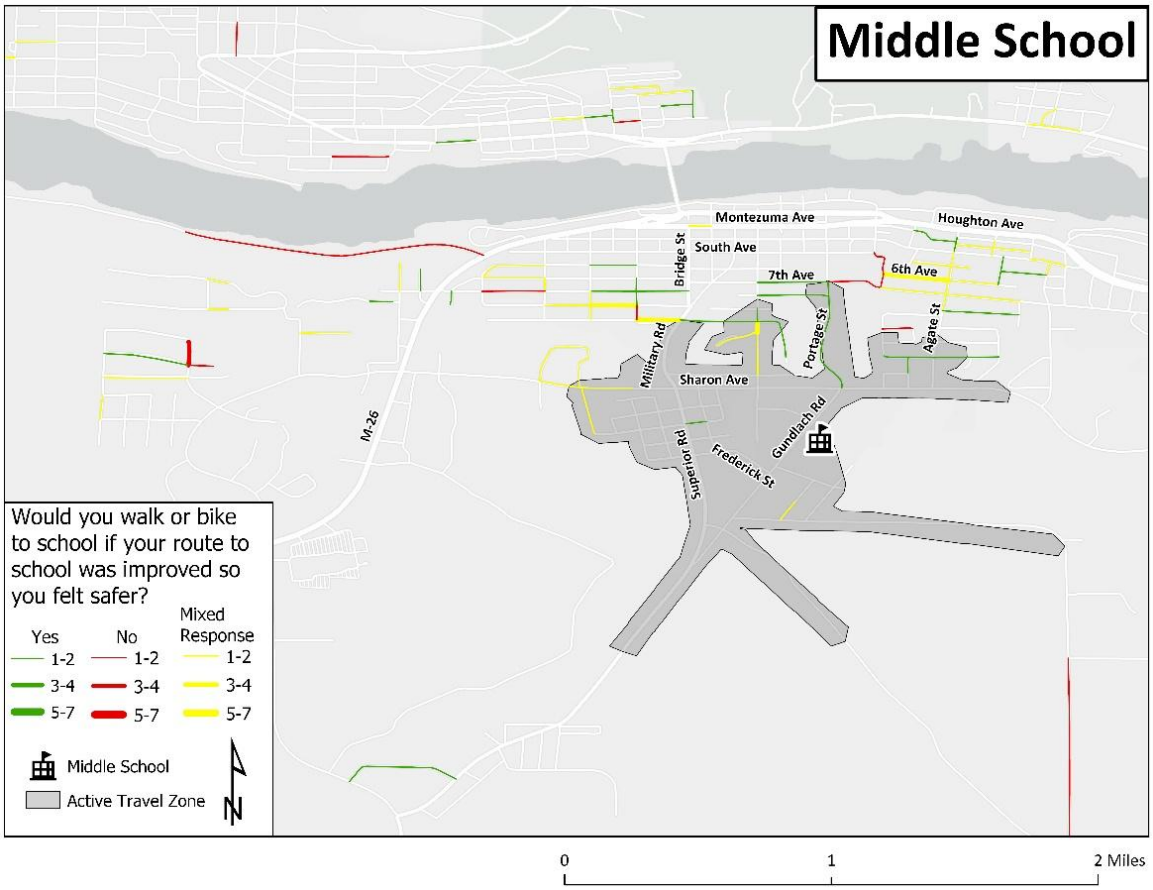


Figure 14- Middle school students in active travel zone who would walk to school with route improvements

V. Walking Audits

Route Summary

Walking audit routes were completed at both the Houghton Elementary and Middle Schools to identify potential hazards or barriers that students encounter during active travel to and from school. Walking audits provide first-hand experience for stakeholders, community members, and students and increased awareness of the limitations and opportunities for active travel in the community. Identifying barriers helps to recognize opportunities for infrastructure improvements and to increase the number of students who engage in active modes of transportation.

A total of ten walking routes were audited, five at each school. Small groups were assigned to each route to gather information on observations made by the stakeholders. Each group comprised of two MTU student researchers and at least one of the following stakeholders: MTU professor, student, parent, community member or local policy maker. MTU student researchers recorded both qualitative and quantitative data representing observations made during the walking audits. The mobile GIS tool, Survey123, was utilized to link observations with a geographical location for accurate representation and later spatial analysis. Photographs were captured for most recorded observations. Observations focused on the following broad categories: sidewalks or formal trails, street crossings, traffic speed, informal routes, school zones, and other barriers.

Areas of concern were identified from the recorded observations about barriers that inhibit students from walking and biking. Areas of concern are locations where there is either a high number of observations that impair student walkability or are areas where an infrastructure or programming change would impact a large number of students. Areas of concern were also collected during the community meeting, where community members created participatory maps by locating areas of concern and other observations on a map of Houghton. Figure 15 is a map showing a synthesis of the areas of concern from all of the Houghton Elementary and Houghton Middle School audit routes along with observations from the community meeting.

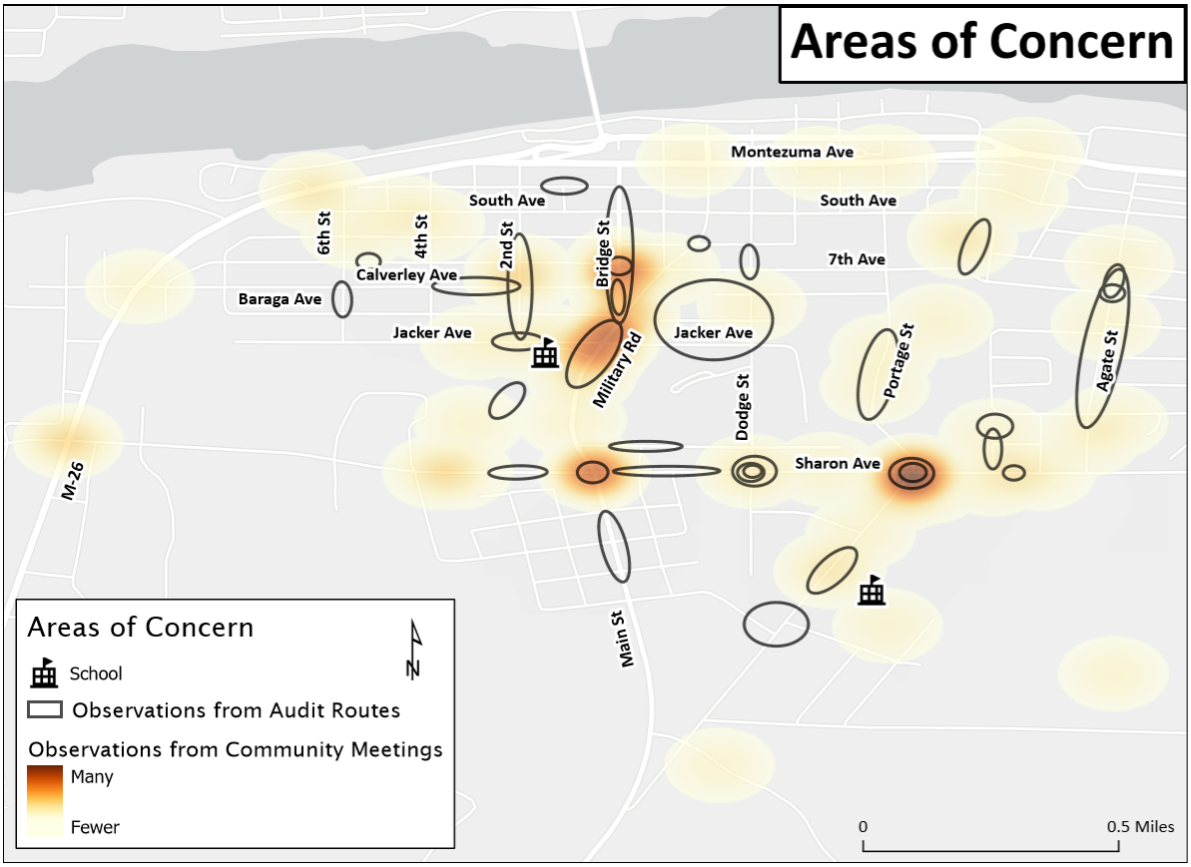


Figure 15: Areas of concern identified from the Elementary and Middle School audit routes and community meeting observations

Elementary School

On October 7th, 2019, five walking audit routes were conducted from 3:30-5:00 PM. In total, ten MTU student researchers, two MTU professors, five students, three parents, and two policymakers participated. The following walking routes were audited: (1) South on Military Road, North on Dodge Street; (2) West Houghton Neighborhood; (3) West Central Houghton; (4) Neighborhood South of Houghton Elementary School; (5) East Houghton Neighborhood (**see Appendix 1**). From these, a total of 120 observations were noted along all of the routes. The most noted observations include: no sidewalk or trail, driver's view obstructed, fast traffic, and no pedestrian signal or marked crosswalk.

Twelve areas surrounding Houghton Elementary school were identified within a one-mile walking distance. The top three concentrated areas of concern are:

Bridge Street: Three out of the five audit routes identified areas of concern along Bridge Street. A total of twenty-one observation points was collected on Bridge Street. When referencing the crosswalk at the intersection of Bridge Street and Jacker Avenue, one parent said, "We really need a crossing guard here. Maybe even a stoplight." A narrow sidewalk along Bridge Street can make it difficult for students to walk during the winter when there is snow. One mom stated she "would allow them to walk in the winter if the sidewalks are clear."

Sharon Avenue: Sharon Avenue poses as another barrier for students during active travel. Students living within the one-mile distance may have to cross Sharon Avenue to reach school. Observations during the walking audit, especially on route four, noted the lack of sidewalks as a barrier. Further the intersection at Sharon Avenue and Military Road does not include any pedestrian lighting or marked crosswalks and it is a noted busy 4-way intersection. Additional contributing barriers can be found in figure 16.

West Houghton Neighborhood (near Elementary School): Few students who live in West Houghton near the Elementary School walk or bike. Many observed barriers in this area may be contributing factors. Walking audits for route two and three collected a total of forty-five observation points incorporating these encountered barriers. Several observations noted that there are some sidewalks, but they are poorly maintained or noncontinuous. Additionally, crosswalks are faded and hard to distinguish. Referring to traffic, a participant noted, "Not a lot of people stop at the stop signs on Jacker Avenue, and they go really fast down the road even though there is a posted school sign." Another said, "Traffic goes really fast down this road from a lack of stop signs."

BARRIERS IN ELEMENTARY SCHOOL AREAS OF CONCERN		
Bridge Street	**Sharon Avenue**	**West Houghton**
Speed limit not obeyed	Narrow or no sidewalk	Poor or no crosswalks
High traffic volume	Sidewalk too close to road	Poor or no sidewalks
Narrow or no sidewalk	High traffic volume	Noncontinuous sidewalks
Obstructed driver/pedestrian view	Traffic does not yield	Obstructed driver/pedestrian view
No pedestrian signals		
Poor lighting		

Figure 16: Observed barriers in the identified areas of concern for the Elementary School

Middle School

Five walking audits for the middle school were conducted on October 16th, 2019, from 3:30-5:00 pm. Ten MTU student researchers, two MTU professors, six students, two parents, and one policymaker participated. The following walking routes were audited: (1) Dodge Street to West Houghton; (2) Hurontown - Neighborhood West of Houghton Middle School; (3) Agate Street Neighborhood; (4) East Houghton Neighborhood; (5) Northwest along Sharon Avenue and Dodge Street (see **Appendix 2**). Overall, a total of 131 observations were recorded. The most noted observations include: fast traffic, no sidewalk or trail, no pedestrian signal or marked crosswalk, and driver's view obstructed.

Nineteen areas surrounding the Houghton Middle School were identified within a one-mile walking distance. The top two concentrated areas of concern are:

Intersection of Gundlach Road & Sharon Avenue: Four walking audit routes identified the intersection of Gundlach Road and Sharon Avenue as an area of concern. Observations about this barrier are in figure 17. When crossing the intersection, one policymaker noted, "The kids with us are confused and not sure how to cross or when." A Middle School student who normally walks to school stated, "It is hard to cross right after school when there is a lot of traffic and buses, but if you wait like 15 minutes, it's ok." also referring to the Gundlach Road and Sharon Avenue intersection.

Sharon Avenue: There are similar barriers along Share Avenue (see figure 17) Eighteen observations points were collected along Sharon Avenue. One student mentioned that they "Feel safer on the north side of the road" referring to Sharon Avenue, and a policymaker also stated, "Crossing Sharon is difficult as there aren't any crosswalks, and it is very busy."

BARRIERS IN MIDDLE SCHOOL AREAS OF CONCERN	
Gundlach Road & Sharon Avenue Intersection	**Sharon Avenue**
No sidewalk or trail	Fast Traffic
Sidewalk too close to road	No sidewalk or trail
No curb ramps	Paved shoulder poorly maintained
No pedestrian signal	No pedestrian signals or crosswalks
High traffic volume	High traffic volume
No curb ramps	Poor lighting

Figure 17: Observed barriers in the identified areas of concern for the Middle School

See **Appendix 2** for detailed walking audit routes with photographs and maps

VI. Qualitative Insights

Many factors influence the decision parents and students make when deciding what mode of travel to take when travelling to and from school. In addition to infrastructural barriers, cultural and social barriers also impact the likelihood of walking to school such as the perception of safety along a route, or how safe pedestrians feel when crossing an intersection. Pedestrians have different perceptions about what is walkable, even if there are sidewalks, or other types of infrastructure in place. Are sidewalks scary because they are too close to the road? Is traffic intimidating because it is deafening? Does a person feel like they are not as important as cars because of the lack of pedestrian infrastructure? This kind of data is important because these barriers are real. Sometimes, these attitudes add up and create a culture that is not receptive towards change.

Methods

The key themes outlined below were determined primarily based on observations taken from the Community Meeting. Attendees gathered around maps of the neighborhoods adjacent to the respective schools to record observations and to point out known barrier to active walking to school. They were also asked why kids do not walk to school, and what can be done to fix it. Notes from the meeting were coded into themes and the themes with the highest frequency were selected. A Word Cloud (**see page 26**) was also used to identify important themes.

Key Themes

Key themes are important messages that need to be addressed within the Houghton community. We found that overall there is a culture of disregard for pedestrians that socially, politically, and institutionally discourages walking in Houghton. Parental concerns were also added to one of our themes because we noticed that parents have many fears pertaining to active transport. We want to highlight that within the culture of disregard for pedestrians, there is a need for local bodies to encourage walking and biking. The research team wants to emphasize the rewards associated with active transportation and talk about why children should walk to school. These themes are important influencers for why parents are not letting their children walk or bike. These themes should be discussed honestly to ensure that stakeholders get to the root of issues and can move to foster improvements.

Culture of Disregard for Pedestrians

The culture of disregard for pedestrians is a combination of a lack of encouragement, infrastructure, engagement, and social patterns that surround Houghton consensus around walking. Trying to cross Sharon Avenue along Military Street there is traffic that makes it hard for pedestrians to cross in all directions. The impeding presence of cars urges pedestrians to hurry and cross the road even if it might not be an ideal time. One parent commented, “It's terrifying to think that a car would hit my child because the driver didn't yield to the child crossing the street.”

There is a bit of a chicken and egg issue with Houghton’s walkability. Are sidewalks not maintained because there are no pedestrians, or are pedestrians not walking because there are no sidewalks? When infrastructure is absent, initiative within the local government to enact solutions is unfortunately rare. Pedestrians do not seem to be on the priority list because city officials do not believe Houghton residents’ are interested in walking. City planners believe that people do not walk as much as they used to and that people would rather drive than walk, thus priority is to invest in roads and not sidewalks.

Local walking and biking initiatives show the long-standing interest in active transportation in the community.

> "Active transport is not emphasized as a way for students to travel from school."
> ***Parent***

Several people expressed that they would like the see active transport encouraged within the school and city of Houghton. One parent says "active transport is not emphasized as a way for students to travel from school". Houghton is lacking Complete Streets which are "roadways planned, designed and constructed to provide appropriate access to all legal users in a manner that promotes safe and efficient movement" which can be for any means of legal transportation[14]. Parents and community members wish active transport was encouraged with proper knowledge and infrastructure in place.

Parental Concerns

Houghton has a diversity of parental concerns because our geography is unique. Parents are very concerned about the safety of their children if they were to choose active transport when traveling to school, primarily because they feel like the current infrastructure and traffic patterns are not safe for walking or biking. Traffic, especially during rush hours, is significant. For young children, parents are worried about how their students will safely cross the street, the possibility of getting lost, and children making it to school on time. Many streets lack visibility, especially lighting, for students to safely walk to school. Parents are worried about hills because they make it even harder for drivers to see pedestrians. Many of the parents also associate hills with accidents because during the winter months, it is easy for a child to slip. One solution parents recommended was the use of walking school busses led by an adult. A walking school bus would be led by an adult and pick up children along a route. This helps children go to school on time while traveling on a safe and supervised route. Using lights or reflectors can help participants increase their visibility, especially during the dark morning commute.

Positive Rewards Associated with Active Transport

Active transportation improves health, well-being, social connectedness[12]. Students who are active during their commutes to school have more robust friendships, greater sense of independence, enjoyment of the environment and several health benefits such as lower obesity, lower rates of diabetes, and cardiovascular health[12]. While on a walking audit a student was reflecting on their time living in a different city where walking was the main form of transportation. The student described walking about a mile on the way to and from school. The student had a lot of pride from walking that route every day and is something she would like to replicate in Houghton. Students who participated in our walking audits noted several positive observations about the times they have walked to school such as passing over little streams, noting native plants and apple trees that they would like to pick and have a snack on the way home. Choosing active transport can reduce compartmentalized living that is being seen and replace it with outdoor experiences[15]. When choosing active transport, students have opportunities to make new friends or grow existing friendships face to face[15]. By having children engage in active transportation early in life this could produce lifelong healthy habits.

Key Barriers

In addition to these key themes, participants discussed key barriers that limit walking/biking to school. Although these things can be counted, like how many sidewalks are missing crosswalks, sometimes these physical barriers come with stories and human experiences that help shape the way we view a route. Lack of sidewalks, crosswalks, bike paths, and poor lighting are big problems in Houghton. They

become even greater problems when there is a social stigma against walking along a route, and over time, decreases active travel participation.

One 6th grade student in the Middle School audit walks to and from school almost every day, but the lack of sidewalks makes it difficult for them to walk. Shoulders provide some space for the student to walk in, but traffic is intimidating, especially when cars zoom pass them. When leaves begin to fall, and snow covers the ground, finding a shoulder becomes an impossible game of guessing where a lane ends. Many of the streets do not feature crosswalks. It is easy for oncoming traffic to hit pedestrians, especially since many of the roads have no clear distinction between walking pathway and driving lane. This is a recurring pattern because poor infrastructure discourages kids from walking to school. The 6th grader remarked that "There should be sidewalks on every street. And bike lanes."

> "There should be sidewalks on every street. And bike lanes."
> ***Sixth Grade Student***

Parents are worried that accidents could potentially happen when kids have no sidewalks they can use. When parents do not feel like their kids are safe, they do not let their kids walk to school. A lot of our audit routes had poor visibility (**see audit route summary page 19**). During the walking audits, one of the researchers was almost hit by a car coming south on Military making a left turn on Sharon. If oncoming traffic had difficulty seeing a grown adult, how much harder would it be spot a child?

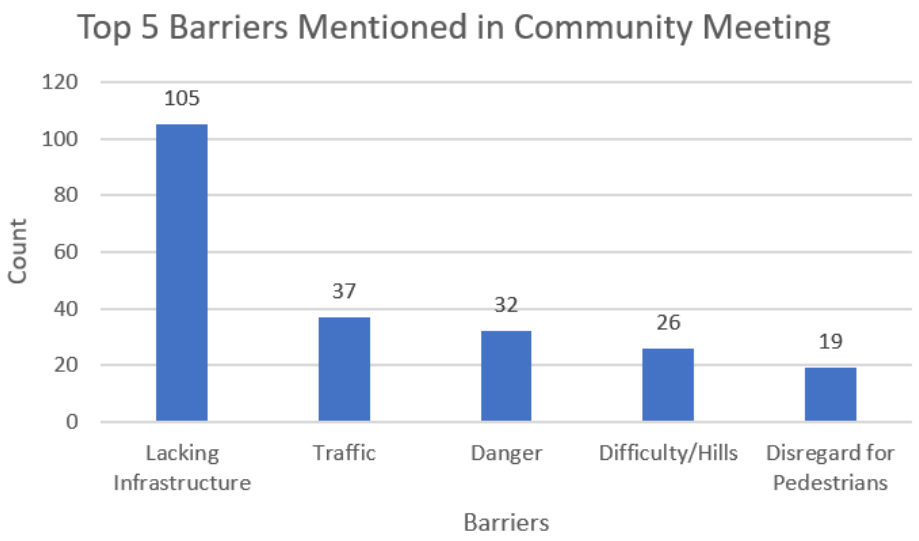


Figure 18- Top 5 barriers mentioned during community meeting

Potential Solutions

There were many comments about sidewalks at Bridge Street and Military Road throughout the community meeting and in parent surveys. While there are some sidewalks along these streets, they are incomplete or inadequate. Parents and community members feel that only a continuous and well-maintained sidewalk is effective on such a busy street. Many people recommend crossing guards on Bridge Street and other surrounding streets near the Elementary School. One parent stated, "Crossing Bridge Street is my biggest concern and the reason we do not allow our children to walk". Another

parent allows their child to walk but only after all the traffic has dissipated said, “Adult presence whether police or crossing guards or other volunteers who could help manage traffic would be an enormous step in the right direction.” Our analysis shows that such an improvement would potentially allow at least 52 more students walk to school safely.

> “Adult presence whether police or volunteers who could help manage traffic would be an enormous step in the right direction.”
> ***Parent***

For Middle School parents, the largest area of concern is crossing M-26 and walking along Sharon Avenue. Parents who live west of M-26 need safer infrastructure for their children. Sharon lacks sidewalks and features busy oncoming traffic, making it unsafe to walk. Many parents know the risks of walking this road. A Middle School student said that when walking on Sharon Ave, they “have to time it just right to get across the road without getting hit” from the lack of crosswalks. Having sidewalks on Sharon would allow more children to safely walk to school and something many parents commented about on their survey. M-26 is an extremely busy road that deters parents from letting their children live a more active lifestyle. With high traffic volume, having a crossing guard or making the intersection more pedestrian friendly would ease parental concerns.

Around school zones, parents feel that traffic is too fast and a danger to children. To solve this issue, having either more flashing speed limit signs or more enforcement of speed limit zones around arrival and dismissal times would make active transport to school much safer. Although there are some current methods of speed and traffic prevention surrounding school parents feel they are not effective or enforced. Having a stronger enforcement of school zones would give parents a peace of mind when allowing their children to engage in active transport.

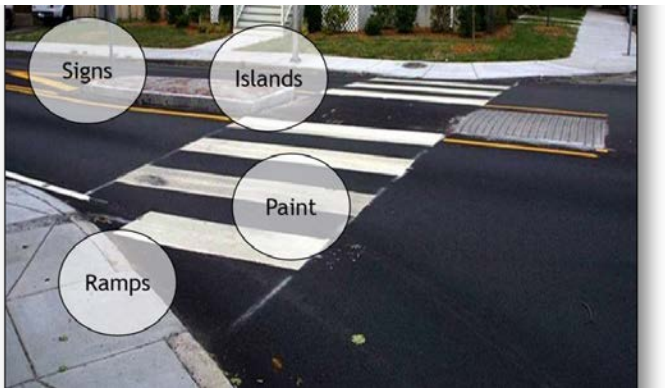
Figure 18- Word Cloud of Potential Solutions

VII. Lessons Learned from Other SRTS Projects

This section reviews lessons learned from other Safe Routes to School (SRTS) projects or research studies evaluating SRTS programs. The SRTS organization has developed a comprehensive and integrated framework called the Six E's that projects should consider when designing improvements to increase safe access to active transportation. These include: engineering, education, encouragement, enforcement, evaluation, and equity. It has been shown that projects that follow this framework have been more effective at increasing physical activity, reducing injuries and overall more successful[12]. The following paragraphs describe key findings related to each of the Six E's that should inform any SRTS project, with examples of solutions that have worked in communities similar to Houghton, as well as other important components to take into consideration.

Engineering

Engineering creates physical improvements to streets and neighborhoods that make walking and bicycling safer, more comfortable and more convenient. According to the Task Force on Community Preventive Services, recommended engineering tactics include introducing or enhancing traffic-calming measures and improvements to street crossings such as center islands, raised crosswalks or speed bumps, improving street lighting and improving street aesthetics[16]. Speed bumps are associated with a 53% to 60% reduction in the odds of injury or death among children struck by an automobile in their neighborhoods[17]. In Sweden, central refuge islands and raised walkways were added to a busy street near a public school, resulting in a decline in the number of children driven to school (from 27% to 21%) and an increase in the number of children bicycling to school (from 29% to 51%[18]). A study done in Eugene, Oregon, found that after augmenting existing education programs with infrastructure improvements such as sidewalks, crosswalks and covered bike parking, there was a 5-20% increase in student walking and biking to school[15]. According to a report on a community improvement project done by the county of Middlesex, a rural community in New Jersey, having a bike trail system within a 10-minute walk or bicycle ride from home has been found to "significantly increase active transportation"[19]. Street crossings can best be improved by adding clearly marked crossing locations in places with appropriate traffic control, including traffic signals or adult school crossing guards[20]. Our own findings from studying opportunities for improving infrastructure that supports active transportation near Houghton Elementary and Middle Schools show substantial room for improvements in sidewalks, street crossings, bike lanes, pedestrian islands, and lighting on almost every road, but especially important on Bridge Street, Sharon Avenue, and Second Street.



Education

Education provides students and the community with the information to encourage safe, active transportation, as well as teaching them about the benefits of physical exercise and the broad range of transportation choices. Education complements other components by raising awareness of changes to the built environment, directing people to the safest routes, and celebrating the social and health

benefits of active transport. Information that could be taught in educational campaigns include pedestrian and bicycle safety skills. This could be practiced during class time in a school environment, or through a special event after school. A popular example for an educational event is a school-sponsored bicycle rodeo that consists of bicycle handling drills and practice in a simulated setting. According to reports of a SRTS program done by the school district of Eugene, Oregon, there was a 5% increase in student biking after implementing education programs alone which were aimed at developing the student's active commuting skills and awareness[15]. Education programs can be integrated into physical education classes, linked to curriculum within the classroom tapping into Common Core curricula in a range of subjects, or handled as one-time instruction in an assembly kind of format. Projects that integrate into curricula and that are reinforced in multiple settings and using various methods are most effective, and this requires active teacher involvement[20]. Sample curricula have been developed and tested and are available for public use[12]. Students, however, are not the only target audience for education programs- parents, drivers, and neighbors should also be included[21]. In Houghton, this is particularly important given the culture of disregard for pedestrians and prioritizing automobile traffic that our research team observed.

Encouragement

Encouragement generates enthusiasm and increased walking and bicycling for students through events, activities, and programs. Encouragement for students to participate in the Safe Routes to School program can be accomplished through several means. A program launched in 2007 by the Roosevelt Middle School in Oregon encouraged students by providing active transportation equipment including bicycle helmets, safety vests, and reflective lights. The school reported an increased percentage of children walking or bicycling to school from 27% to 42% over the course of three years. As well as seeing a decrease of 59 motor vehicles per day bringing children to school[3]. Another idea for getting more active transportation among students is having school-sponsored events, such as "Bike to School Day", or the "Golden Sneaker Award" program. Bike to School Day occurs annually on the first Wednesday of the first full week in May, which as the name implies, is a school sponsored event where students are encouraged to bike to school. Lorri Oikarinen, a member of the Bike Initiative Keweenaw organization has helped organize a Bike to School Day event in Calumet and has stated the effectiveness of such events in terms of increasing local active transportation among students as well as creating social cohesion in the community. Walk to School day, which may be more relevant to the Houghton area than Bike to School Day because of the areas topography, follows the same idea except with walking instead of biking. Walk to School Day occurs nationally on October 4th each year. The Golden Sneaker Award Program implements a competition to determine which classes walk the most based on the number of days walked, distance, or steps (using pedometers). This program encourages a healthy and active lifestyle and fosters teamwork among children while still having fun.

Enforcement

Enforcement deters unsafe traffic behaviors and encourages safe habits by people walking, bicycling and driving in school neighborhoods and along school routes. Enforcement in the context of Safe Routes to School projects is not so much about officers writing tickets for unsafe behaviors, but more so a network of community members working together to promote safe walking, bicycling and driving. This can be accomplished through safety awareness, education and where necessary, the use of ticketing for dangerous behavior or observation by police officers or other authority figures. Unsafe behaviors first need to be identified before enforcement can begin. Most notably are unsafe driving behaviors, including speeding through school zones, passing stopped school buses, and failing to yield to pedestrians. On the other hand, unsafe pedestrian behaviors include not watching out for traffic, darting out between parked cars or wearing dark clothes when there is poor lighting. Community members can help with enforcement during active transportation include volunteering to become crossing guards, neighborhood speed watch programs, or just setting examples of safe behaviors. According to the Center for Disease Control, having crossing guards located near schools is associated with having 26% or more students who walked or biked to school[2]. The Safe Routes program in western Massachusetts is a neighborhood speed watch program that addresses the enforcement needs of speed management through the use of community members taking role model positions in safe driving behavior as well as reporting unsafe driving behaviors. Results from research done on the effectiveness of such a community program found that the 85th percentile speed in the town of South Haley, Massachusetts, was reduced from 40 mph to 35 mph and the percent of vehicles exceeding the speed limit dropped from 81.6% to 77.8%[22]. The overall idea is that members in the community all need to do their part in keeping transportation safe, rather than relying on individual enforcement officers. In Houghton, enforcement could be a particularly important means to change the culture of disregard for pedestrians.

Evaluation

Evaluation assesses which approaches are more or less successful, ensuring initiatives are supporting desired outcomes, identifying unintended consequences or opportunities to improve the effectiveness of each approach. In order to monitor the effectiveness of SRTS programs, it is recommended by the Safe Routes Partnership to take periodic measurements on the number of children walking or biking to school, the number of pedestrian injuries, and the qualitative level of how safe pedestrians feel walking or biking. At the very least, measurements should be taken before implementing the project as well as after a pre-established time once the implementation is finished. Results of such monitoring should be reported publicly along with transparent information about how measurements were collected. A recommended evaluation technique is to use Travel Pattern Surveys. A travel pattern can be defined as an ordered sequence of trips made during a day by the members of a household. This is a quick way to measure how students get to and from school now and how they would like to do so if conditions permitted[23]. From our own research on this project, we worked with the Houghton Elementary and Middle Schools to send out surveys to collect information from students on how they get to school and

what they think could be improved to use more active transportation. We found this method to have fairly positive results at effectively gathering the student transportation information.

Equity

Equity in SRTS projects recognizes that different people have different barriers to living healthy, fulfilled lives. In order to allow people similar opportunities, policies, programs and overall approaches need to be crafted with those various challenges and needs in mind. Some barriers to consider may include: students living too far away from school, the inability to ride a bike, concerns about personal safety, physical ability differences, neighborhood differences (crime, safe infrastructure, green space, etc.), or incompatible parent/child schedule[24]. The Walking Summit organization recommends using a Park & Walk program to help more students have the chance to walk to school, no matter where you live. The idea with a Park & Walk program is that parents will drop students off at a designated location some distance away from the school, which lets the student walk the rest of the way to school. For addressing the parents who leave for work before school but only want their child to walk with adult supervision, the Walking Summit also recommends a Walking School Bus program. A walking school bus is a group of children walking to school with one or more adults. This can vary from just having two families taking turns walking their children to school, or as a well-planned walking route with meeting points, a timetable and a regularly rotated schedule of trained volunteers or paid walking school bus "drivers." Given the large number of HPTS students who live out of district, drop sites could be a good option for promoting equity.

Sustainability

Another important aspect to consider in implementing a successful Safe Routes to School project is sustainability. Even after the project has been implemented, infrastructure maintenance and sustaining community engagement are crucial. A Montana Safe Routes to School program similar to our own has given examples of ways to sustain the project. They suggest identifying various "program champions", or individuals from the community that will take leadership initiative. This will ensure that the success of the program is not dependent on one person. When given a sense of responsibility, community members will stay dedicated and involved with the program over a longer period of time. They also suggest periodically publicizing activities and events, encouraging policy changes, and creating a permanent Safe Routes to School committee[20]. The town of Carrboro recommends the following strategies for sustainability: form a permanent, active SRTS Committee, partner with local businesses for support, create and maintain an active SRTS website with a calendar of events and SRTS news, re-evaluate the SRTS program on regular intervals to redefine priorities, and maintain a SRTS presence at school events throughout the year[25]. Given Houghton's current low active transportation participation rates and multiple infrastructure challenges, sustainability will be particularly important. It will take several years and sustained effort, well beyond any one grant cycle, to make the necessary improvements and cultural change to normalize walking or biking to school. Organizing to facilitate long-term sustainability of efforts will be critical.

Michigan SRTS Funding Opportunities and Limits

The Safe Routes Michigan organization offers two grants, a Mini Grant and a Major Grant. Both of these grants are administered by the Environment section of Federal Highway Administration (FHWA) Office of Planning, Environment, and Realty. The Michigan Fitness Foundation is a private non-profit organization that contracts with the State of Michigan Department of Transportation to handle SRTS program and grant facilitation. The Major Grant is a grant to help communities build sidewalks, crosswalks and other infrastructure improvements to support safe active transport for students in grades K-8. It offers up to $200,000/school for infrastructure and $8,000/school for programming around the SRTS project. This means that if Houghton Elementary and Middle School submitted together, they would be eligible for potentially up to $416,000 in funding. Additional funds are sometimes available, and program administrators have encouraged the Houghton team to request the funds necessary to complete the right project for the schools. Funds originate from a combination of federal and state programs.

Major Grant proposals require communities to undergo an in-depth research and planning process prior to submitting an application. This report is background research to inform a Major Grant proposal for Houghton Elementary and Middle Schools. The Core Planning Team will use this information to plan for what kinds of improvements should be made and what kinds of programming should be done. While planning, it is important to keep in mind what requirements and limitations to the grant program may apply. For example, all funded projects must be built within two miles of the school submitting the application. Schools must partner with a municipal organization, in this case the City of Houghton. Another example is when building new sidewalks, they must include sidewalks on both sides of the street, rather than just one side. Grant money can't be used for reorganizing pick-up and drop-off areas or parking lots or for improvements to bus stops. These limitations are meant to encourage best practices for facilitating safe active transportation. To learn more about the more specifics of applying towards the grant and what requirements must be met, you can visit the Safe Routes Michigan organization's website at http://saferoutesmichigan.org/funding/.

VIII. Recommendations

There are multiple barriers to active transportation in the Houghton community, and dozens of improvements that could make a difference. It will take a long-term sustained effort to address all of them. **Here, we make six recommendations as a starting point**.

Ultimately, school and city leadership will need to work with parents, students, and community members and organizations on the Core Planning Team to decide how to proceed and which improvements to pursue. The more people involved in this decision-making process, the more likely to achieve broad buy-in and the level of support and engagement that will be necessary to change culture, programs, and infrastructure that support active transportation.

Sharon Avenue:

Recommendation Summary:

Improve safety on Sharon Avenue through the addition of sidewalks and bike paths. Install wide, raised sidewalks replacing the current bike paths along both sides of Sharon Avenue similar to what is seen on College Avenue. Additionally, install medians that function as pedestrian refuges at the intersections of Sharon Avenue with Gundlach Road and Portage Street, and with Military Road and Superior Road. The intersection of Sharon Avenue and Dodge Street also provides a potential area of concern that could be improved with the addition of a pedestrian median. Lighting should also be installed along those sidewalks to ensure it is well lit for early morning visibility of students.

Problem Description:

Sharon Avenue functions as the secondary East-West arterial road within the city of Houghton. Both school active travel zones cross Sharon Avenue meaning that this busy road represents a clear and present barrier to active travel to and from both schools. 25 observations were made about Sharon Avenue in the public meeting. Only 1 observation was positive, 8 of them were suggested improvements, and 16 were negative comments. Many participants noted that high volumes of traffic make this area dangerous. A bike path and shoulder is present, but they are not clearly denoted with lines on the pavement. Consequences of this were directly observed during the walking audits, where an auditor was almost struck by a passing vehicle. Additional information on our findings along Sharon Avenue can be found in the audit report summary and the reports themselves. These paths could serve to not only allow, but encourage, active travel along all of Sharon Avenue if properly maintained and displayed.

Improve and Install Bike Paths and Sidewalks:

Installing raised curbs and wide sidewalks (wide enough to allow walking and cycling on the same path) similar to the ones along College Avenue would resolve many of the perceived problems of safety when walking along Sharon Avenue. Improving these paths would also serve to connect potential active travelers west of M-26. 101 students have the potential to benefit from this improved active travel corridor on Sharon Avenue. In addition to the SRTS project, this improvement may provide an important connection for that area of the community to the Michigan Tech Trails, potentially improving the city's bike community ranking.

Create Pedestrian Refuges and Signage:

Another improvement also already implemented along College Avenue is a median that serves as a pedestrian refuge for crossing students. In the case of Sharon Avenue, these medians do not necessarily need to stretch along the length of the road, only right at the intersection nearest each school (the intersections of Sharon Avenue with Gundlach Road and Portage Street, and Military Road and Superior Road) as well as potentially the intersection of Sharon Avenue and Dodge Street. These will benefit the students needing to cross Sharon Avenue to get to each school: 14 Elementary School students, and 60 Middle School students respectively.

Improve Lighting:

Lights should be installed along with these new improvements to facilitate safer conditions in the months where students will be traveling to school in darkness.

Bridge Street & Military Road:

Recommendation Summary:

Install crosswalks and pedestrians signals on Bridge Street. Utilize crossing guards during the arrival and dismissal periods of school. Improve existing sidewalks and add missing sidewalks. Enact a walking school bus program.

Problem Description:

Houghton Elementary School is located next to Bridge Street and Military Road, which function as one of the main North-South roads within the city of Houghton. During the arrival and dismissal periods of the Elementary School, the traffic observed along Bridge Street and Military Road increased to the point of being nearly impassable, especially for young students. These streets are restricting Elementary School students from walking and biking to school as it is dangerous to cross due to obstructed views and fast, plentiful traffic. Additionally, missing sidewalks along portions of these streets make this route unsafe for students to use for the walk to and from school.

Of the Elementary School students who are currently using active transport to get to and from school, all of them live in West Houghton and do not face the barrier that these two streets introduce. The students living in West Houghton have several alternate, less busy streets to travel along and cross in order to get to school. The students living east of Bridge Street do not have any practical ways to avoid crossing these dangerous streets. As seen in the map below (figure 20), the only students walking or biking to school are those that live in West Houghton. No students living east of Bridge Street and Military Road use active transport methods.

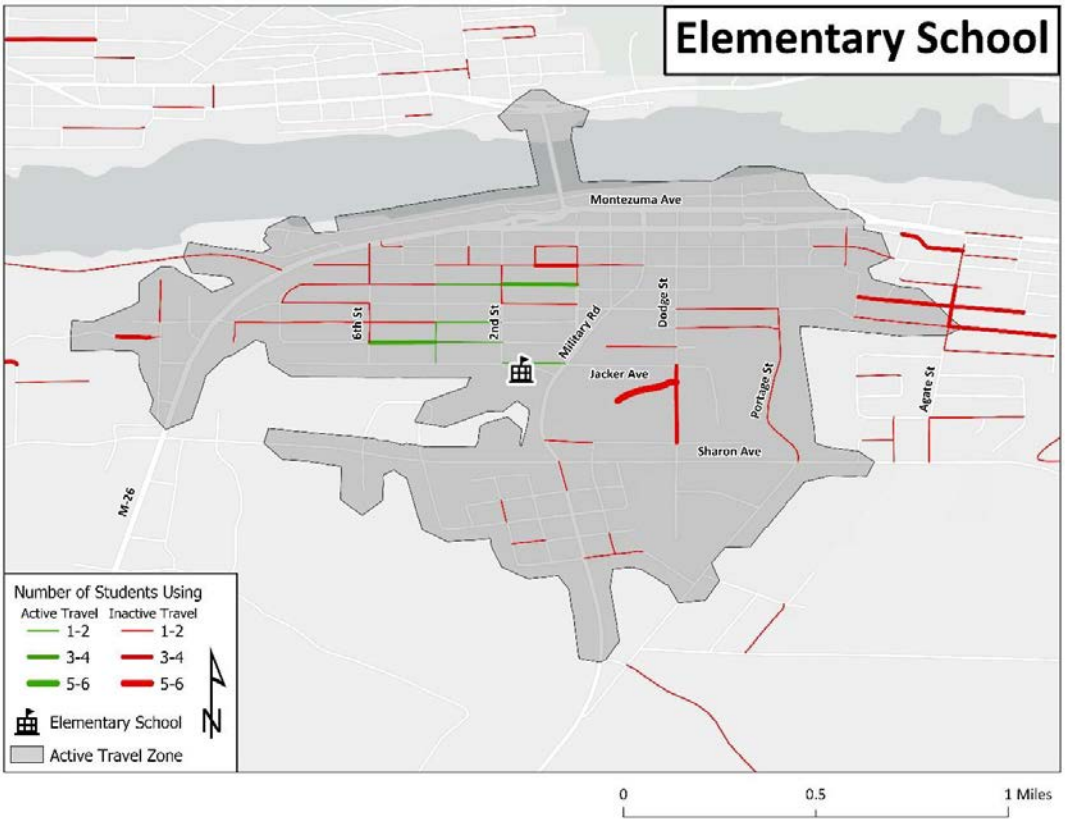


Figure 19- Current elementary school students using active travel.
Note that no students east of Bridge Street are actively walking to school

In addition, when parents were asked "Would you probably let your child walk or bike to/from school if the safety of intersections and crossings were improved?", the majority of those living east of Bridge Street and Military Road said "Yes", as seen in Figure 21. This area represents a large group of students who would benefit greatly from improvements in intersections and street crossing on Bridge Street and Military Road.

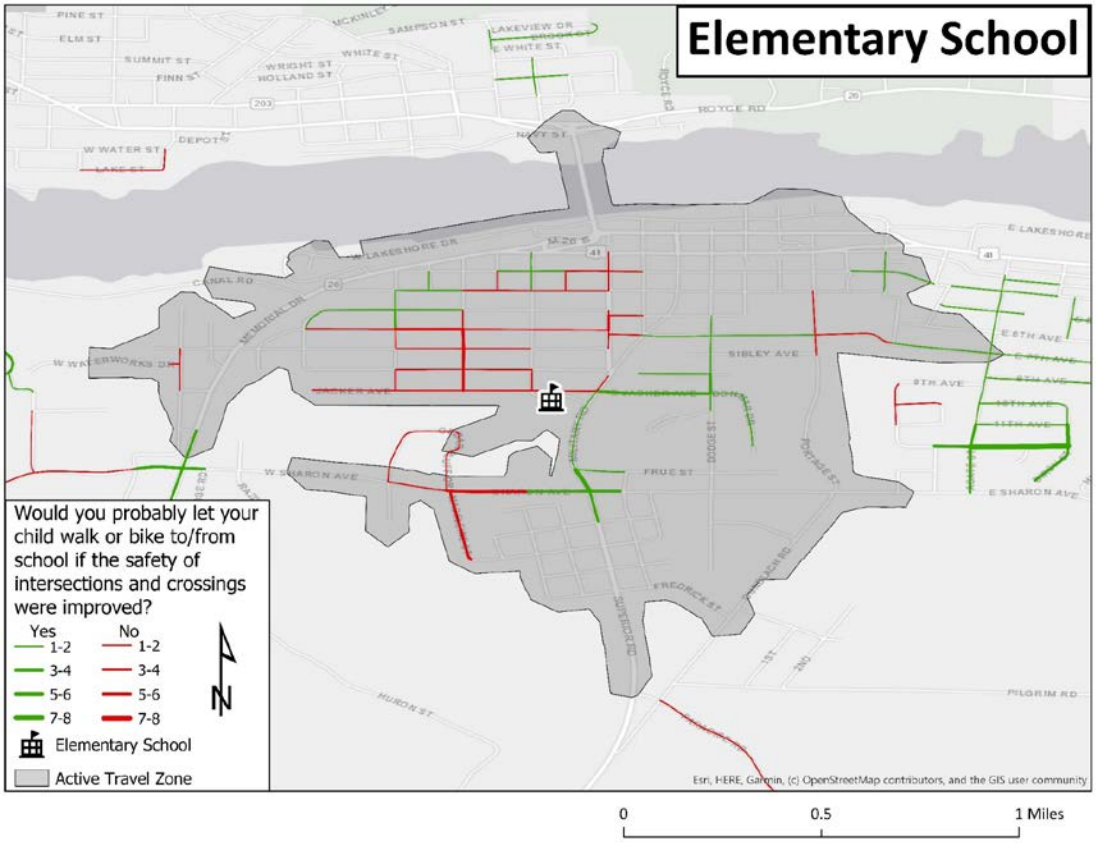


Figure 20- Parents who would let their children walk to school if road crossing improvements were made

During the walking audits, Elementary School routes 1, 3, and 5 (see **Appendix 1**) traveled along Bridge Street. Numerous infrastructural problems and barriers were noted along the way. There are missing sidewalks along the northern portion of Bridge Street that make travel difficult, as well as very few street lights along Bridge Street. In addition, vehicular traffic tends to move quickly, making it difficult to cross these streets, even outside of peak traffic periods.

> "I would let my walk to school if it weren't for crossing Bridge Street."
> ***Parent***

Out of the 673 Elementary School students currently enrolled, 52 of them live east of Bridge Street and Military Road within the active travel zone. This count does not include those living in the Agate Street neighborhoods, where several additional Elementary School students reside east of Bridge Street, just outside of our conservative active travel zone.

Establish Crosswalks, Pedestrian Signals, and Crossing Guards:

Many community members, including parents and students, have stated that a crossing guard and crosswalk across Bridge Street would help to create a safer walking environment for students. During the community meeting alone, there were 16 mentions of specific solutions that would help counteract the problem of Bridge Street, 10 of which specifically suggested the addition of crossing guards onto Bridge Street. In addition to this, additional traffic calming efforts were suggested as improvements for student safety along Bridge Street.

Improve Sidewalks:

For students living in northern Houghton that could be using Bridge Street to get to and from school, improved sidewalks can provide a safer way for travel along this street where infrastructure is currently lacking or non-existent. Without a safe pathway for students to travel along, students and parents will continue to feel discouraged about the possibility of active travel to and from school.

Develop a Walking School Bus:

There is a large number of students living within close proximity of one another near the intersection of Jacker Avenue and Dodge Street. A walking school bus serving these students would promote an active, safer, and more enjoyable journey to school. With an adult picking up and leading a group of students along a safe, supervised route, students can benefit from actively getting to and from school.

West Houghton:

Recommendation Summary:

Implement and utilize Walking School Buses while also improving infrastructure in West Houghton. Sidewalks should be continuous and maintained. Lighting should be improved so students can walk or bike when it is dark in the mornings.

Problem Description:

In West Houghton, 22 students who live very close to the Elementary School do not walk or bike. All of these students are located inside the active walking zone. 36 students in the same neighborhood (those closest to the school) *sometimes* use active travel choices to school, but not consistently. While having some students walking is encouraging, parents and our research team noted that students do not walk regularly in this area, thus leaving many more opportunities to increase active transportation in this neighborhood.

Barriers observed include no sidewalk or trail, no pedestrian signal, poor lighting, and intersection obstructions.

Walking School Buses:

A walking school bus is a low-cost, high-impact solution where students walk in groups accompanied by adults. This recommendation has health, safety, and social benefits according to literature[26,27]. Walking school buses can be implemented before, during, and after infrastructural improvements[28].

Sidewalks:

The addition or enhancement of sidewalks has been shown to increase walking or biking to school [29]. Currently, the sidewalks in West Houghton are discontinuous, in poor condition, and often not plowed in the winter. A designated space for pedestrians to walk would improve safety.

Lighting:

Lighting is a recommended improvement to help students feel safe and encourage active travel[27]. For example, some parents noted that low visibility in the morning inhibits active travel for students. Lighting improvements would encourage more parents to allow their students to walk or bike.

Parents were asked if they would let their child walk or bike if specific improvements were made. In response parents said 'yes' if: children are chaperone (40%); sidewalk improvements (70%) are made;

intersection and crossing safety (55%) improvements are implemented. These improvements are essential to enable student active travel.

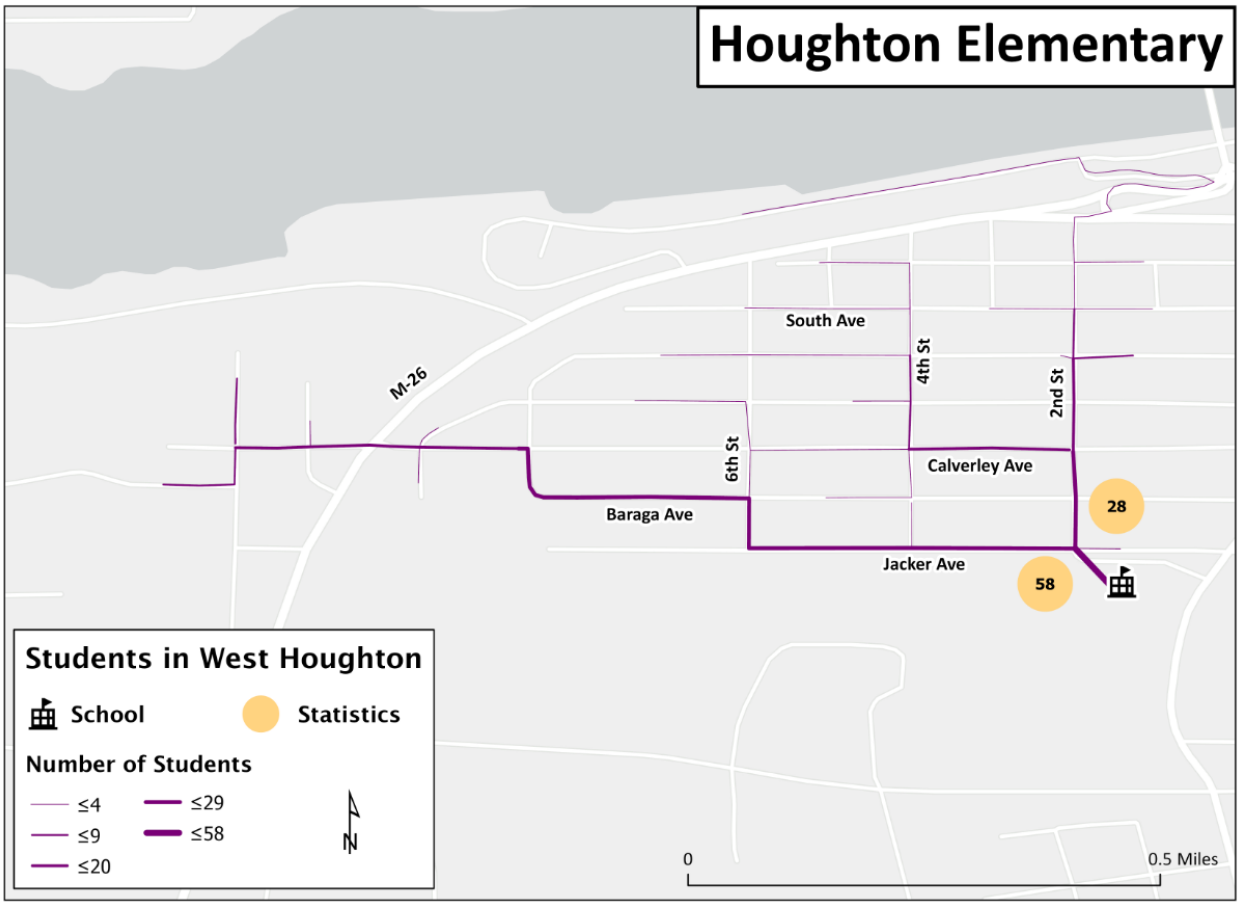


Figure 21- At least 58 students would benefit from Walking School Buses and 28 students will benefit from lighting and sidewalk improvements on 2nd St.

No Busing and Idle Free Zones:

Recommendation Summary:

Implement a no busing zone within 0.50 miles of the Elementary School and idle-free zones on both schools' property.

Problem Description:

Busing limits active transport, contributes to air pollution, adds time to students' travel, and costs the school district money.

While not the primary focus of this study, when asked about transport to school several people brought up issues with busing. One parent from the parent survey commented, "The bullying and language on the buses is awful." Kids can spend long times on the bus while only traveling short distances. The parent of one Elementary School student said, "I would love for [my son] to be able to get home on his own versus a 30 min bus ride when we live just six blocks away." Another parent of an Elementary School student who lives close to the school said, "My kids would lose an hour of sleep to catch the bus

when it comes to our house", and from this she feels obligated to drive them. "Walking is faster because of the way bus routes are arranged," another parent commented.

Buses also contribute to air pollution around the school when idling. Buses and cars are often left running for long periods of time while waiting to pick up or drop off students. Due to these idling periods, buses produce unnecessary emissions that can have negative effects in children. A study from London, Ontario, Canada shows that when students are traveling to and from school, they are exposed to significantly worse air quality than throughout the rest of the day[30]. This significantly worse air quality comes from the bus and personal vehicle emissions as there are several vehicles during peak times. Exposure to greater amounts of air pollution can lead to increased issues for students who suffer from asthma and decrease overall lung function[31]. This is why the Environmental Protection Agency (EPA) recommends idle free zones on school property. This would impact both parents dropping off students and buses.

Examples:

Many school districts have limits on busing children who live close to school. For instance, Stillwater Schools in Minnesota has a 2-mile no busing zone surrounding the schools. This school has a similar climate to Houghton. Illinois State Board of Education outlines a proposal for 1.5 mile no busing zone surrounding the school[32]. In Ontario, Canada, no school districts in the province provide bussing to students within 1 mile of school.

The EPA, along with Idle Free California, have campaigns to reduce idling around schools. This attempts to reduce emissions from buses and cars so that children have better air quality on school grounds[33]. Idling for more than 10 seconds emits more than restarting an engine[31].

Solutions:

Implementing a no busing zone within 0.50 miles from the Elementary School would impact 80 Elementary School students. Below is a map of a possible Elementary School no-busing zone. There are graduated line segments on the map outlining the number of students that live on each road, showing if they engage in active transport currently.

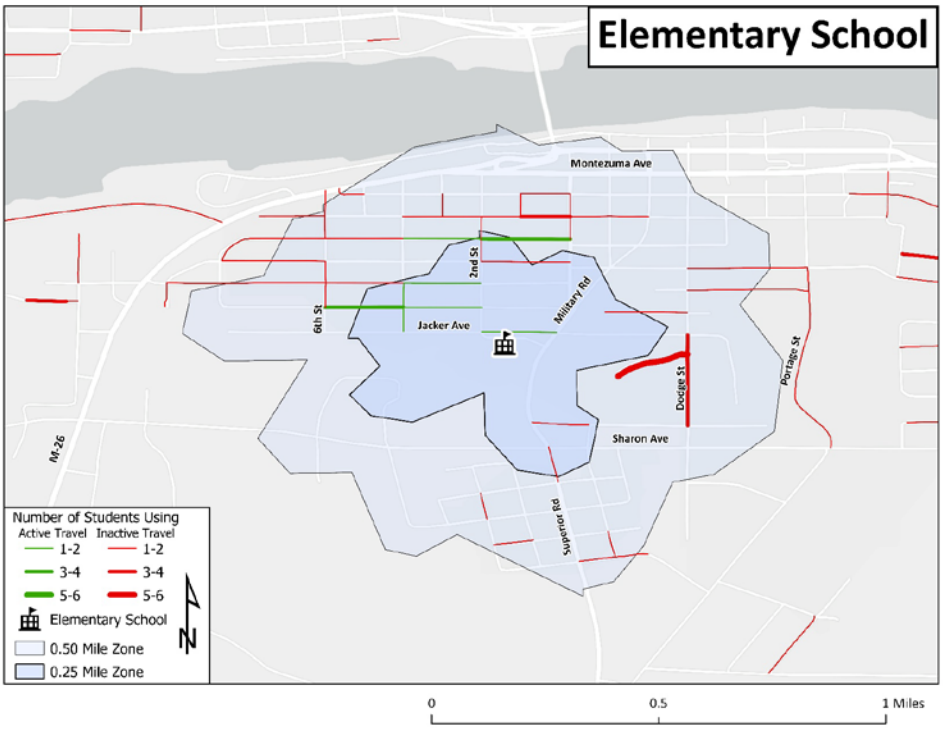


Figure 22- Map of potential .25 or .50 mile no busing zones and number of students impacted

The no busing zone would impact part of bus routes 1, 2, 3 and 6. From the no busing zone, this might allow the school district to redesign bus routes and eliminate one school bus. This recommendation would save the school money and create a healthier environment for students. According to SRTS, a school district can save approximately $37,000 by eliminating one bus route[34]. Coupled with improvements in West Houghton and drop sites, implementation of no busing zones would provide the best atmosphere for transportation options. Busing cannot ethically be stopped if the proper infrastructure is not in place. These solutions in conjunction with improved infrastructure would improve student's health, decrease emissions, and save the school district money.

	0.25 mile buffer	0.50 mile buffer	All Students
Walk or Bike	13	13	16
Bus	7	39	133
Drive	5	28	225
Total for Column	25	80	374

Figure 23- Table displaying how students get to school related to their distance from school.

Drop Sites:

Recommendation Summary:

Use drop sites to stop idling and congestion near school grounds. Potential drop sites may include Trinity Episcopal Church, Little Red Schoolhouse, and/or Mason Nature Area. These drop sites would increase access to active transport while also reducing the number of vehicles on school grounds, thus reducing traffic congestion and air pollution, and increasing the safety of walking and biking for other students. Drop sites should be conveniently located for parents.

Problem Description:

Approximately 47% of students attending the Elementary School and 46% of students at the Middle School live outside of the City of Houghton. That is almost 200 out-of-town students who are mostly driven to school in a personal vehicle, in part because busing is not provided. Between these students and resident students, 65% of Elementary School students and 73% of Middle School students are driven to school each morning in a personal vehicle. Assuming that every student is riding in their own family car that is over 400 students driven to school every day. This contributes to congestion, air pollution, and increased traffic around the schools, all of which limit the ability of students who live close to the schools to safely walk or bike, adds to the time it takes for parents to take their children to school, and increases potential for accidents in the school parking lot.

Traffic is a nuisance, as expressed by parents during our community meeting, but high traffic can also be a physical barrier and a hazard. One of the biggest issues that we saw during our preliminary observations was mass idling. This phenomenon happened when hasty parents rushing to get their kids to school stop their cars (while the car is still on) and let their kids out of their car a few feet from the school, blocking the other cars behind them. While idling may be bad for gas conservation, it is especially harmful for kids' health via air pollution[31].

Solution:

We propose drop sites that are off from school grounds in order to alleviate traffic and pollution, and to offer students who live farther from school the opportunity to walk. This should be coupled with an emphasis on stopping idling in all drop sites and school zones. Drop sites will give students the chance to be more active, since many of the students living outside the district would not normally get a chance to walk to school. Convenient locations with off-street parking and easy on-off access to common parent driving routes should be chosen for drop sites. These can be located some distance from the school but along a safe walking route so that kids receive physical activity in their daily routine. A few possible drop sites were identified by participants at the community meeting and by the student research team.

Suggested Locations

The first location is at the Trinity Episcopal Church. Parents coming from Hancock who work at Michigan Tech can easily drop their students off on their way to work. Students who are dropped off here can join walking school buses that take Bridge Street all the way up to the Elementary School. This location however, is a popular way for Michigan Tech traffic to get to campus and might congest traffic flow if additional infrastructural improvements are not considered.

The second suggested location is the Little Red Schoolhouse located on Sharon Avenue. This would be a great location for students to take a short walk to the elementary school, utilizing the recently added west access road, as well as a good starting location for walking school busses to the middle school as

long as previously mentioned infrastructure issues on Sharon Ave. are addressed. The students walking on Sharon Avenue would have a safer walk to school if sidewalks and crossing guards were present.

Additionally, Mason Nature Area fits the distance criteria for both the Middle and Elementary Schools. It is ideal because it is away from high traffic streets like Montezuma Avenue and Sharon Avenue. However, it is a little out of the way for parents who are in a rush to get to school. This location provides a beautiful scenic walk and will help students build a sense of place in their community.

It is difficult to find good drop sites that fit all the criteria in Houghton. The points mentioned above are just a start. The team is optimistic that, with improved infrastructure, new drop sites specifically designed with children in mind will be created.

Figure 24- Map of potential drop sites

Champion Program:

Recommendation Summary:

Start a community driven volunteer organization to help sustain this project overtime and to address the culture of disregard for pedestrian.

Problem Description:

A core challenge for improving access to safe active transportation in Houghton, is the culture of disregard for pedestrians. We see this playing out in multiple examples from infrastructure development to road-rage and social norms. For example, the newly constructed loop at the Elementary School reinforces automobile culture, rather than promoting active transportation. Community members who

walk or bike expressed concern over the lack of respect drivers have towards speed limits and yielding to pedestrians. These deeper issues will not be possible to fully address in any one grant program funding cycle, but rather require long-term investment, organization, and mobilization by committed organizations and community members. One way that other communities have been able to sustain this kind of effort over the long term is through creating a Champion Program.

Solution:

A Champion Program is an organization for local community members dedicated to advocating for the needs of pedestrians and bikers. Some of the responsibilities a champion, or a member a part of the organization, may have include: organizing and facilitating events that promote active transportation, bringing awareness to local infrastructure that pose unsafe conditions to active transportation or that are in need of repair, acting as a role model by obeying safety provisions and laws, volunteering to become crossing-guards at school locations, or just making pedestrians and bikers visible in the community. Along with addressing the issue of automobile culture, a Champions Program can meet the conditions for several of the 6 E's, including education, enforcement, encouragement, evaluation, as well as the sustainability of the SRTS project.

A champion can facilitate events that educate the community about the benefits of active transportation or how to properly use active transportation equipment. By acting as a role model for safe active transportation behaviors, they will be helping to enforce as a community member. Encouragement could be achieved through organizing events such as Bike to School Day, which encourages students to use active transportation more frequently. As a community member, a program champion can help keep tabs on the general use of active transportation over time, evaluating the effectiveness of the SRTS project. Program sustainability comes from the idea that through an organization, the success of the program overtime does not just rely on one individual, but through various program champions that continue the project, passing the champion role and responsibilities to others. It will take several years and sustained effort, well beyond any one grant cycle, to make the necessary improvements and cultural change to normalize walking or biking to school. Organizing to facilitate long-term sustainability of efforts will be critical.

Lessons Learned:

There were lessons about best practices in implementing a Champion Program identified from a study from the Safe Routes Partnership Organization which reviewed 15 studies about SRTS programs in the U.S. and Canada. One such lesson was to expect slow progress and gradual change due to the lack of experience, time or even quantity in volunteers. This can be combated by collaborating with pre-existing groups, such as the experienced Bike Initiative Keweenaw citizen group, the Single Track Flyers kids' mountain biking club, and the Western UP Health Department. It may also be useful to target youth groups for long-term investment, who may become more involved with the organization overtime[35].

Other Recommendations:

These represent a small sample of the areas of potential improvements. Other key areas include: 1) Agate Street, which was commonly noted in our data but mostly just outside of the Active Transport Zone; 2) crossing M-26 at several different locations; and 3) crossing Montezuma Avenue. There are also several informal routes that could be good candidates for improvement for student travel, including the school forest near the Middle School, the newly developed trails connecting the Elementary School to

Jacker Street, the Mason Nature Area, and the Champion Street Cut-off connecting Datolite Street (near Sharon Avenue) to Champion Street.

IX. Conclusions

Currently only a small proportion of Houghton Elementary and Middle School students walk or bike to/from school. This is partly due to issues that are difficult to address, like weather, steep slopes, and busy parents. But, other commonly cited reasons include unsafe crossings, lack of sidewalks, and traffic. Students say they want to walk or bike to school, but parents generally don't feel safe allowing them to. The research herein calls attention to several practical solutions that schools, city, and community groups could work together to implement. Altogether, the research presented in this report will allow the Core Planning Team to: efficiently and actively engage a diverse set of community members, parents, and students in their decision making; carefully research proposed infrastructure changes to make the most effective decisions; work closely with the Michigan Fitness Foundation to determine which solutions are best for Houghton Portage Township Schools; and submit a Safe Routes to School Major Grant application.

One of the findings is that the barriers and issues raised throughout this process together indicate a systemic issue of disinvestment over a period of decades and active transportation not being prioritized in the schools or across the city. This has led to a situation where there are dozens of issues, which cannot all be addressed in a single grant cycle. This project has the potential to be the first step in changing the culture surrounding active transport in Houghton and making key improvements that will have an impact. While our findings point to several challenges, we also found a good deal of enthusiasm in the level of interest and response from students, parents, and community members. This enthusiasm might be leveraged to create a Champion program that could work to foster sustained, long-term commitment to ensuring students have options for safe routes to walk or bike to school.

X. Web Map

Throughout the course of this project, the research team has gathered a large amount of information, beyond what can be described or analyzed in this report. In order to make more information available to community members and the Core Planning Team, we created two online maps where users can view data and even conduct some simple analyses, such as counting the number of students who live near a proposed improvement. Both are available at http://houghtonsaferoutes.com.

The first web map contains data, observations and recommendations from the study. The second version of the map is password protected and is designed for the Core Planning Team to review the full results of the background research and to analyze the potential impact of improvements. This webmap is more complicated to use and includes some more sensitive information from survey results.

We also recognize that we were not able to talk with everyone who has an interest in active transportation in Houghton. The **maps provide people the opportunity to add their own observations and share feedback**, marking places of concern or sharing ideas for improvements. Ultimately the purpose of the online map is to make SRTS and active transportation information more accessible to decision-makers and the general public, involving as many people as possible in sharing information.

XI. Bibliography

1. McDonald NC, Brown AL, Marchetti LM, Pedroso MS. U.S. School Travel 2009: An Assessment of Trends. *American Journal of Preventive Medicine.* 2011;41(2):146-151.
2. Jones SE, Sliwa S. School Factors Associated With the Percentage of Students Who Walk or Bike to School, School Health Policies and Practices Study, 2014. *Preventing Chronic Disease.* 2016;13.
3. US Department of Transportation. Safe Routes to School Programs. 2016; https://www.transportation.gov/mission/health/Safe-Routes-to-School-Programs.
4. Centers for Disease Control. CDC Healthy Schools: Physical Activity Guidelines for School-Aged Children and Adolecents. In. *Centers for Disease Control and Prevention*2019.
5. Cooper AR, Wedderkopp N, Wang H, Andersen LB, Froberg K, Page AS. Active travel to school and cardiovascular fitness in Danish children and adolescents. *Medicine and Science in Sports and Exercise.* 2006;38(10):1724-1731.
6. Ramanathan S, O'Brien C, Faulkner G, Stone M. Happiness in Motion: Emotions, Well-Being, and Active School Travel. *Journal of School Health.* 2014;84(8):516-523.
7. Lubans DR, Boreham CA, Kelly P, Foster CE. The relationship between active travel to school and health-related fitness in children and adolescents: a systematic review. *International Journal of Behavioral Nutrition and Physical Activity.* 2011;8(5).
8. Waygood EOD, Friman M, Olsson LE, Taniguchi A. Transport and child well-being: an integrative review. *Travel Behavior and Society.* 2017;9:32-49.
9. Salmon J, Salmon L, Crawford DA. Associations among Individual, Social, and Environmental Barriers and Children's Walking or Cycling to School. *American Journal of Health Promotion.* 2007;22(2):107-113.
10. Wilson K, Clark AF, Gilliland JA. Understanding child and parent perceptions of barriers influencing children's active school travel. *BMC Public Health.* 2018;18.
11. Chillón P, Hales D, Vaughn A, Gizlice Z, Ni A, Ward DS. A cross-sectional study of demographic, environmental and parental barriers to active school travel among children in the United States. *International Journal of Behavioral Nutrition and Physical Activity.* 2014;11(61).
12. Safe Routes to School. The 6 Es of Safe Routes to School. https://www.saferoutespartnership.org/safe-routes-school/101/6-Es.
13. The National Center Safe Routes to School. *How Children Get to School: School Travel Patterns from 1969 to 2009.* 2011.
14. Michigan Departnemnt of Transportation. *Complete Streets: Making Connections.* 2010.
15. McDonald N, Yang Y, Abbott SM, Bullock A. Impact of the Safe Routes to School program on walking and biking: Eugene, Oregon study. *Transport Policy.* 2013;29:243-248.
16. Heath GW, Brownson RC, Kruger J, Miles R, Powell KE, Ramsey LT. The Effectiveness of Urban Design and Land Use and Transport Policies and Practices to Increase Physical Activity: A Systematic Review. *Journal of Physical Activity & Health.* 2006;3(2):55-76.
17. Tester J, Rutherford G, Wald Z, Rutherford M. A matched case—Control study evaluating the effectiveness of speed humps in reducing child pedestrian injuries. *American Journal of Public Health.* 2004;94(4):646-650.
18. Leden L, Wikstrom PE, Garder P, Rosander P. Safety and accessibility effects of code modification and traffic calming of an arterial road. *Accident Analysis & Prevention.* 2006;38(3):455-461.
19. Gilliland J, Clark AF, Richard L, Sadler R, Hill E. *Linking Health and the Built Environment in Rural Settings: Evidence and Recommendations for Planning Healthy Communities in Middlesex County.* 2013.

20. Safe Routes to School. *Safe Routes to School Noteworthy Practices Guide: A Compendium of State SRTS Program Practices.*
21. Safe Routes to School. *Safe Routes to School Guide: Education.*
22. Blume MC, Noyce DA, Sicinski CM. The Effectiveness of a Community Traffic Safety Program Transport Operations: Moving into the 21st Century. Institute of Transportation Engineers Conference; 2000.
23. New Jersey Department of Transportation. *EVALUATING YOUR SAFE ROUTES TO SCHOOL PROGRAM.*
24. Day-Kapell H, Vallez-Kelly T, Danzl J. Creating Inclusive & Equitable Safe Routes to School Programs. In:2017.
25. Carrboro To. *Safe Routes to School Action Plan: Carrboro.*
26. Kingham S, Ussher S. An assessment of the benefits of the walking school bus in Christchurch, New Zealand. *Transportation Research Part A: Policy and Practice.* 2007;41(6):502-510.
27. Martin SL, Moeti R, Pullen-Seufert N. Implementing Safe Routes to School: Application for the Socioecological Model and Issues to Consider. *Health Promotion Practice.* 2009;10(4):606-614.
28. Bejleri I, Steiner RL, Fischman A, Schmucker J. Using GIS to analyze the role of barriers and facilitators to walking in children's travel to school. *Urban Design International.* 2011;16(1):51-62.
29. Boarnet MG, Anderson CL, Day K, McMillan T, Alfonzo M. Evaluation of the California Safe Routes to School legislation: Urban form changes and children's active transportation to school. *American Journal of Preventive Medicine.* 2005;28(2):134-140.
30. Gilliland J, Maltby M, Xu X, Luginaah I, Loebach J, Shah T. Is active travel a breath of fresh air? Examining children's exposure to air pollution during the school commute. *Spatial and Spatio-temporal Epidemiology.* 2019;29.
31. Environmental Protection Agency. Clean School Bus Idle Reduction. 2019; https://afdc.energy.gov/conserve/idle_reduction_bus.html.
32. *PUPIL TRANSPORTATION FREQUENTLY ASKED QUESTIONS.* 2015.
33. Idle-Free California. California Idle-Free Schools. http://idlefreecalifornia.org/california-idle-free-schools.html.
34. Safe Routes to School. *National Statistics on School Transportation.*
35. Macridis S, Bengoechea EG. Adoption of Safe Routes to School in Canadian and the United States contexts: best practices and recommendations. *Journal of School Health.* 2015;85(8):558-566.
36. Daniel P, Burns L. How steep is that street?: Mapping 'real' pedestrian catchments by adding elevation to street networks. *Radical Statistics.* 2018;121:26-48.
37. Tobler W. *Three Presentations on Geographical Analysis and Modeling: Non-Isotropic Modeling; Speculations on the Geometry of Geography; Global Spatial Analysis.* Santa Barbara: National Center for Geographic Information and Analysis;1993. 93-1.
38. Larsen K, Gilliland J, Hess P. Route-Based Analysis to Capture the Environmental Influences on a Child's Mode of Travel between Home and School. *Annals of the Association of American Geographers.* 2012;102(6):1348.