Exploring the Safe Routes to School Program: Feasibility of Using an Active Mode of Transportation to and from School in Prince George's County, Maryland

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PALS - Partnership for Action Learning in Sustainability
An initiative of the National Center for Smart Growth

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Executive Summary

Safe Routes to School (SR2S) is a program that promotes student health by encouraging an active mode of transportation. "The Safe Routes to School National Partnership's mission is to advance safe walking and bicycling to and from schools, and in daily life, to improve the health and well-being of America's children and to foster the creation of livable, sustainable communities."[1] Many elementary and academy school students in Prince George's County Public Schools (PGCPS) meet the 1.5 miles from school bus eligibility criteria but still take the bus. PGCPS has also experienced budget cuts and is looking at ways to save money on student bussing. Based on preliminary findings, PGCPS wants to know the feasibility of implementing an SR2S program at Arrowhead Elementary, Beltsville Academy, Hyattsville Elementary, and William W. Hall Academy. To figure out the feasibility of implementing an SR2S program, current conditions of active student transportation had to be addressed. This study asks the question "To what extent do current conditions at these four schools support or hinder active student transportation?" This feasibility was examined through prior research, site observations, and spatial analysis. Table 1 shows the feasibility criteria for each level of feasibility using qualitative and quantitative data.

Table 1: Feasibility Criteria

Feasible	• Sidewalks on most streets • Crossing guards • Low Annual Daily Traffic Load (ADTL) • Majority of students live near their school (one mile or less) • Bike racks
Potentially Feasible	• Sidewalk on some streets • Range of ADTL • No crossing guards • Students live near the school (one mile or less)
Not Feasible	• Lack of sidewalks • Unsafe walking conditions • No crossing guards • Medium to high ADTL

[1] Strategic Plan 2011-2015. Safe Routes to School National Partnership. Safe Routes Partnership. November 2013. http://www.saferoutespartnership.org/sites/default/files/pdf/SRTS-Strategic-Plan-FINAL.pdf.

The following were the findings at each schools.

Arrowhead Elementary

- Lack of sidewalks
- No crossing guards
- More than half of the students live nearby (within 1.1 miles)
- No pedestrian-involved accidents in the school boundary area using 2012 data
- Roads within the school boundary areas exhibited less than 13,840 vehicles per day

Beltsville Academy

- Multiple streets and pathways to the school
- Students live near the school (1.3 miles)
- Many streets do not have sidewalks
- 325 accidents inside the school boundary area in 2012
- No crossing guards

Hyattsville Elementary

- High density of sidewalks
- Two crossing guards
- Some sidewalks have a grass buffer
- Most arterial streets within the school boundary area have an ADTL of 4,701 vehicles or less

William W. Hall Academy

- Lack of sidewalks
- One crossing guard
- All students live near the school (1.06 miles)
- Most arterial streets within the school boundary area have a ADTL of 7,480 vehicles or less
- Some streets are steeply sloped
- Four pedestrian-involved accidents within the school boundary area in 2012

Introduction

The SR2S program involves students traveling to and from school using an active mode of transportation. According to a 2011 study, out of all Maryland's counties, PGCPS had the highest mileage of bussed students at 20 million miles per year.[2] The school district also spends about $1,218 on per student every year to be bussed.[3] In recent years the County has faced budget cuts that included bussing and is examining ways to save money. Many students live within a walkable distance of their schools but ride the school bus or are driven rather than walking or bicycling. This study will help to further understand the question "To what extent do current conditions at these four schools support or hinder the feasibility of active student transportation?" To answering this question this report focuses on current built environment, safety, and demand/mode choice conditions to encourage healthy student activity and reduce transportation costs for the County.

Safe Routes to School

The SR2S program involves students traveling to and from school using an active mode of transportation. "The Safe Routes to School National Partnership's mission is to advance safe walking and bicycling to and from schools, and in daily life, to improve the health and well-being of America's children and to foster the creation of livable, sustainable communities." [4] This program promotes active student transportation, which can improve student health and has the potential to decrease the amount of buses and cars transporting students to and from school, which can have positive environmental impacts. Maryland SR2S programs are 80 percent federally funded and 20 percent or more government entity sponsored.[5] Government entities include local governments, transit agencies, school districts, or individual schools.[6] More information and details about funding can be found on the

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[2] Maryland Statewide Student Travel Policy Survey. Maryland Department of Transportation. February 2011. http://www.mdot.maryland.gov/Office_of_Planning_and_Capital_Programming/Bicycle/Documents/School_Survey_Report_Revised.pdf

[3] Maryland Statewide Student Travel Policy Survey. Maryland Department of Transportation. February 2011. http://www.mdot.maryland.gov/Office_of_Planning_and_Capital_Programming/Bicycle/Documents/School_Survey_Report_Revised.pdf

[4] Strategic Plan 2011-2015. Safe Routes to School National Partnership. Safe Routes Partnership. November 2013. http://www.saferoutespartnership.org/sites/default/files/pdf/SRTS-Strategic-Plan-FINAL.pdf.

[5] "Safe Routes to School." Maryland Department of Transportation State Highway Administration. http://www.roads.maryland.gov/Index.aspx?PageId=735.

[6] "Safe Routes to School." Maryland Department of Transportation State Highway Administration. http://www.roads.maryland.gov/Index.aspx?PageId=735.

Maryland Department of Transportation State Highway Administration website section on safety programs.[7]

Current research has shown that the built environment, walkability, demographic factors, and vehicle availability all play a role in determining feasibility of an SR2S program. To understand the four schools being studied, it is important to look at this study's local context and purpose.

Local Context

AS noted above, PGCPS had the highest mileage of bussed students and has faced budget cuts, which included bussing and is look into ways to save money. A 2016 state commission to "review and assess current education financing formulas and accountability measures."[8] Based on the commission's findings PGCPS currently defines an elementary student as bus eligible if they live 1.5 miles or more from their assigned school and live 2 miles or more from their middle and high school. [9] For elementary students there are safety patrols at bus stops where a "considerable number of students wait for the bus. Safety patrols should be encouraged to maintain order and keep students on the pavement or the side of the road until the bus arrives"[10].

The superintendent is responsible for developing and maintaining administrative procedures in order to ensure safe and efficient transportation services for eligible student riders.[11] PGCPS district boundaries are developed by the Board of Education under Policy Number 0113.[12] This policy states that school boundaries are determined to best use available school facilities "in support of educational objectives by full consideration of school capabilities, capacities, transportation, and student

[7] "Safe Routes to School." Maryland Department of Transportation State Highway Administration. http://www.roads.maryland.gov/Index.aspx?PageId=735.
[8] "COMMISSION ON INNOVATION & EXCELLENCE IN EDUCATION." Education, Maryland Commission on Innovation & Excellence in Education http://msa.maryland.gov/msa/mdmanual/26excom/html/13edinnov.html.
[9] Prince George's County Public Schools. Administrative Procedure: Student Transportation Procedure No. 3541. July 1, 2013
[10] Prince George's County Public Schools. Administrative Procedure: Student Transportation Procedure No. 3541. July 1, 2013
[11] Prince George's County Public Schools. Administrative Procedure: Student Transportation Procedure No. 3541. July 1, 2013
[12] Prince George's County Public Schools. Board of Education Policy: School Boundaries-Attendance Areas. Policy No. 0113. March 13,2013

assignment stability." [13] The policy also states that every school should have a five-year master plan and school attendance areas should "include as many walking students as can be accommodated." [14]

Study Purpose

Even though many students live within a walkable distance of their schools, they ride the school bus or get driven rather than using an active mode of transportation. Predetermined hazardous walking conditions for students such as lack of sidewalks or roads with multiple lanes are some reasons students don't walk or bicycle to school. PGCPS would like to explore the idea of increasing walkability and bikeability to and from school by implementing the SR2S program, which encourages students to use an active mode of transportation. To understand the feasibility of SR2S, built environment, demand/mode choice, and safety must be taken into account. This study will help answer questions about how current conditions at four schools contribute to the feasibility of active student transportation.

In cooperation with PALS, a preliminary study was conducted to establish a foundation for this report. The preliminary study focused on the question "What are the current demand/mode choice conditions for students to use an active mode of transportation?" The preliminary study looked at potential active travel demand and student mode choice using walkablity data provided by the County at eleven elementary and academy schools. It was found that at least 79 percent of all students attending these schools lived within the 1.5-mile walk zone set by the County. Within the school boundary areas, there was between 13 percent and 94 percent walkable streets.

This data and analysis helped develop the current study. The current study focuses on four schools selected by PGCPS: Arrowhead Elementary, Beltsville Academy, Hyattsville Elementary, and William W. Hall Academy for a more in-depth analysis into the built environment, safety, demographics, and vehicle availability. (See Appendix 1 for details on the preliminary study.)

[13] Prince George's County Public Schools. Board of Education Policy: School Boundaries-Attendance Areas. Policy No. 0113. March 13,2013

[14] Prince George's County Public Schools. Board of Education Policy: School Boundaries-Attendance Areas. Policy No. 0113. March 13,2013

To better understand current active student transportation factors at the four schools, this study reviews previous studies in addition to conducting multiple GIS analyses, collecting observational data through a Walkability Environment Assessment, and research promising practices in three bordering counties' bus eligibility and SR2S participation. This study looks into demographic characteristics, safety, student distance between home and school, the built environment, and street/sidewalk connectivity, to understand how these factors influence active student transportation to and from school.

This report is composed of the following sections. A literature review synthesizes prior research about the built environment, walkability, vehicle availability, and demographic characteristics relating to students using active transportation to and from school. Data and methods outlines data used for this study, maps, GIS analysis, and feasibility criteria. Case studies of the four schools examine their built environments, walkability, vehicle availability, and demographic characteristics. An examination of promising practices gives PGCPS a reference based on bordering counties for planning an SR2S program and bus eligibility. An examination future studies and additional analysis discusses this study's limitations and recommends future analysis of other aspects pertaining to the feasibility of active student transportation and an SR2S program. Finally, conclusions and recommendations provides next steps to implement an SR2S program in Prince George's County.

Literature Review

Previous research has found many different factors that influence active student transportation. The following high-level categories emerged from research. Built environment and infrastructure, walkability, vehicle availability, income, and demographics all influence active student transportation. These influences were examined further for each of the selected schools.

Built Environment and Infrastructure

The built environment and infrastructure play a significant role in the SR2S feasibility. A lack of sidewalks means people are less likely to walk in an unsafe environment where pedestrians or bicyclists are forced to travel along the side of the road with no separation between vehicles and people.

A street network is a group of lines and points which make up roads. [15] Street connectivity is the ease of movement between streets. [16] There is a strong interaction between street network and connectivity. [17] Children who attend schools in areas with high street connectivity and high traffic loads are less likely to walk.[18] Walking trips and dense sidewalk networks are highly correlated.[19]

Sidewalks are elevated from the road on average about one-half foot, which creates a barrier between the road and the sidewalk. Many times, sidewalks are buffered from traffic by grass and street trees that create a safe and more welcoming environment for walking and bicycling.

Street trees around schools also have a positive influence on walking.[20] They create an aesthetically pleasing atmosphere that makes and area more desirable for walking and bicycling.

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[15] Giles-Corti B et al. 2011. "School Site and the Potential to Walk to School: The Impact of Street Connectivity and Traffic Exposure in School Neighborhoods." *Health & Place* 17 (2): 545–50. doi:10.1016/j.healthplace.2010.12.011.
[16] Ibid.
[17] Ibid.
[18] Ibid.
[19] Ewing, R, W Schroeer, and W Greene. 2004. "School Location and Student Travel: Analysis of Factors Affecting Mode Choice." *Transportation Research Record* 1895 (1895): 55–63.
[20] Ibid.

Short blocks can negatively influence active transportation.[21] They require people to cross often and be aware of turning vehicles, which can deter people from using an active mode of transportation.

Walkability: Safety Conditions and Barriers

An area that has good walkability is defined as being safe, compact, aesthetically pleasing, and supportive of sustainable transportation options.[22] Walkability can support or hinder the feasibility of students using an active mode of transportation to get to and from school. Previous studies have looked at walkability using questionnaires and on the ground observations. The most commonly reported barriers to active student travel are traffic, distance, lack of sidewalks, lack of crossing guards, bad weather, lack of bike racks, and crime.[23] Some of these barriers can be addressed more easily than others through funding, including crossing guards, lack of bike racks, and lack of sidewalks. Others, like bad weather and crime are more difficult to address. States that require schools to have crossing guards help to reduce this barrier and increase the odds of students using active transportation.[24]

In some cases, schools offer hazard bussing to address to unsafe active transportation conditions to and from school. In other cases, some schools do not offer bussing at all.[25]

School districts often enact lower speed limits in front of schools during school days to increase the safety for the students. Most often, these speed limits are 25mph, the speed at which a vehicle is most likely to be able to stop thus preventing a pedestrian-involved accident.

Bike racks encourage students to ride their bikes to school.[26] They also enable students to use more than one mode of active transportation to get to and from school. Schools that have volunteer or paid crossing guards have a higher number of students who walk or bike to school. On the other hand,

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[21] Ewing, R, W Schroeer, and W Greene. 2004. "School Location and Student Travel: Analysis of Factors Affecting Mode Choice." *Transportation Research Record* 1895 (1895): 55–63.
[22] Forsyth A. 2015. "What Is a Walkable Place? The Walkability Debate in Urban Design." *Urban Design International*20 (4): 274–92. doi:10.1057/udi.2015.22.
[23] Chriqui, Jamie F, Daniel R Taber, Sandy J Slater, Lindsey Turner, Kerri McGowan Lowrey, and Frank J Chaloupka. 2012. "The Impact of State Safe Routes to School-Related Laws on Active Travel to School Policies and Practices in U.s. Elementary Schools." *Health and Place* 18 (1): 8–15. doi:10.1016/j.healthplace.2011.08.006.
[24] Ibid.
[25] Jones S.E, and Sliwa S. 2016. "School Factors Associated with the Percentage of Students Who Walk or Bike to School, School Health Policies and Practices Study, 2014." *Preventing Chronic Disease* 13 (5). doi:10.5888/pcd13.150573.
[26] Ibid.

schools without crossing guards have fewer students walking or biking.[27] Crossing guards create a safe environment for students and increase the likelihood of parents and or guardians allowing their children to use an active mode of transportation to and from school.

A programmatic factor that helps increase active student transportation is educational materials about waking or biking to school.[28] It is important to educate students about safety when using active transportation modes. This helps teach students what to look out for when walking or biking and how to safely get to and from school.

Walkability: Demand and Mode Choice/Demographics and Free and Reduced Meal Program (FARM)

Demand and mode choice are influenced by distance, demographics, and household vehicle ownership. As students live closer to school they are more likely to use an active transportation mode.[29] Across all demographic groups, students who live a half mile away from their school, are more likely to walk or bike to and from school.[30] When students' households have higher income, they are more likely to own more vehicles per capita, which decreases the likelihood of active student transportation.[31] Also, households with more licensed drivers offer students more ride opportunities.[32]

Demographics and income as measured by the percentage of students eligible for Free and Reduced Price Meals (FARM) can positively impact walkability. Hispanics and non-Hispanic Blacks were found to be the most likely to use active transportation modes compared to other demographic groups such as Asians or whites.[33] Whites are more likely to live farther than a half mile from school. They also have

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[27] Jones S.E, and Sliwa S. 2016. "School Factors Associated with the Percentage of Students Who Walk or Bike to School, School Health Policies and Practices Study, 2014." *Preventing Chronic Disease* 13 (5). doi:10.5888/pcd13.150573.
[28] Ibid.
[29] Ewing, R, W Schroeer, and W Greene. 2004. "School Location and Student Travel: Analysis of Factors Affecting Mode Choice." *Transportation Research Record* 1895 (1895): 55–63.
[30] McDonald NC. 2008. "Critical Factors for Active Transportation to School among Low-Income and Minority Students. Evidence from the 2001 National Household Travel Survey." *American Journal of Preventive Medicine* 34 (4): 341–44. doi:10.1016/j.amepre.2008.01.004.
[31] Ewing, R, W Schroeer, and W Greene. 2004. "School Location and Student Travel: Analysis of Factors Affecting Mode Choice." *Transportation Research Record* 1895 (1895): 55–63.
[32] Ibid.
[33] McDonald NC. 2008. "Critical Factors for Active Transportation to School among Low-Income and Minority Students. Evidence from the 2001 National Household Travel Survey." *American Journal of Preventive Medicine* 34 (4): 341–44. doi:10.1016/j.amepre.2008.01.004.

higher incomes, more vehicles per household, and live in less dense areas.[34] All of these aspects decrease a student's likelihood of using an active transportation mode. In the U.S., those who own a vehicle are more likely to use it when living in a suburban area, which is more spread out than an urban area. Also, having a vehicle can be an indicator of income, which may make people less likely to use an active transportation mode of transportation.

Many times, low bussed areas have a higher proportion of Free and Reduced Meal (FARM) programs.[35] Students are eligible for FARM based on income and household size. The County has a useful webpage that breaks down the household size and yearly, monthly, and weekly incomes in relation to reduced meal prices.[36] There is a positive correlation between students using an active transportation mode when they also receive FARM. [37] They come from lower income households that may not own a car, which leads them to using an active transportation mode of transportation to and from school if they are not bus eligible.

[34] McDonald NC. 2008. "Critical Factors for Active Transportation to School among Low-Income and Minority Students. Evidence from the 2001 National Household Travel Survey." *American Journal of Preventive Medicine* 34 (4): 341–44. doi:10.1016/j.amepre.2008.01.004.

[35] Lee SM, Tudor-Locke C, and Burns EK. 2008. "Application of a Walking Suitability Assessment to the Immediate Built Environment Surrounding Elementary Schools." *Health Promotion Practice* 9 (3): 246–52. doi:10.1177/1524839907301403.

[36] "Apply For Free or Reduced-Price Meals." Prince George's County School District. http://www1.pgcps.org/page.aspx?Pageid=234147&id=235880.

[37] Lee SM, Tudor-Locke C, and Burns EK. 2008. "Application of a Walking Suitability Assessment to the Immediate Built Environment Surrounding Elementary Schools." *Health Promotion Practice* 9 (3): 246–52. doi:10.1177/1524839907301403.

Data and Methods

Students ranging from kindergarten to eighth grade are the primary focus for this study of the feasibility of active student transportation in a SR2S program based on current conditions within the boundary areas the four selected schools. The school boundary is the area defined by the school district, which determines the catchment area of students to attend a particular school. Depending on the school, boundary areas vary in size. Data collected consists of GIS data provided by the County, census data, and on-site data. Table 2 shows a complete list of data sources.

Table 2: Data Sources

Data	Year	Source
School Boundaries	N/A	PGCPS
All Roads	2017	Maryland iMap
Sidewalks	2014	PG Opendata: Layer Name Transporation_2014_Py
Crossing Guard Location	2015-2016	PGCPS
Annual Daily Traffic Load	2012	Maryland Imap
Accident Data	2012	Maryland State Highway Administration
Student Address Points	September 2016	PGCPS
School Locations	2015	PGCPS
Median Income	2015	Census
Zero Car Households	2015	Census
County Boundary	N/A	County

GIS Analysis, Site Assessment, and Feasibility Integration

Sidewalk Identification: Sidewalks are important for the feasibility of active student travel for both safety and connectivity purposes. Sidewalk data for the County are sparse and outdated. To get a better understanding of sidewalks and conditions, GIS data provided by the County and site observations were combined to identify sidewalks and walkable streets.

Walkshed Analysis: The most common way of defining walksheds is to establish a buffer from a point-of-origin to point-of-destination using a straight-line distance. This approach fails to account for pedestrian barriers, such as highways and rivers, as well as street variations that can influence connectivity in a study area. To overcome these limitations, we constructed walksheds using County's walkable street layer around each school at different distances (quarter-mile, half-mile, and one-mile) to capture variations of street connectivity.

Site Assessment/Measuring Walkability: Walkability was measured two ways. First was the Walkability Environment Assessment, which examined on-site street aesthetics, built environment infrastructure including sidewalks and streets, and safety both around the school and on particular streets chosen for this assessment. An on-site visit was conducted at each school in this study.[38] The full Walkability Environment Assessment is in Appendix 2A and 2B. Two sets of questions were developed for the Walkability Environment Assessment. One set was for the school perimeter and the other set was developed solely for streets students might walk on to get to school. Questions were both multiple choice and long answers to obtain more explanation about the answers. There is also a notes section for additional information the respondent wished to share.

The second way was a GIS analysis using the walkshed analysis of the network function in Arc GIS, and Annual Daily Traffic Load/Accidents obtained through Maryland iMap. Based on PGCPS existing walk area evaluation, and drawing on published research, the topics covered in this Walkability Environment

[38] It was not feasible to conduct the Walkability Environmental Assessment during drop off or pick up times. In a future study, having a site visit during drop off and pickup times would be a good gauge to see the approximate number of students using an active mode of transportation to get to and from school. In addition, talking to the crossing guards at the schools would be a good way to see how many students use them to cross.

Assessment are sidewalks, traffic, street characteristics (e.g., number of lanes, speed), and other built environment characteristics at each school that influence students' use of an active transportation mode (e.g., crosswalks, lights, bike racks, and sidewalks).

Student Proximity to School: Student proximity was measured by a straight-line distance from the student's address to school using Arc GIS. Student proximity is important to understanding bus eligibility, as well as the distance a student lives from school. Students who attend these schools but do not live within the school boundary were omitted from this analysis.

Feasibility: Feasibility was determined by comparing quantitative and qualitative factors using the GIS analysis, Walkability Environmental Assessment, and a site visit to each school. The impacts of these factors helped determine feasibility. For example, if the school boundary area severely lacks sidewalks, it creates dangerous conditions for students to use an active transportation mode, limiting the feasibility of active student transportation. On the other hand, if a school boundary area has high sidewalk coverage, active student transportation would be feasible.

In addition, previous study findings on active student transportation were used as benchmarks for feasibility determination. Positive factors include sidewalks, crossing guards, and students' proximity to school. Negative factors include a lack of sidewalks and unsafe walking conditions. Table 3 shows the criteria for the different levels of feasibility.

Table 3: Feasibility Criteria

Feasible	• Sidewalks on most streets • Crossing guards • Low Annual Daily Traffic Load (ADTL) • Majority of students live near their school (one mile or less) • Bike racks
Potentially Feasible	• Sidewalk on some streets • Low ADTL • No crossing guards • Students live near their school
Not Feasible	• Lack of sidewalks • Unsafe walking conditions • No crossing guards • Medium to high ADTL

Data Integration

ADTL and Accidents: These two sets of data were integrated to capture safety and programmatic factors. Traffic loads and accidents are important for student safety in crossing the street and are a potential barrier for students getting to and from school. If a road is heavily trafficked during school start and end times, it can create unsafe walking conditions. Data for the Annual Daily Traffic Load (ADTL) was split into five categories using natural breaks (natural grouping of data) in Arc GIS for each school because each school's traffic loads are different. In Maryland, when road ADTL is 80,000 or more vehicles, it is considered a highly trafficked road.[39] Pedestrian-involved accident locations were mapped for each school. The roads with the lightest traffic are highlighted in green and the heaviest trafficked roads are highlighted in red.

[39]Peng, Edward F., Deepak Gopalakrishna, and Dan Middleton. "Highway Performance Monitoring System Traffic Data for High Volume Routes: Best Practice and Guidelines Final Report." September 8, 2004. https://www.fhwa.dot.gov/policyinformation/hpms/volumeroutes/hvr_revisedrpt.pdf.

Crossing Guards: This data was provided directly by the County in a hard copy list of all schools with crossing guards and their street locations. Two out of the four school in this study have crossing guards. The crossing guard data locations were validated using Google maps and Google street view to create a new map shape file showing the locations of the crossing guards.

Socio-demographic Data Integration

Prior research shows that high income student households are more likely to own more vehicles per capita, which decreases the likelihood of active student transportation.[40] Also, it was found that Hispanics and non-Hispanic Blacks were most likely to use an active mode of transportation compared to other demographic groups such as Asians or whites.[41] Looking at zero car households, median household income, demographics, and FARM percentages helps to better understand the socio-demographic conditions inside each of the school boundary areas.

Zero Car Households and Median Income: This data was collected from the U.S. Census American Community Survey (ACS) 2011-2015 5-year estimates at the block group level. To provide a broad view of socio-demographic patterns, block groups in areas surrounding school boundary areas were also included.

Demographics/FARM Percentages: Demographics and FARM percentages are both indicators of a student's potential to use an active transportation mode. This data was taken from the Maryland Report Card website, which breaks down student demographics by school as well as FARM percentages at each school.[42]

[40] Ewing, R, W Schroeer, and W Greene. 2004. "School Location and Student Travel: Analysis of Factors Affecting Mode Choice." *Transportation Research Record* 1895 (1895): 55–63.
[41] McDonald NC. 2008. "Critical Factors for Active Transportation to School among Low-Income and Minority Students. Evidence from the 2001 National Household Travel Survey." *American Journal of Preventive Medicine* 34 (4): 341–44. doi:10.1016/j.amepre.2008.01.004.
[42] 2017 Maryland Report Card. (n.d.). http://reportcard.msde.maryland.gov/

Arrowhead Elementary School Analysis

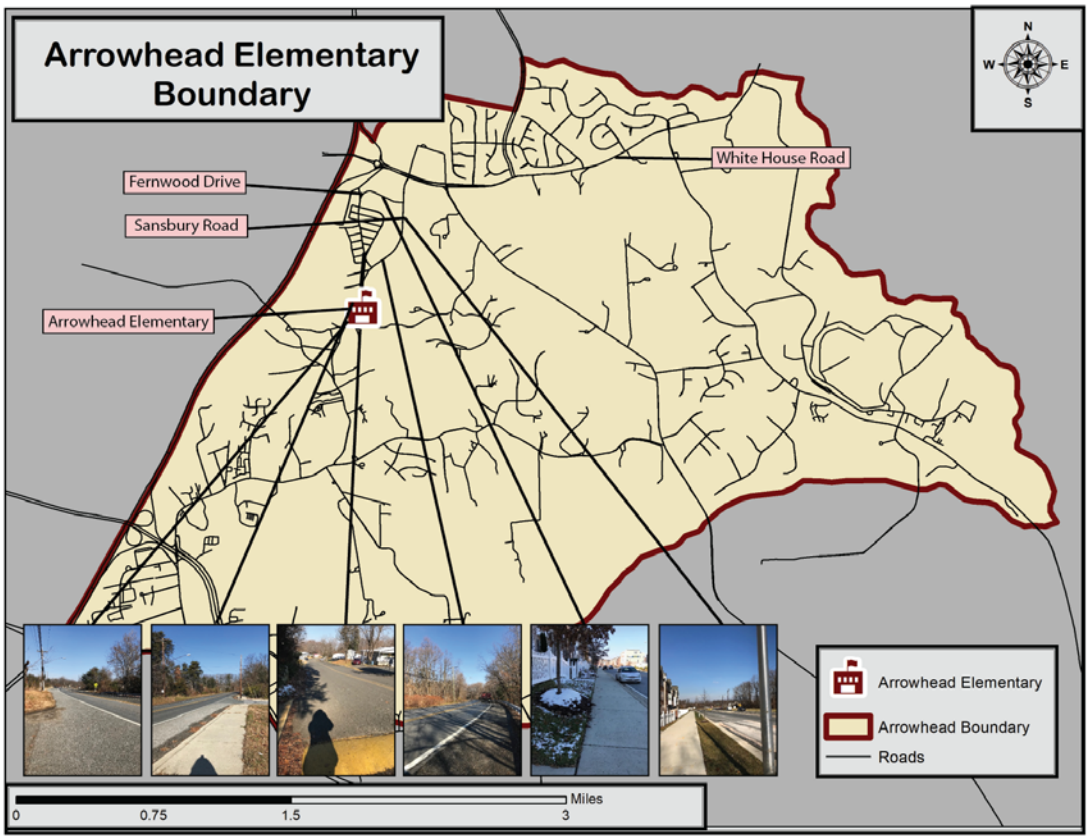

Figure 1: Arrowhead Boundary and photos taken during the site visit.

Introduction

Arrowhead Elementary is located at 2300 Sansbury Road, Upper Marlboro and had a student enrollment of 379 in 2016 (see Figure 1).[43] A majority of students who attend this school live within 1.5 miles north or south of the school. Arrowhead Elementary was examined for this study because it has new sidewalk infrastructure and would be a good candidate for the SR2S program.

[43] "Demographics." Demographics: Prince George's County - Arrowhead Elementary: 2017 Maryland Report Card. Accessed January 29, 2018. http://reportcard.msde.maryland.gov/Demographics.aspx?K=160640&WDATA=School#ENROLLMENTgrade3all.

Built Environment/Infrastructure

Sidewalks

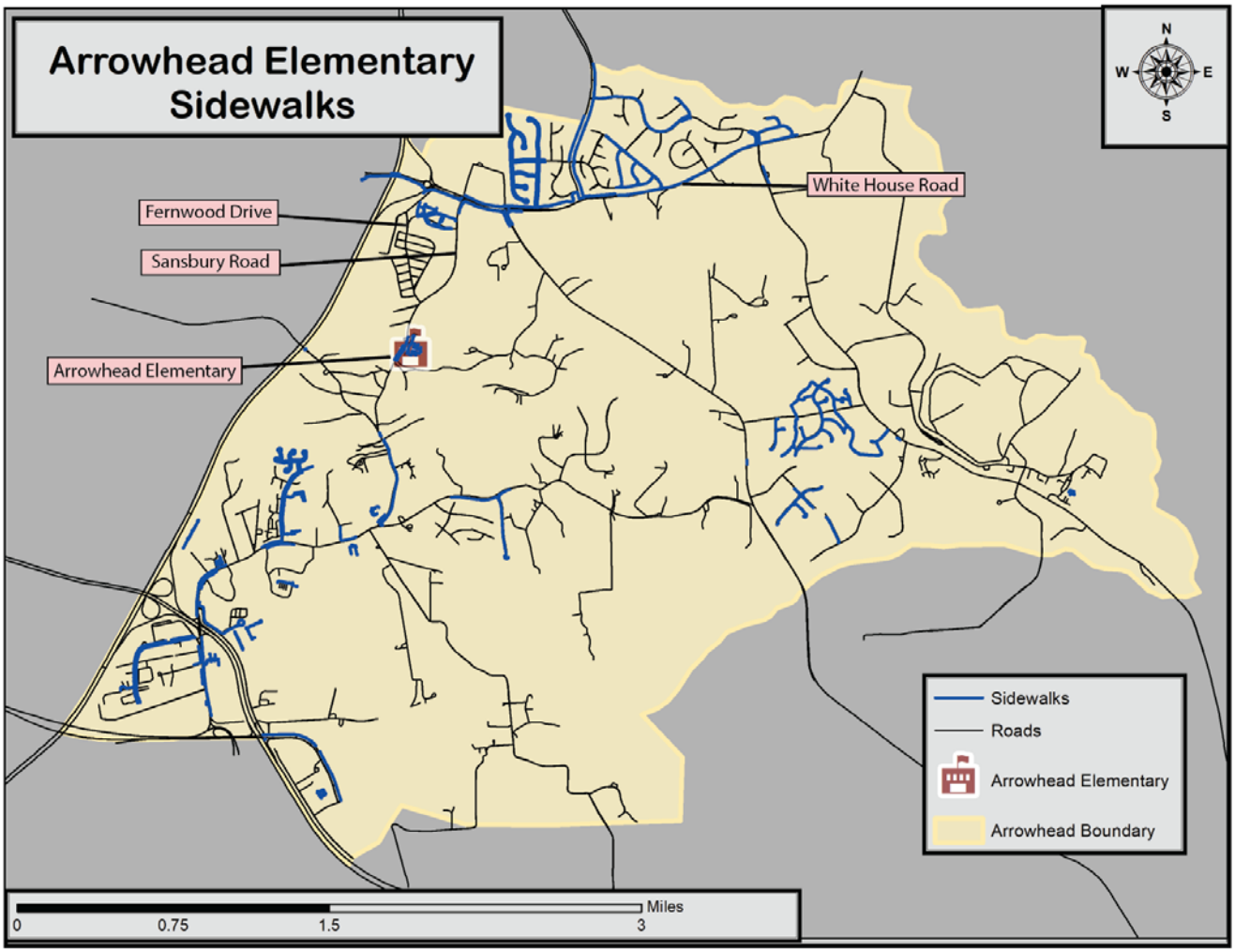

Figure 2: Arrowhead Elementary Sidewalks

The Arrowhead boundary area lacks sidewalks, which makes it hard and dangerous for students to use an active transportation mode of transportation (see Figure 2). Sidewalks exist only in a few areas within the boundary. Two and a half feet-wide sidewalks exist on and around Fernwood Drive but are not mapped because the GIS data was not available. Instead, a site visit confirmed these sidewalks. New development, on the north side of Fernwood Drive has a four-foot-wide sidewalk with a buffer of parked cars or grass between the sidewalk and road. A buffer creates a safe barrier to prevent vehicle and pedestrian accidents. Sidewalks in the Fernwood Drive area allows people to move within that

block but beyond that block, there are no sidewalks. There is one crosswalk on the south property line but there are no sidewalks from the south to the crosswalk. From the north, there are sidewalks along the school's property line and across the street at the park. Sidewalks end at property lines of the park and the school. To reach the school, students would have to travel along Sansbury Road, which does not have sidewalks. Students north of White House Road have sidewalks but no connected network of sidewalks leading to the school.

Safety

Annual Daily Traffic Load and Accidents

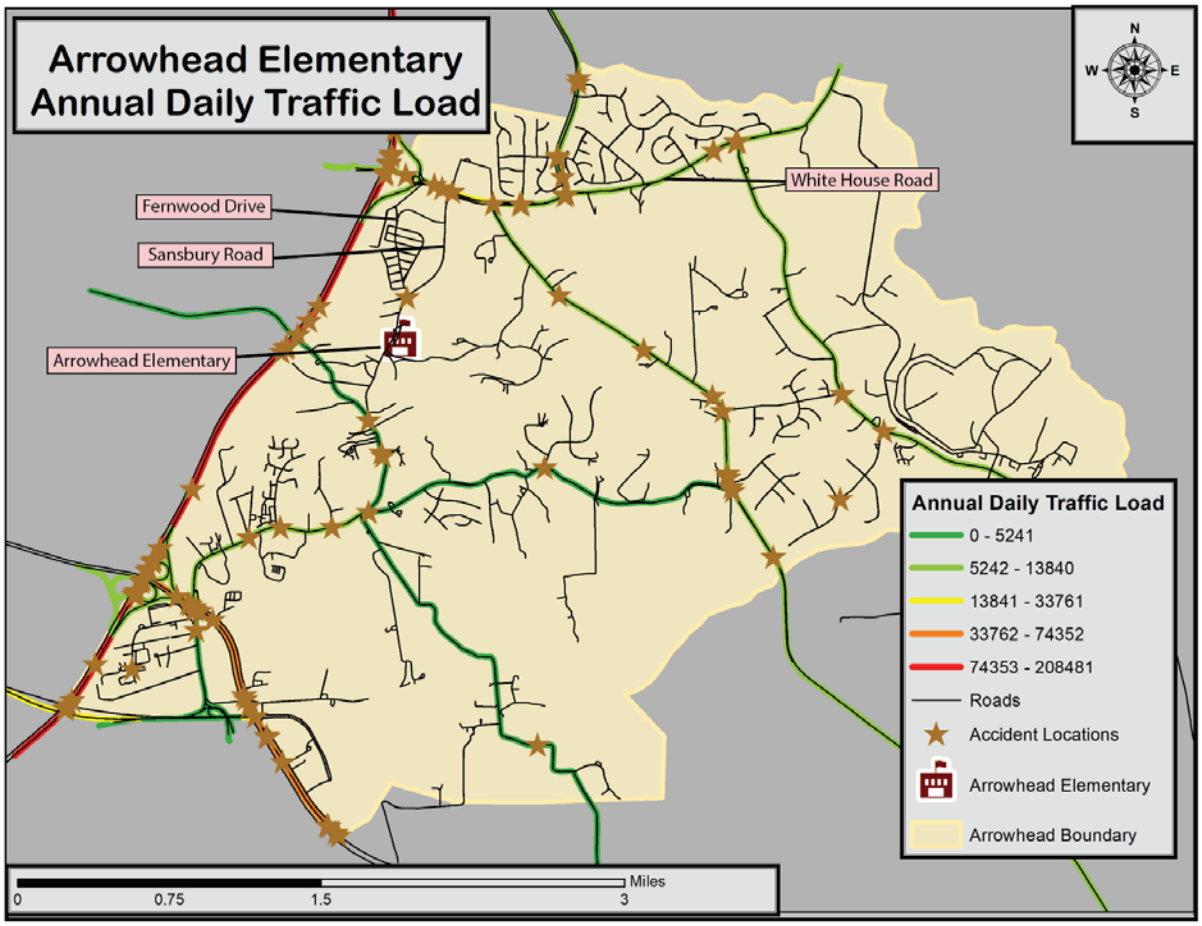

Figure 3: Arrowhead Annual Daily Traffic Load and Accidents

Where the school is located on Sansbury Road, the speed limit is 30 miles per hour and a speed camera is located in front of the school, which helps slow cars. According to the County, this school does not have any crossing guards. In 2012, there were 156 accidents (see Figure 3) within the Arrowhead boundary, and none involved pedestrians.[44] There were three accidents on Sansbury Road, one of which was just north of the school. White House Road to the north of the school and D'Archy Road to the south of the school also had numerous accidents. Sansbury Road in front of the school had less than 13,840 cars per day, dramatically lower than the 80,000 ADTL standard.[45] Fernwood Drive has speed humps as traffic calming measures. In addition, some sections of Fernwood Drive are steeply sloped, which can create a barrier for students when there is bad or icy weather. Also, on the north side of Sansbury Road off White House Road, there is a raised median used as a traffic calming device for both directions of the road (see Figure 1).

[44] With the Accident Data, time of day was not taken into account, so the accidents might not have necessarily happened during times where students would be travelling to and from school.

[45]Peng, Edward F., Deepak Gopalakrishna, and Dan Middleton. "Highway Performance Monitoring System Traffic Data for High Volume Routes: Best Practice and Gudielines Final Report." September 8, 2004. https://www.fhwa.dot.gov/policyinformation/hpms/volumeroutes/hvr_revisedrpt.pdf.

Demand/Mode Choice

Student Proximity to School

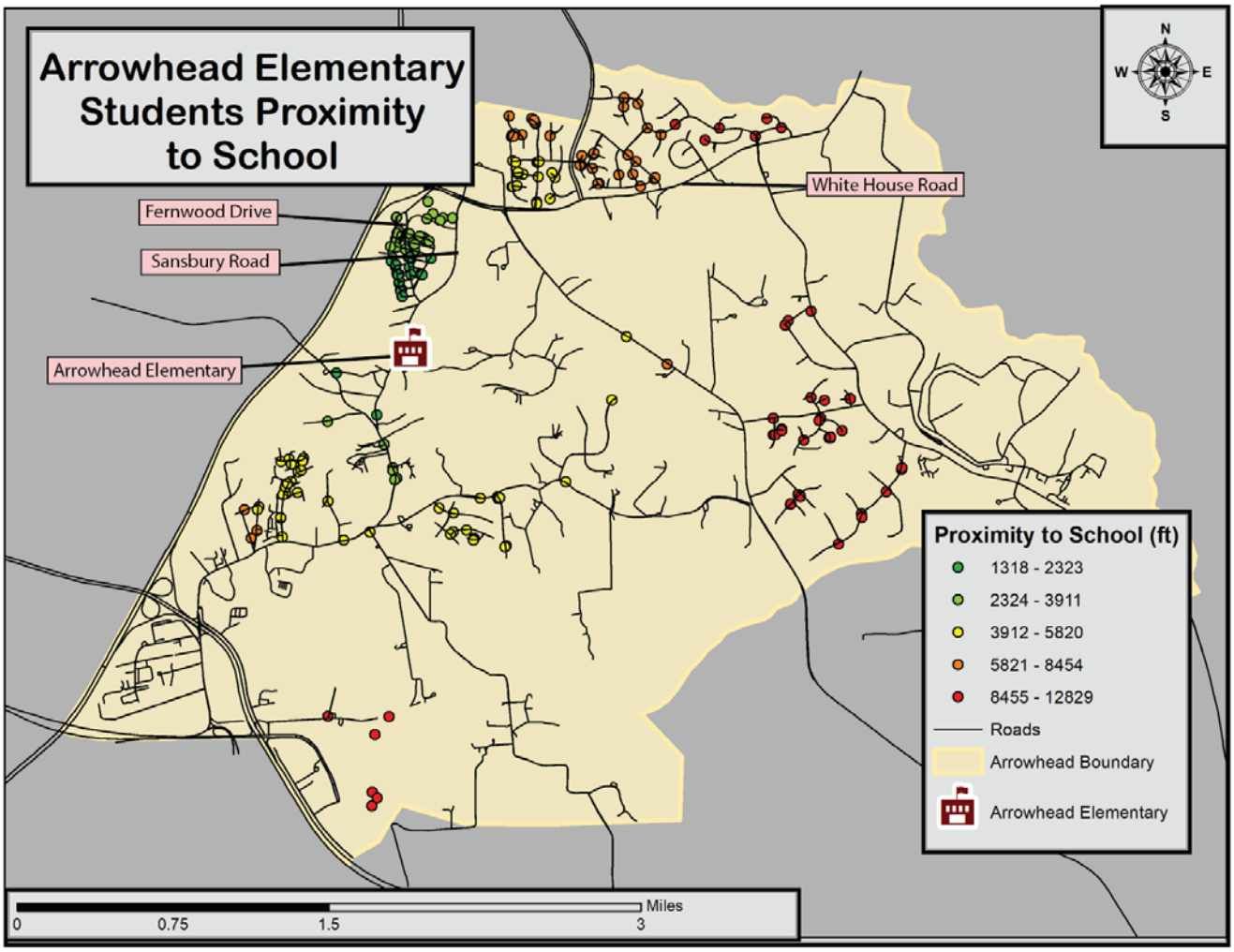

Figure 4: Arrowhead Elementary Students Proximity to School

Table 4: Arrowhead Student Count and Proximity to School

Arrowhead Elementary		
Distance (ft)	Distance (mi)	Student Count
1318 - 2323	.25-.44	46
2324- 3911	.45-.74	71
3912 - 5820	.75-1.10	74
5821 - 8454	1.11-1.60	51
8455 - 12829	1.61-2.42	52

More than half of the students who live in the Arrowhead School boundary area are within 1.10 miles of the school (see Figure 4 and Table 4). This is less than the 1.5-mile PGPCS non-transport zone and indicates that in an ideal setting, most of the students attending this school are not eligible for the bus. But in reality, this is not the case because many of these students are using the bus. Most of the school's students live within three quarters of a mile or a little over a mile from the school while the fewest live within a quarter- to an almost half-mile. Research has noted that students who live closer to a school are more likely to use an active transportation mode and those who live farther away are more likely to use another means of transportation. [46] Since many students attending this school use the bus, but live within the current non-transport zone, there is a missed opportunity for students to use a means of transportation other than the bus.

[46] Ewing, R, W Schroeer, and W Greene. 2004. "School Location and Student Travel: Analysis of Factors Affecting Mode Choice." *Transportation Research Record* 1895 (1895): 55–63.

Socio-demographic Analysis

Table 5: Arrowhead Elementary Enrollment Count, FARM Percentage, and Demographic Information

Arrowhead Elementary	
Enrollment Count	379
FARM Student Percentage	72%
Hispanic or Latino Student Percentage	22%
African American Student Percentage	73%
Asian Student Percentage	N/A
White Student Percentage	4%
Two or More Races Percentage	N/A

During the 2016 school year, more than half of Arrowhead students received free or reduced price meals.[47] This school also has a high percentage of Hispanic or Latino and African-American students with 22 percent and 73 percent respectively. Only four percent of the students attending this school were White and since there were less than 10 students enrolled as "Asian or two or more races," the data was omitted. [48] As seen in prior research, Hispanics and non-Hispanic Blacks were found to be the most likely to use an active transportation mode compared to other demographic groups such as Asians or whites.[49] There is also a higher positive correlation of students using an active transportation mode when they are also receiving Free and Reduced Price Meals (FARM). [50]

[47] "Demographics." Demographics : Prince George's County - Arrowhead Elementary : 2017 Maryland Report Card. Accessed January 29, 2018. http://reportcard.msde.maryland.gov/Demographics.aspx?K=160640&WDATA=School#ENROLLMENTgrade3all.
[48] Ibid.
[49] McDonald NC. 2008. "Critical Factors for Active Transportation to School among Low-Income and Minority Students. Evidence from the 2001 National Household Travel Survey." *American Journal of Preventive Medicine* 34 (4): 341–44. doi:10.1016/j.amepre.2008.01.004.
[50] Lee SM, Tudor-Locke C, and Burns EK. 2008. "Application of a Walking Suitability Assessment to the Immediate Built Environment Surrounding Elementary Schools." *Health Promotion Practice* 9 (3): 246–52. doi:10.1177/1524839907301403.

Zero Car Households

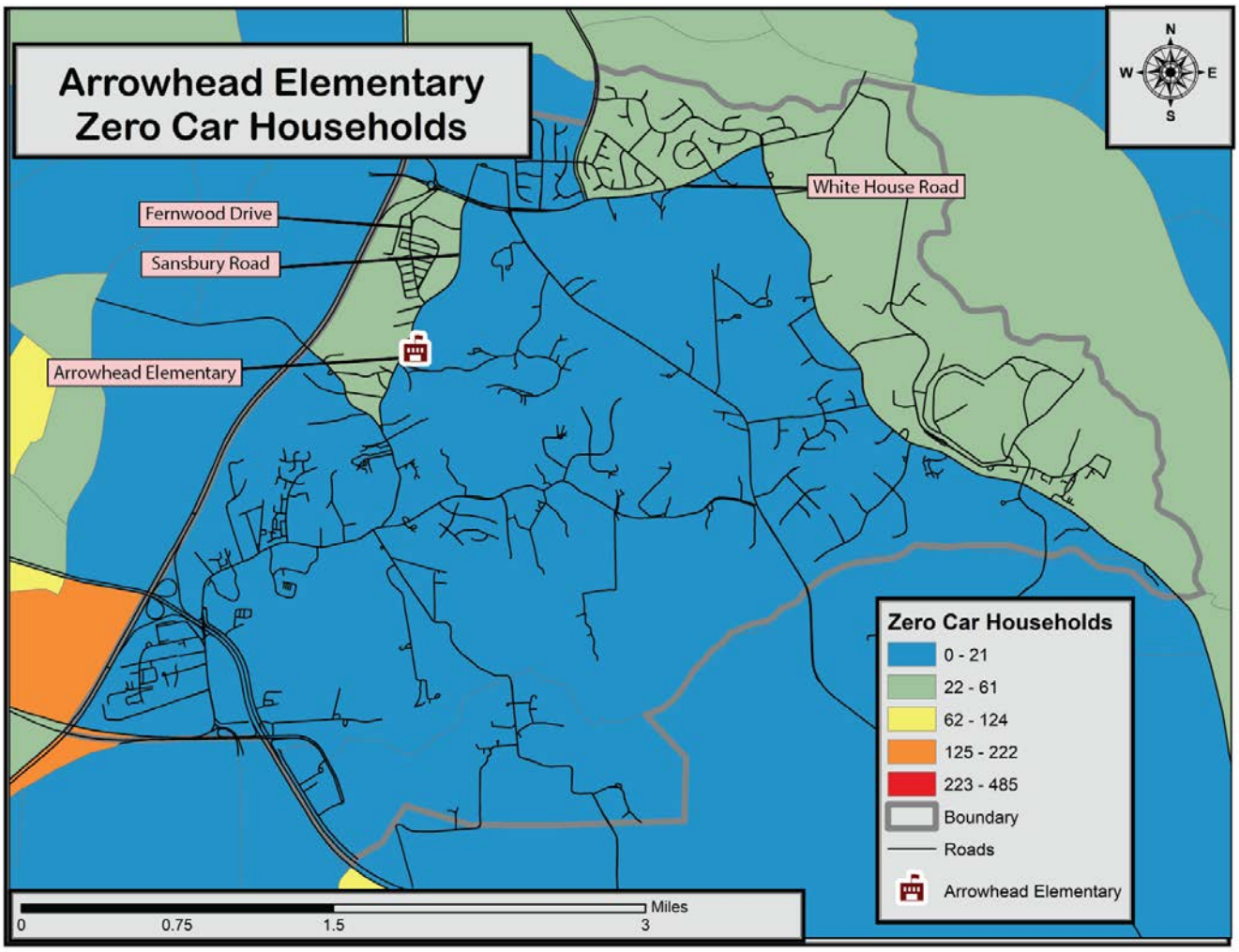

Figure 5: Arrowhead Elementary Zero Car Households

As seen in Figure 5, most households within the boundary area own at least one car, with a higher number of zero car households located off of Fernwood Drive. One reason there are fewer zero car households in this school boundary area is that the area is not densely populated and households must own at least one car. Households with more vehicles are also correlated with less dense areas.[51] This has the potential to hinder the active student transportation at this school.

[51] McDonald NC. 2008. "Critical Factors for Active Transportation to School among Low-Income and Minority Students. Evidence from the 2001 National Household Travel Survey." *American Journal of Preventive Medicine* 34 (4): 341–44. doi:10.1016/j.amepre.2008.01.004.

Median Household Income

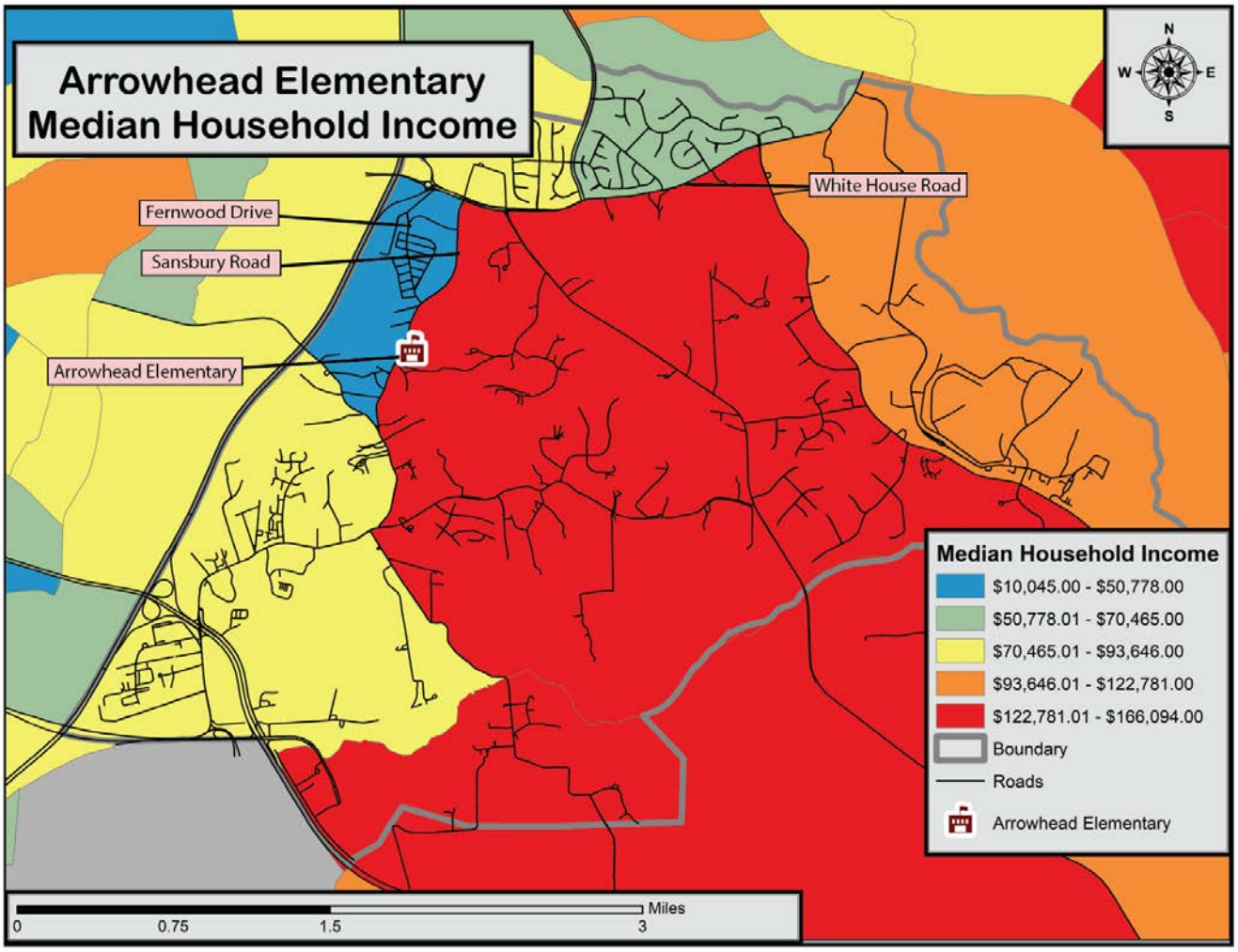

Figure 6: Arrowhead Elementary Median Household Income

Students in this school boundary area come from a variety of income levels. Students in the Fernwood Drive area come from households that exhibit the lowest median household income within the school boundary area while students living to the east of the school exhibit the highest median household incomes. This is important in determining which students are more likely to use an active transportation mode. Since students off of Fernwood Drive have lower incomes, they have a higher likelihood of using an active mode of transportation than students in other parts of the boundary area (see Figure 6).

Conclusion

Core Findings

Multiple findings support or hinder the feasibility of active student transportation. The factors that supports feasibility of active student transportation was proximity to school, low ADTL, student demographics, and student FARM recipients. Hindering factors are a lack of sidewalks within the school boundary area, no crossing guards, and car ownership levels in the school boundary area.

Recommendations

To facilitate active student transportation at this school, better infrastructure such as sidewalks, is required. Sidewalks create a way for students to use active transportation and also help students and parents/guardians feel safe letting traveling to and from school. In addition, adding a crossing guard at the intersections of White House Road/Sansbury Road and at Sansbury Road in front of the school would aid in students safely crossing the street.

Recommendations to Increase the Feasibility of an SR2S program

Table 6: Arrowhead Elementary Goals

Short Term	Better understand student/family mode choice • survey walkability and infrastructure improvements • survey family mode choice and perception of safety • collect and synthesize survey data
Medium Term	Sidewalk identification • on-site investigation of areas where sidewalks would be most beneficial and useable for active transportation • Arc GIS spatial analysis to show existing and potential sidewalk infrastructure
Long Term	Funding and implementation of new sidewalks • search local, state, federal, and capital improvements for potential sidewalk infrastructure funding • apply for and obtain funding • implement new sidewalks

Beltsville Academy Analysis

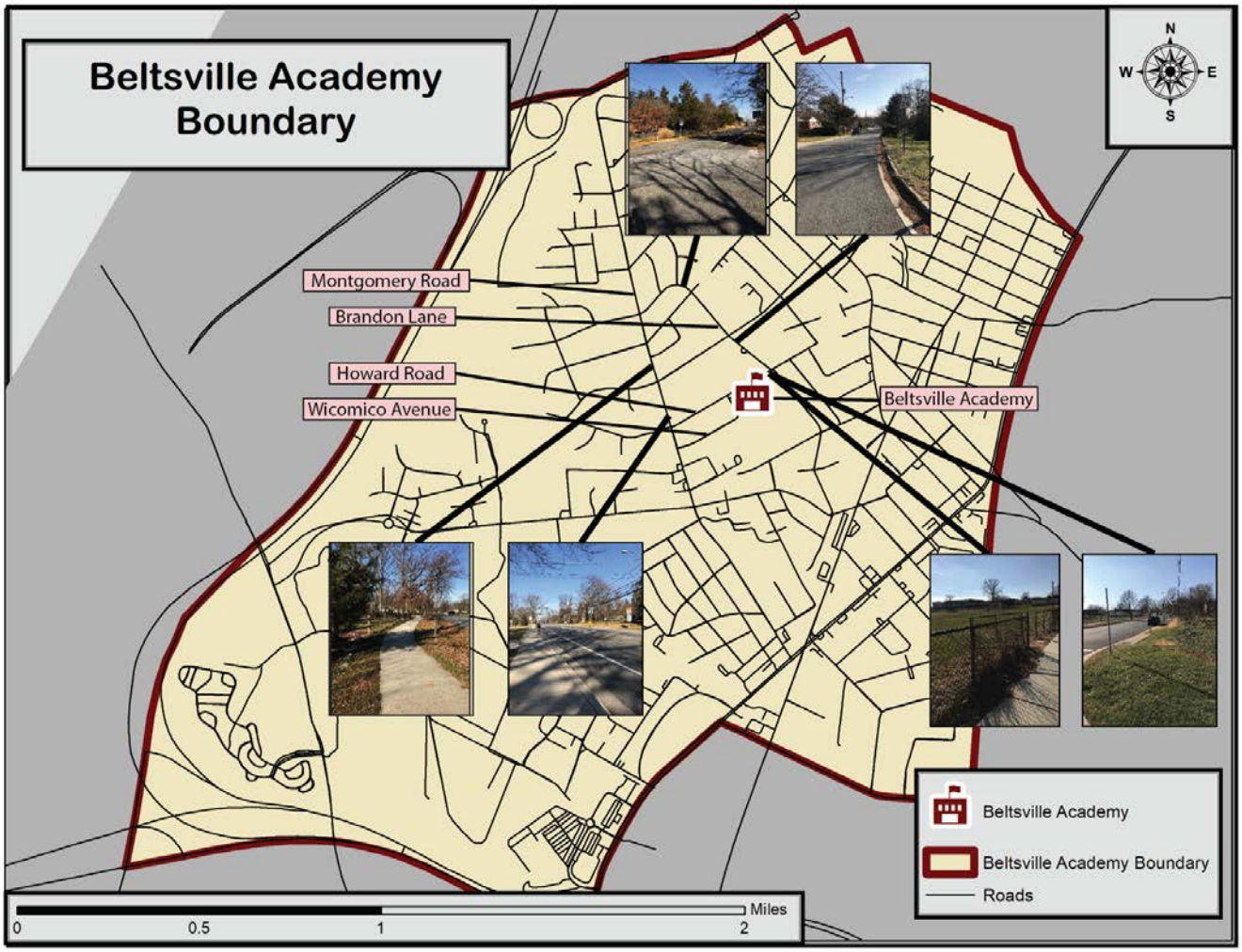

Figure 7: Beltsville Academy boundary with picture from site visit

Introduction

Beltsville Academy is located at 4300 Wicomico Avenue, Beltsville, MD 20705 and had 1,092 students enrolled in 2016.[52] This area is a moderately dense neighborhood of single-family houses. Students live evenly spread out around the school. Beltsville Academy was included in this study because of its student density and proximity.

[52]"Demographics." Demographics: Prince George's County - Beltsville Academy: 2017 Maryland Report Card. http://reportcard.msde.maryland.gov/Demographics.aspx?K=160104&WDATA=School.

Built Environment/Infrastructure

Sidewalks

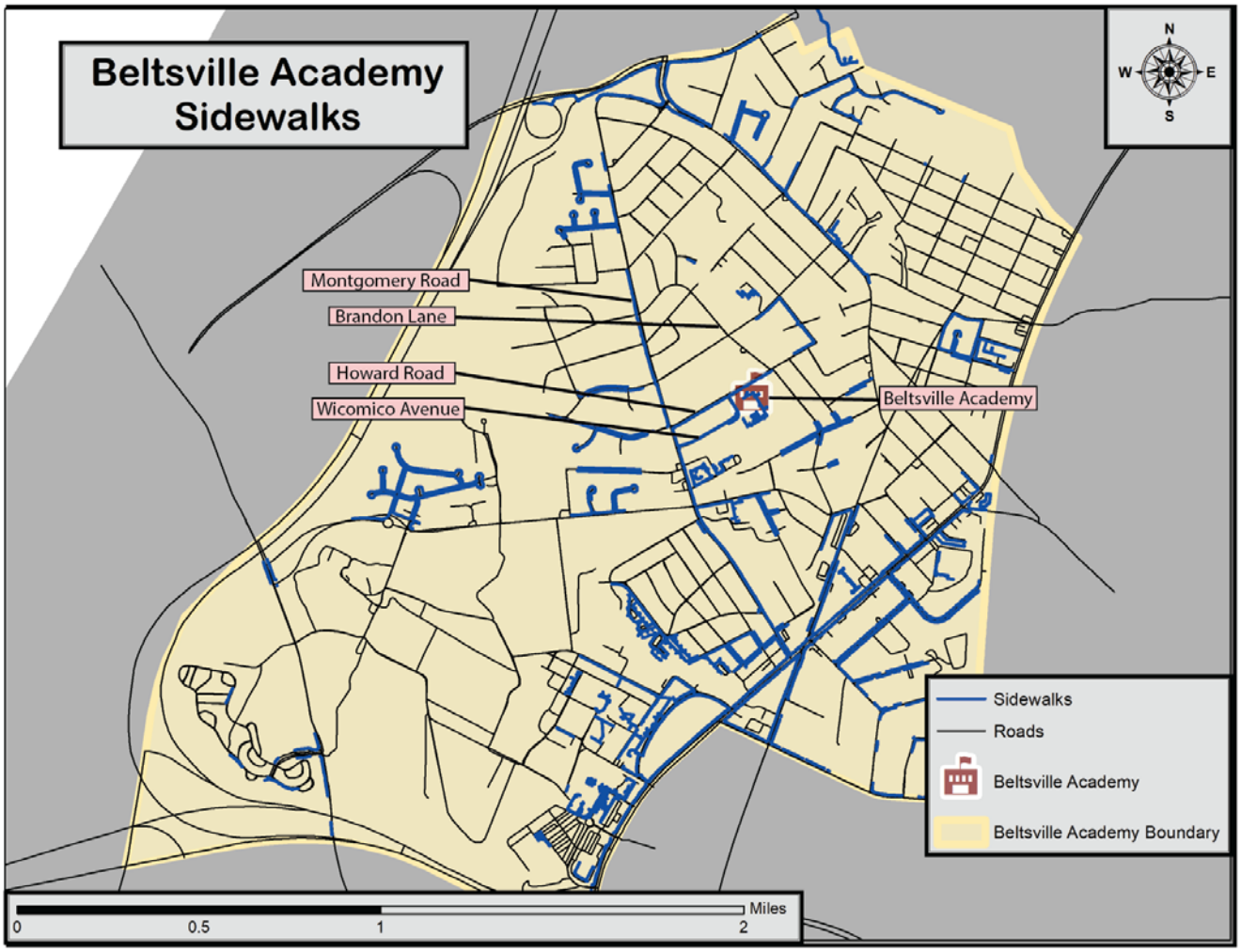

Figure 8: Beltsville Academy Sidewalks

As seen in Figure 8, the Beltsville Academy buffer includes some roads with sidewalks. Most of the sidewalks are on arterial roads, including Baltimore Avenue, Montgomery Road, Powder Mill Road, and Rhode Island Avenue. Montgomery Road, to the west of the school, has sidewalks on one side. Near the school, there is a narrow buffer between the road and the sidewalk, and walking north, the buffer becomes wider. Brandon Road intersects the back of the school, does not have any sidewalks. Brandon Road has a speed limit of 25 miles per hour while Montgomery Road has a speed limit of 30 miles per hour. Brandon Road is also narrow; when cars are parked on both sides of the street, only one car can

pass at a time. This could make it more difficult for students to use an active transportation mode especially if vehicles travel through this road during drop-off and pick-up times.

Safety

Annual Daily Traffic Load and Accidents

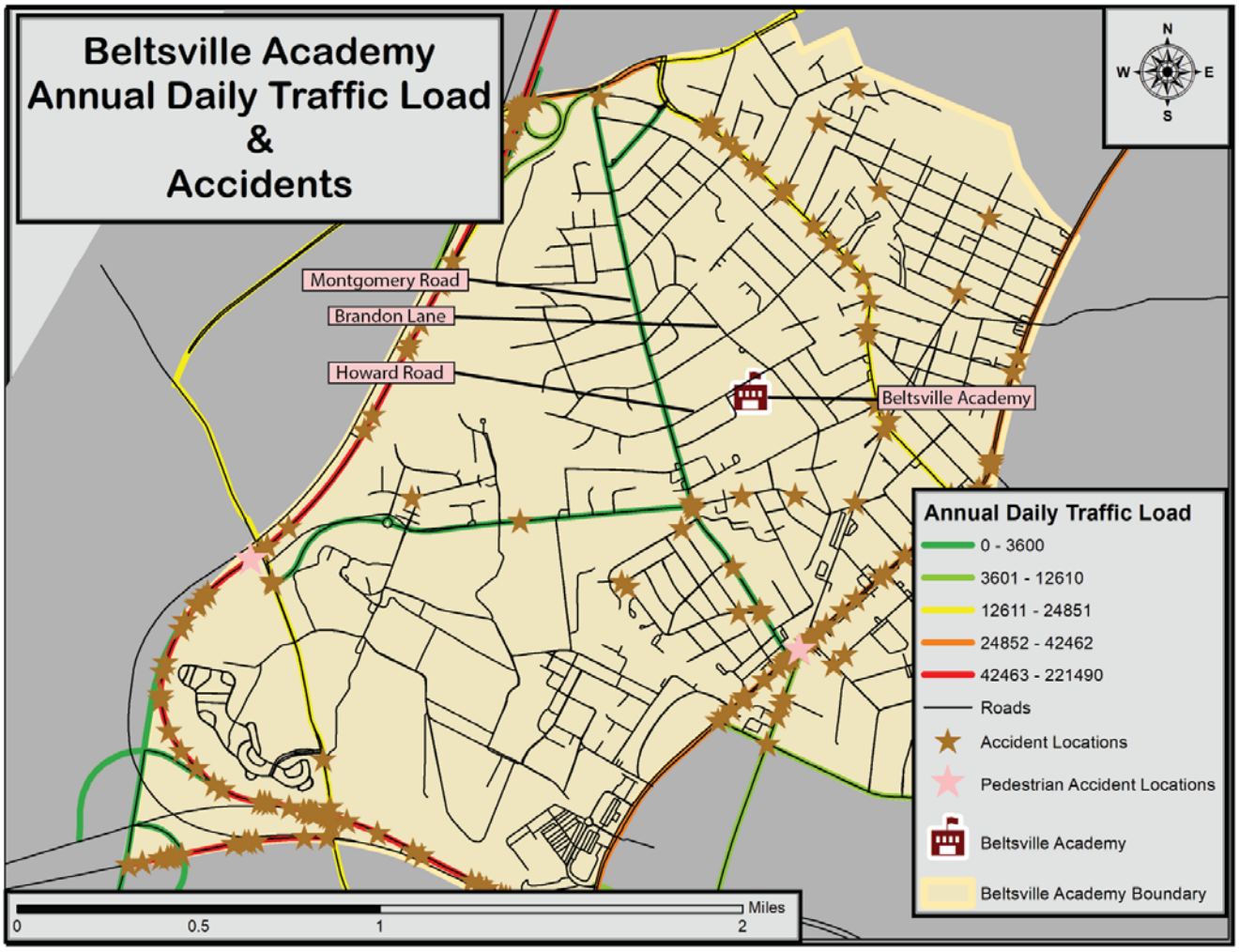

Figure 9: Beltsville Academy Annual Daily Traffic Load and Accidents

In 2012, there were 325 accidents within the Beltsville Academy boundary area and two of them involved pedestrians.[53] The pedestrian-involved accidents were not near the school (see Figure 9). The main arterial roads run on the school's east and west sides and have a low to medium ADTL, which is

[53] See footnote 27

less than 24,851 vehicles per day. Roads on the edge of the boundary area have high ADTLs, with more than 80,000 vehicles per day.[54] Prior research has found that schools in low-volume traffic areas have a high correlation with students using an active transportation modes. [55]

Walkshed Analysis

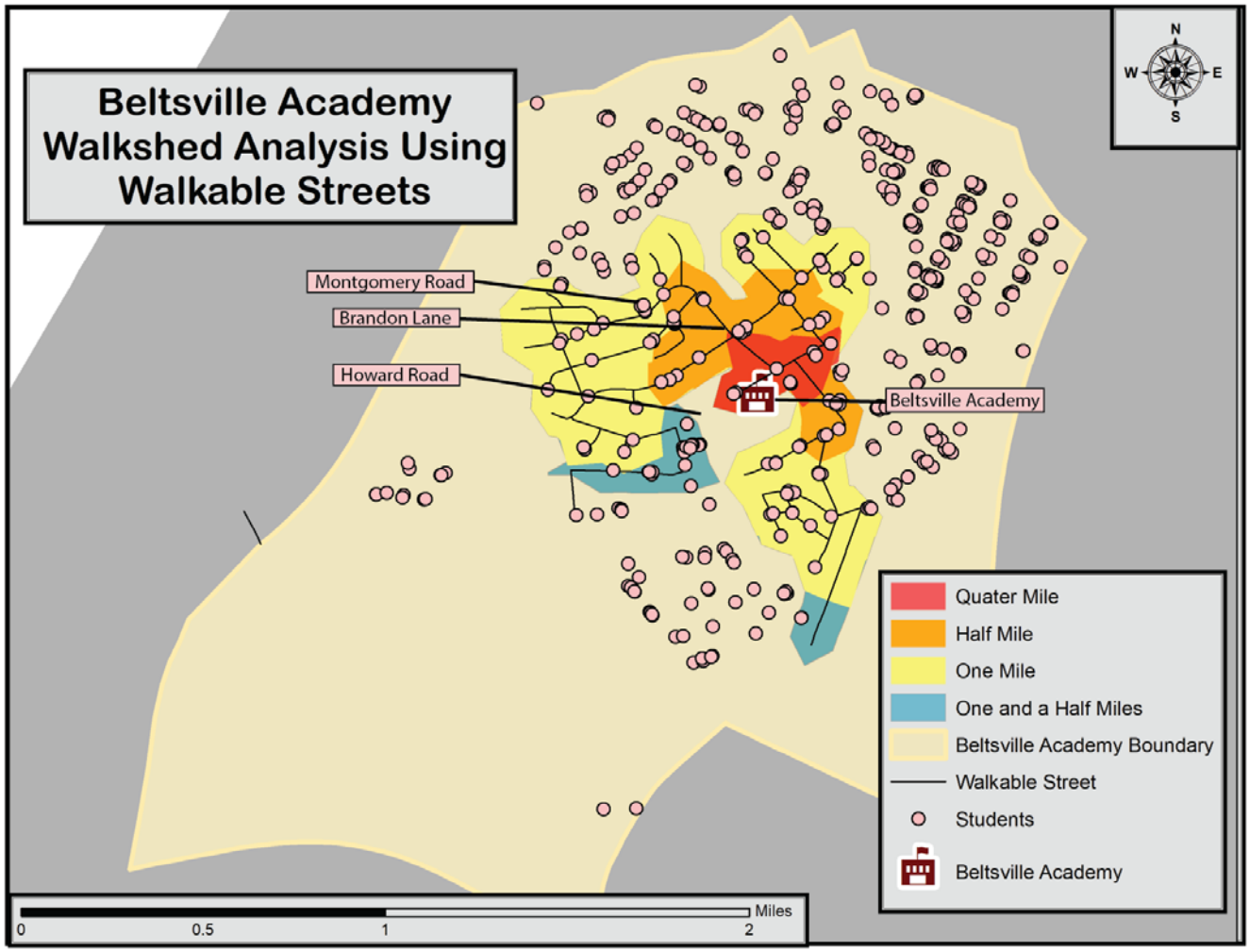

Figure 10: Beltsville Academy Walkshed Analysis using Walkable Street

[54] Peng, Edward F., Deepak Gopalakrishna, and Dan Middleton. "Highway Performance Monitoring System Traffic Data for High Volume Routes: Best Practice and Gudielines Final Report." September 8, 2004. https://www.fhwa.dot.gov/policyinformation/hpms/volumeroutes/hvr_revisedrpt.pdf.

[55] Giles-Corti B, Wood G, Pikora T, Learnihan V, Bulsara M, Van Niel K, Timperio A, McCormack G, and Villanueva K. 2011. "School Site and the Potential to Walk to School: The Impact of Street Connectivity and Traffic Exposure in School Neighborhoods." *Health & Place* 17 (2): 545–50. doi:10.1016/j.healthplace.2010.12.011.

Table 7: Beltsville Academy Student count within a the walkable streets

Beltsville Academy	
Distance	**Student Count within distance**
Quarter Mile	21
Half Mile	71
One Mile	181
One and a Half Miles	225
Total Enroll	982

According to the County's walkable streets Arc GIS layer, most students to the north of the school, do not live on walkable streets.[56] This equates to only 23 percent of students living within 1.5-miles and on a walkable street. Based on this analysis, 752 students do not live on walkable streets. Students who live on non-walkable streets are less likely to use active transportation modes for a variety of reasons including safety and household vehicle ownership.

Demand/Mode Choice

Student Proximity to School

Table 8: Beltsville Student County and Student Proximity to School

Beltsville Academy		
Distance (ft)	Distance (mi)	Student Count
314-1874	.06-.35	153
1875-2844	.36-.54	186
2845-3705	.55-.70	295
3706-4759	.70-.90	304
4760-6431	.91-1.22	44

[56] Accuracy of the walkable street layer provided by Prince George's County School District. It is unclear how they defined a walkable street. With a more accurate walkable streets layer, the walkshed analysis has the potential to look different.

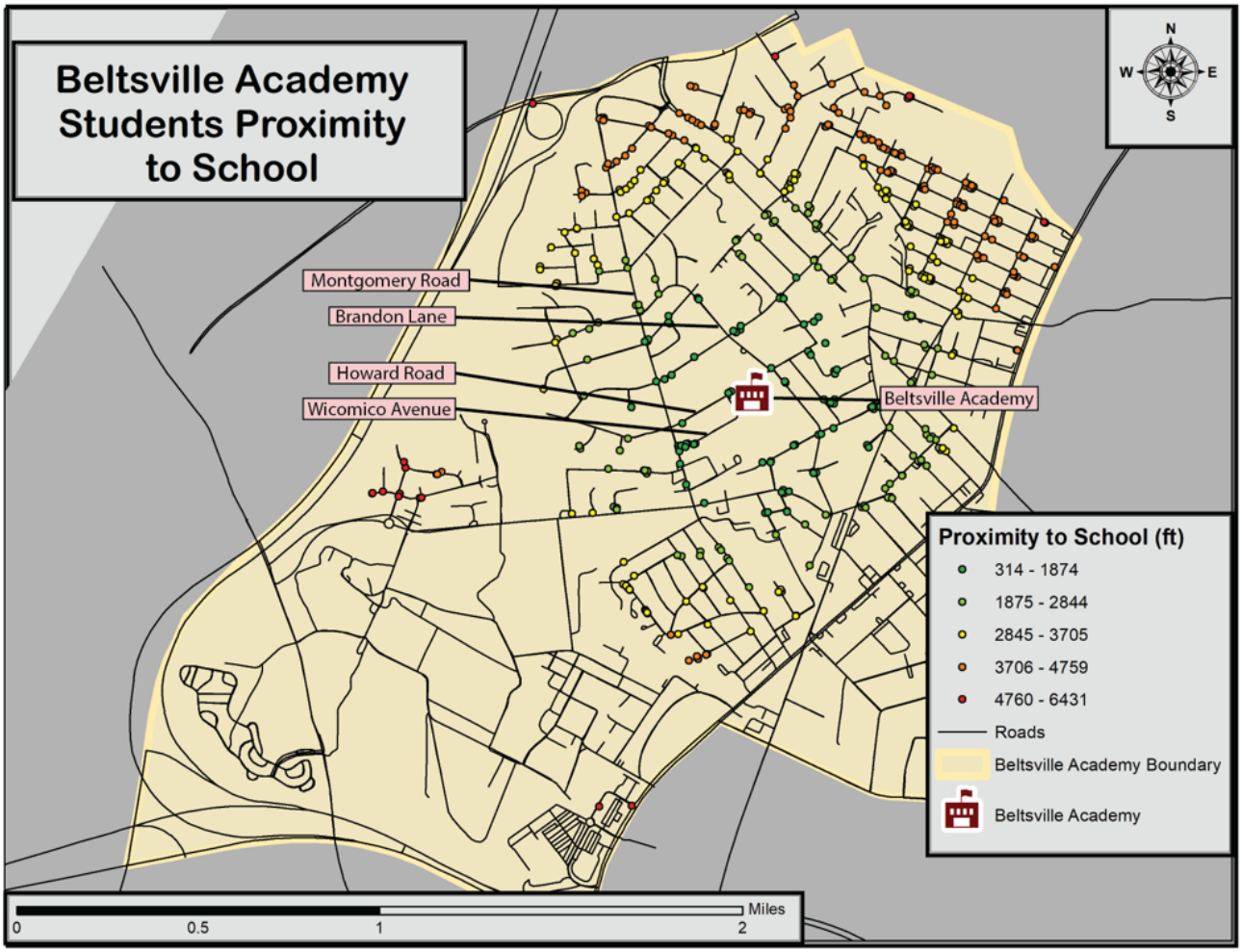

Figure 11: Beltsville Academy Student Proximity to School

In measuring Student proximity to school, students live one and one-third miles or closer to the school. According to Figure 11 and Table 8, the highest number of students lives between seven-tenths and nine-tenths of a mile from the school, while the lowest number of students lives the farthest away from the school, between nine-tenths of a mile and one and one-third miles. Students who live off of Howard Road or Brandon Lane can use a back gate onto school property, creating another path for students to reach school. Prior research shows that students who live closer to school are more likely

to use an active transportation mode and students who live farther away are less likely. [57] Since students live near this school it increases their potential to use an active transportation mode.

Socio-Demographic Analysis

Table 9: Beltsville Academy Enrollment Count, FARM Percentage, and Demographic Information

Beltsville Academy	
Enrollment Count	1092
FARM Student Percentage	70%
Hispanic or Latino Student Percentage	63%
African American Student Percentage	19%
Asian Student Percentage	6%
White Student Percentage	10%
Two or More Races Percentage	1%

Beltsville Academy enrolls both elementary and middle school students. Table 9 shows that 70 percent of the students receive FARM.[58] Prior research shows a higher positive correlation of students using an active transportation mode when they also receive FARM. [59] This school also has a high percentage of Hispanic or Latino students and African American students, 63 percent and 19 percent, respectively, and a low percentage of White and Asian students.[60] Prior research has found that Hispanics and non-Hispanic Blacks are most likely to use an active transportation mode compared to other demographic groups such as Asians or whites.[61] Since this school is made up of mostly African American and Hispanic or Latino students, students attending this school have a higher potential for participating in active student transportation.

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[57] Ewing, R, W Schroeer, and W Greene. 2004. "School Location and Student Travel: Analysis of Factors Affecting Mode Choice." *Transportation Research Record* 1895 (1895): 55–63.
[58] "Demographics." Demographics : Prince George's County - Beltsville Academy : 2017 Maryland Report Card. http://reportcard.msde.maryland.gov/Demographics.aspx?K=160104&WDATA=School.
[59] Lee SM, Tudor-Locke C, and Burns EK. 2008. "Application of a Walking Suitability Assessment to the Immediate Built Environment Surrounding Elementary Schools." *Health Promotion Practice* 9 (3): 246–52. doi:10.1177/1524839907301403.
[60] "Demographics." Demographics : Prince George's County - Beltsville Academy : 2017 Maryland Report Card. http://reportcard.msde.maryland.gov/Demographics.aspx?K=160104&WDATA=School.
[61] McDonald NC. 2008. "Critical Factors for Active Transportation to School among Low-Income and Minority Students. Evidence from the 2001 National Household Travel Survey." *American Journal of Preventive Medicine* 34 (4): 341–44. doi:10.1016/j.amepre.2008.01.004.

Zero Car Households

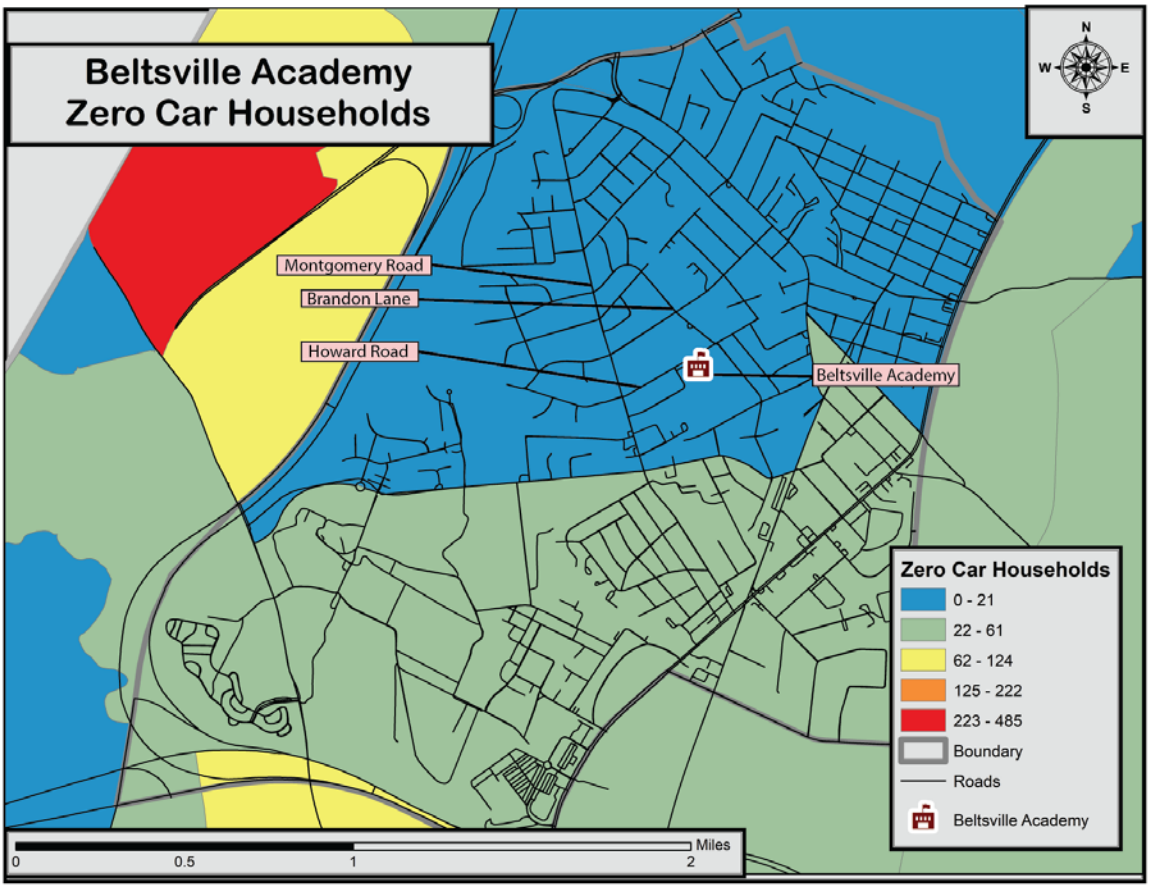

Figure 12: Beltsville Academy Zero Car Households

As seen in Figure 12, households within the Beltsville Academy boundary area have a low number of zero car households. The northern boundary area has the lowest number of zero car households and the southern boundary has a slightly higher number of zero car households. Research shows that in areas with a higher number of vehicles, students are less likely to use an active transportation mode. [62] This is one factors that can hinder an SR2S program. To increase the feasibility of an active

[62] Ewing, R, W Schroeer, and W Greene. 2004. "School Location and Student Travel: Analysis of Factors Affecting Mode Choice." *Transportation Research Record* 1895 (1895): 55–63.

transportation mode program, establishing programmatic factors to incentivize students would help support an SR2S program.

Median Household Income

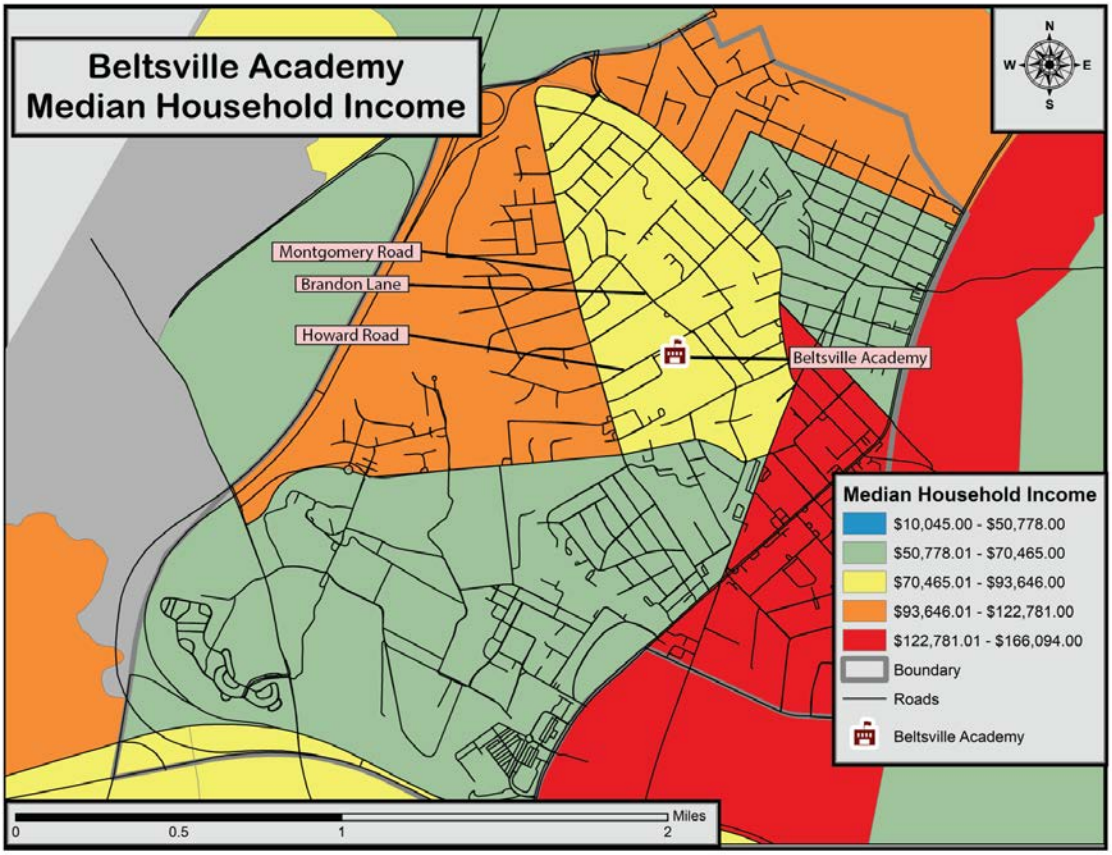

Figure 13: Beltsville Academy Median Household Income

According to Figure 13, the Beltsville Academy boundary area has households that earn an income of $50,776.01 or more. Households within the immediate census block have incomes between $70,465.01 and $93,464.01. Research has shown that in high income households, students are less likely to use an active transportation mode. [63] Since this area is economically diverse, it has the potential to create a mix of students who would and would not use an active transportation modes.

[63] Ewing, R, W Schroeer, and W Greene. 2004. "School Location and Student Travel: Analysis of Factors Affecting Mode Choice." *Transportation Research Record* 1895 (1895): 55–63.

Programmatic factors to study include potential incentives to increase the number of students using an active transportation mode.

Conclusions

Core Findings

Multiple findings support or hinder the feasibility of active student transportation. Factors that support active student travel are student proximity to school, multiple streets/pathways, high number of students receiving FARM, and low to medium ADTL. Hindering factors are insufficient sidewalk coverage and no crossing guards.

Recommendations

Montgomery Road supports active student transportation with sidewalks, proximity to the school, and many students who live near this route. However, Montgomery Road hinders active student transportation with a lack of crossing guards. Placing a crossing guard at Montgomery Road near the school could increase the number of students using active transportation modes. Increasing the sidewalk infrastructure could also increase the number of students using an active transportation mode.

Recommendations to Increase the Feasibility of an SR2S Program

Table 10: Beltsville Academy Goals

Short Term Goal	Better understand student/family mode choice • survey walkability and infrastructure improvements • survey family mode choice and perception of safety • collect and synthesize survey data
Medium Term Goal	Sidewalk feasibility • on-site observations to obtain data about streets without sidewalks • understand street feasibility for sidewalks • understand connectivity and network of existing and potential sidewalks
Long Term Goal	Crossing Guards • identify locations for crossing guards (e.g., Montgomery Road) using student address data • obtain funding for crossing guards • create educational programs to teach students crossing, bike, and walking to school safety

Hyattsville Elementary Analysis

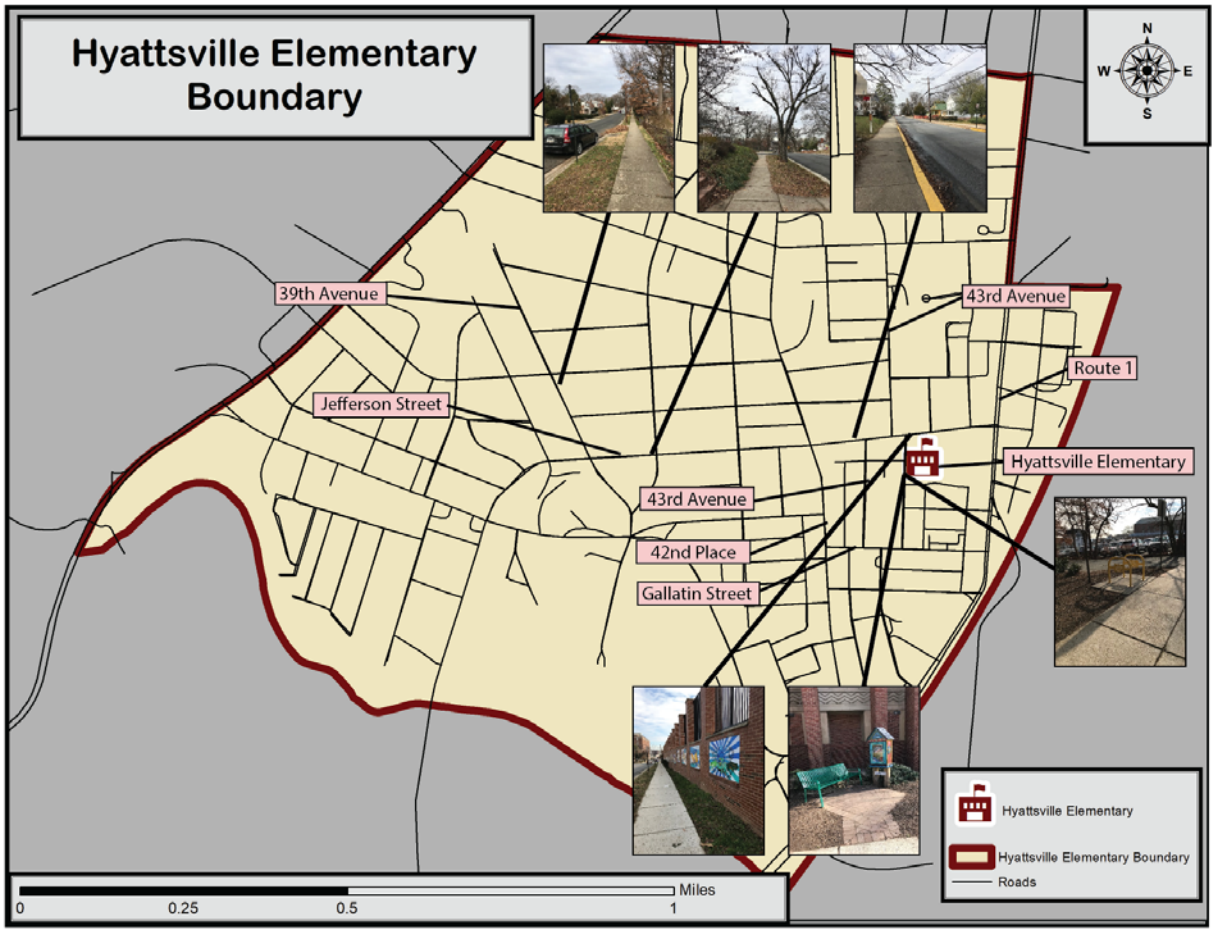

Figure 14: Hyattsville Elementary Boundary with photos from site visit

Introduction

Hyattsville Elementary School is located at 5311 43rd Avenue, Hyattsville, MD 20781 and has a student enrollment of 561 in 2016.[64] This area is moderately dense and students attending this school live in single-family homes, attached townhomes, or apartment buildings. Also, a majority of students live north of Jefferson Street or west of 38th Street. Hyattsville Elementary was chosen for this study because of its high density of sidewalks and student proximity, thought to increase its feasibility for active student transportation and potential for an SR2S program. As seen in Figure 14, this school has a

[64] "Demographics." Demographics: Prince George's County - Hyattsville Elementary: 2017 Maryland Report Card. http://reportcard.msde.maryland.gov/Demographics.aspx?K=161601&WDATA=School.

bench and a book cabinet, a bike rack, and a mural along Jefferson Street that create an aesthetically pleasing atmosphere that can encourage students to use active transportation.

Built Environment/ Infrastructure

Sidewalks

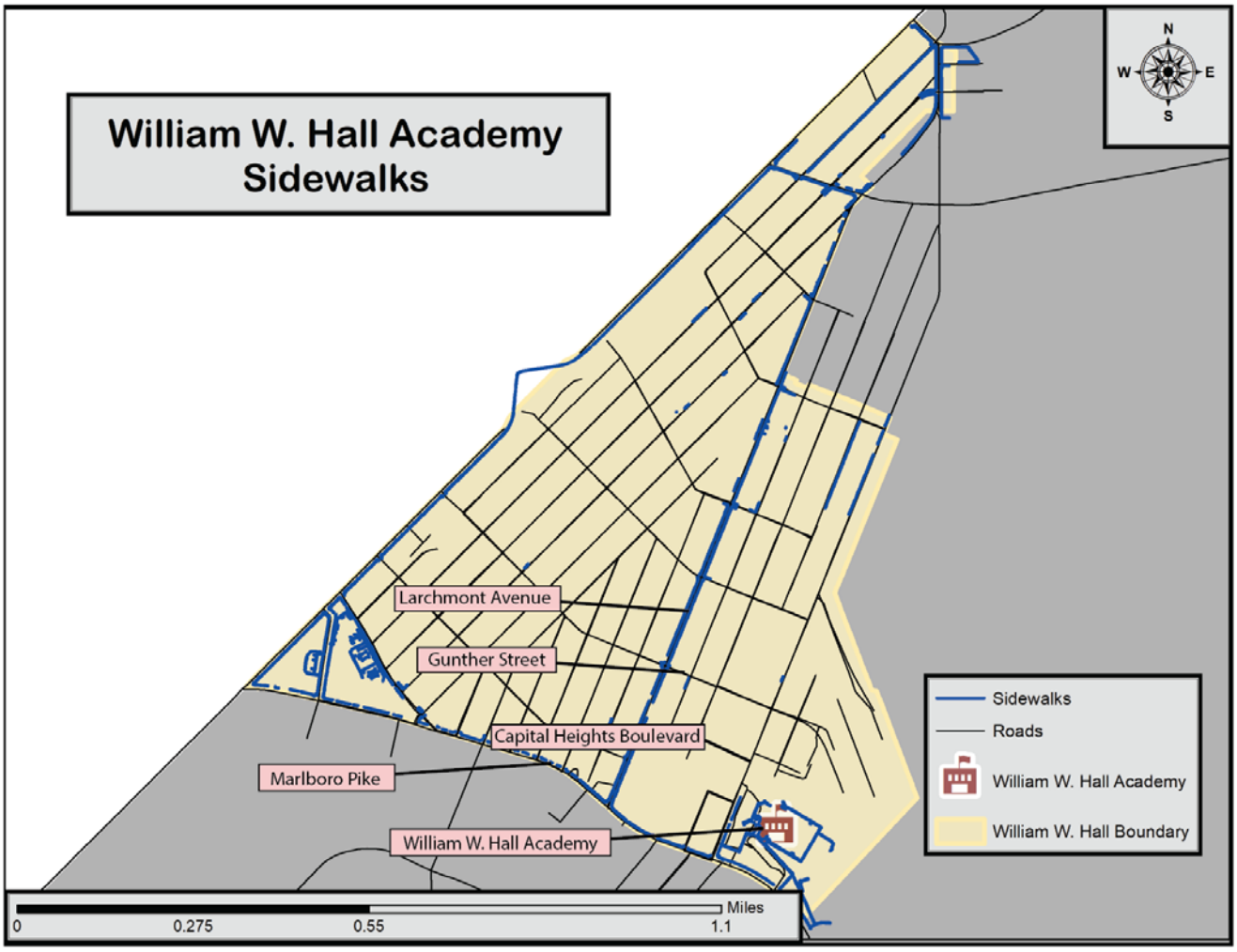

Figure 15: Hyattsville Elementary Sidewalks

According to Figure 15, the Hyattsville Elementary boundary area has an extremely dense network of sidewalks, which was also observed during the site visit. Only a few streets do not have sidewalks. There are also multiple crosswalks including in front of the school and on Jefferson Street. In addition, most sidewalks have a grass buffer between the sidewalk and the street. Closer to the school, Jefferson Street did not have a buffer but farther west, away from the school, the buffer becomes wider. 39th Avenue and most of the other streets have a grass buffer and street trees between the sidewalk and the street.

Safety

Annual Daily Traffic Load and Accidents

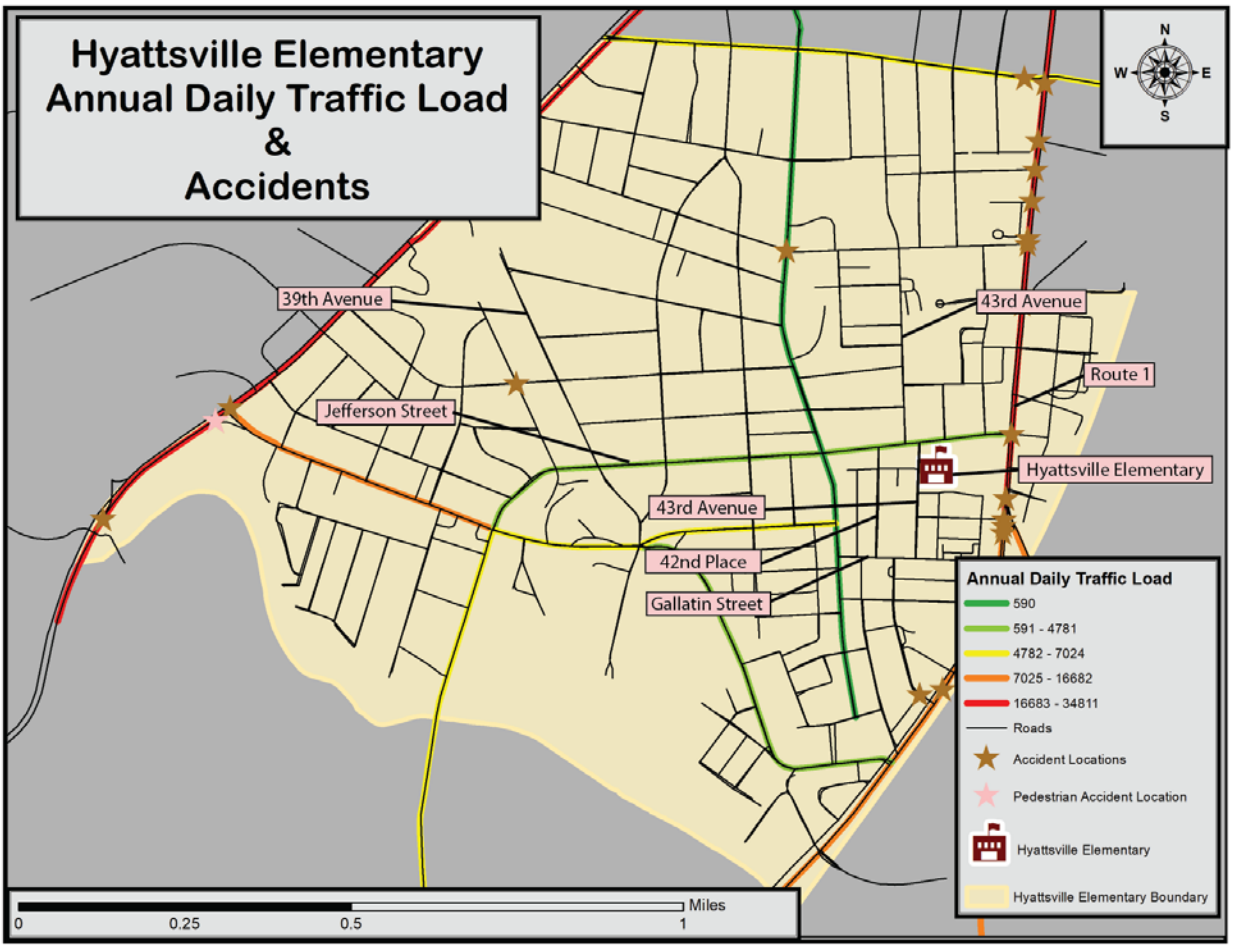

Figure 16: Hyattsville Elementary Annual Daily Traffic Load and Accidents

Jefferson Street, north of the school and 40th Avenue, has the lowest ADTL. Research has found that a low ADTL increases the likelihood that students will use an active transportation mode. [65] According to Figure 16, in 2012, there were a total of 20 accidents most of which were on Route 1 (east of the school).[66] Only one pedestrian was involved in an accident, which occurred far west of the school at the intersection of Queens Chapel Road and Hamilton Street.

Walkshed Analysis

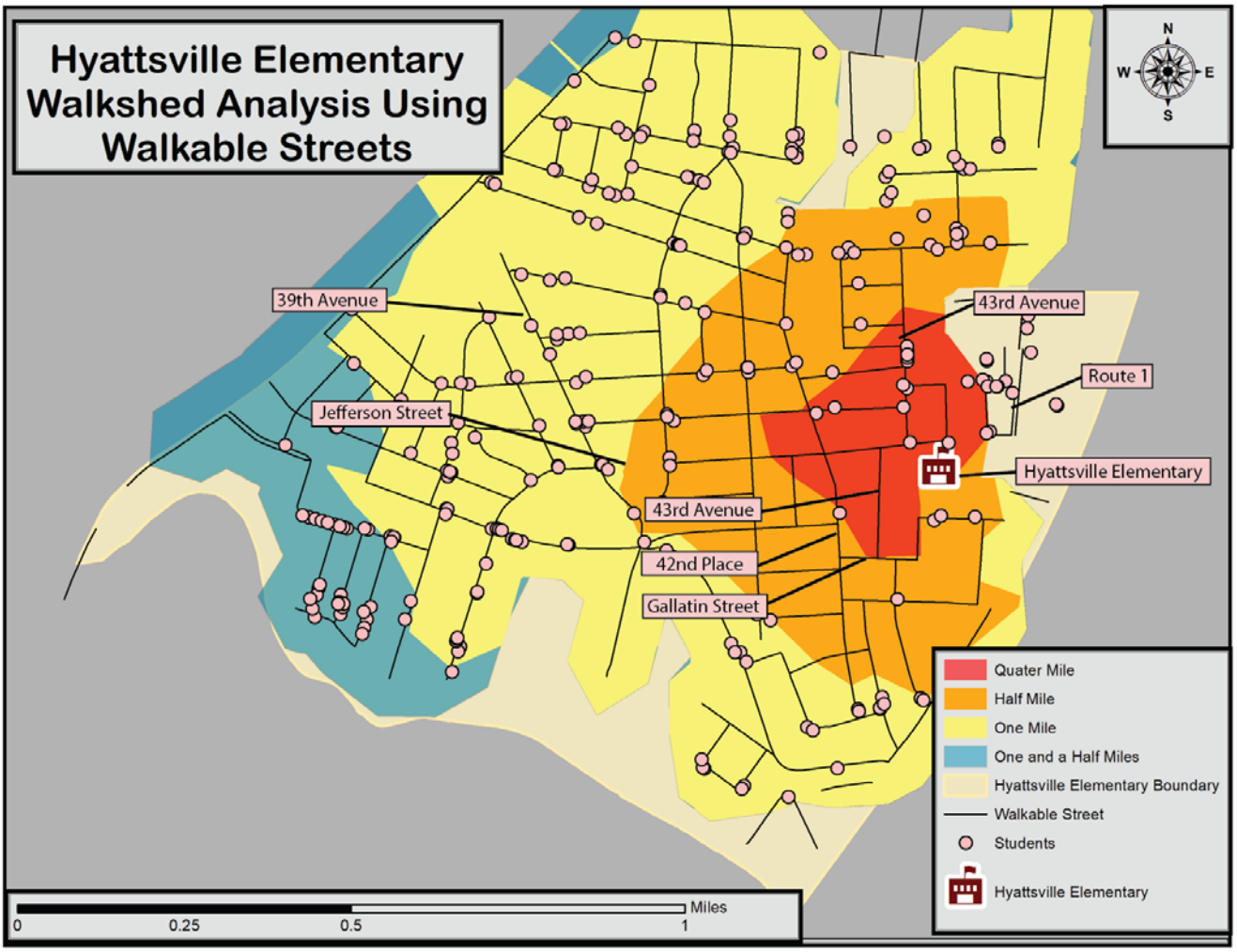

Figure 17: Hyattsville Elementary Walkshed Analysis Using Walkable Streets

[65] Giles-Corti B, Wood G, Pikora T, Learnihan V, Bulsara M, Van Niel K, Timperio A, McCormack G, and Villanueva K. 2011. "School Site and the Potential to Walk to School: The Impact of Street Connectivity and Traffic Exposure in School Neighborhoods." *Health & Place* 17 (2): 545–50. doi:10.1016/j.healthplace.2010.12.011.

[66] See footnote 27

Table 11: Hyattsville Student count within the Walkable Streets

Hyattsville Elementary	
Distance	**Student Count within distance**
Quarter Mile	38
Half Mile	126
One Mile	402
One and a Half Miles	480

According to Figure 17 and Table 11 the Hyattsville boundary area has a high number of walkable streets, with of 95 percent of students living on a walkable street within a one-and-a-half-mile radius of the school, and 80 percent of students within a one-mile radius.[67] This equates to only 24 Hyattsville students who don't live on a walkable street. Most of these students live off of Route 1, which was depicted in Figure 16 as being the road where a majority of accidents occurred. Since there are a high number of students who live on walkable streets, those students are more likely to use an active transportation mode as found in previous research.[68]

[67] See footnote 29

[68] Ewing, R, W Schroeer, and W Greene. 2004. "School Location and Student Travel: Analysis of Factors Affecting Mode Choice." *Transportation Research Record* 1895 (1895): 55–63.

Crossing Guard

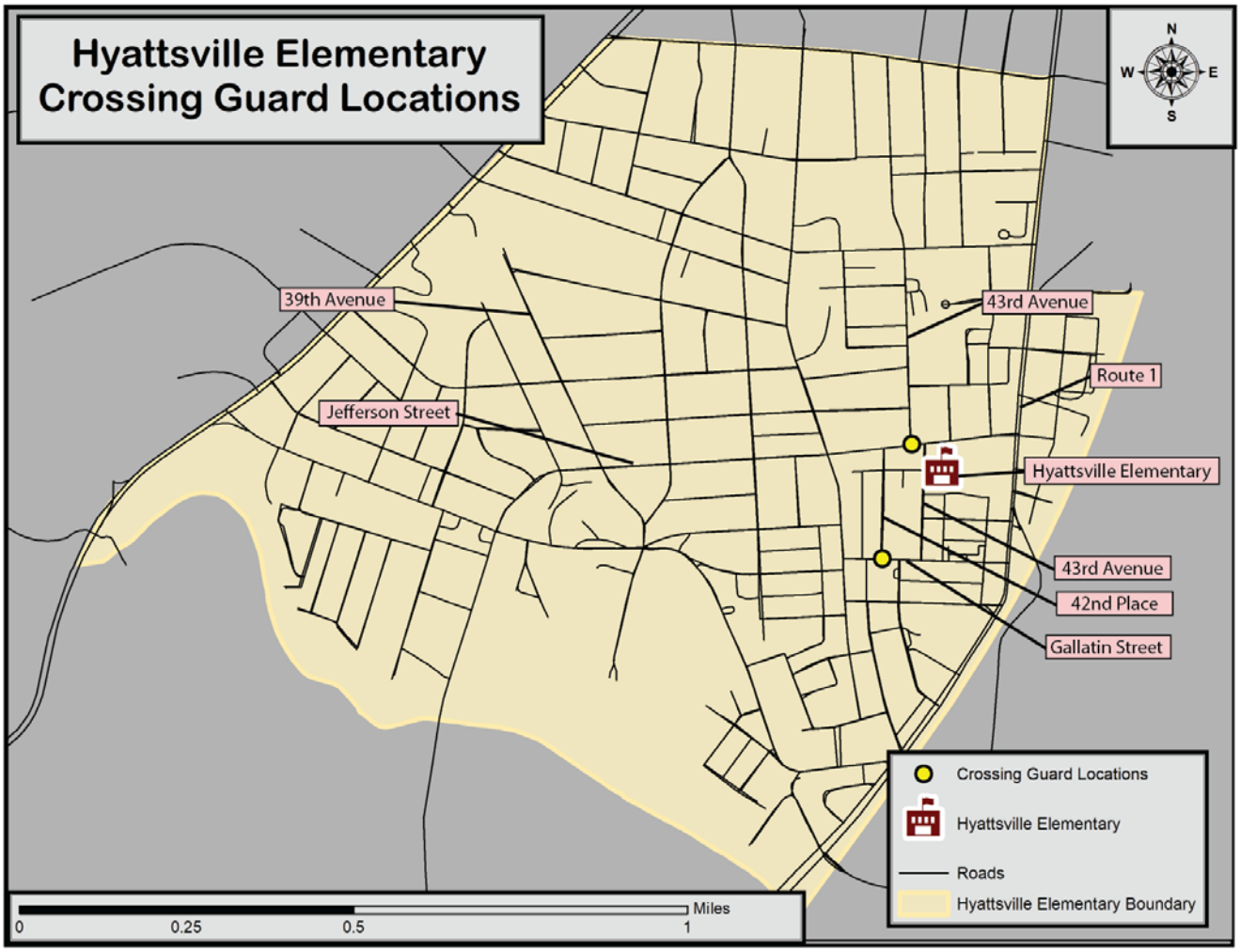

Figure 18: Hyattsville Elementary Crossing Guard Locations

This school has two crossing guard locations, one at 43rd Avenue and Jefferson Street and the other at 42nd Place and Gallatin Street. This creates two areas for students to cross to and from school. As noted in previous research, crossing guards increase the likelihood of students using an active transportation mode to get to and from school. [69]

[69] Jones S.E, and Sliwa S. 2016. "School Factors Associated with the Percentage of Students Who Walk or Bike to School, School Health Policies and Practices Study, 2014." *Preventing Chronic Disease* 13 (5). doi:10.5888/pcd13.150573.

Demand/ Mode Choice

Student Proximity to School

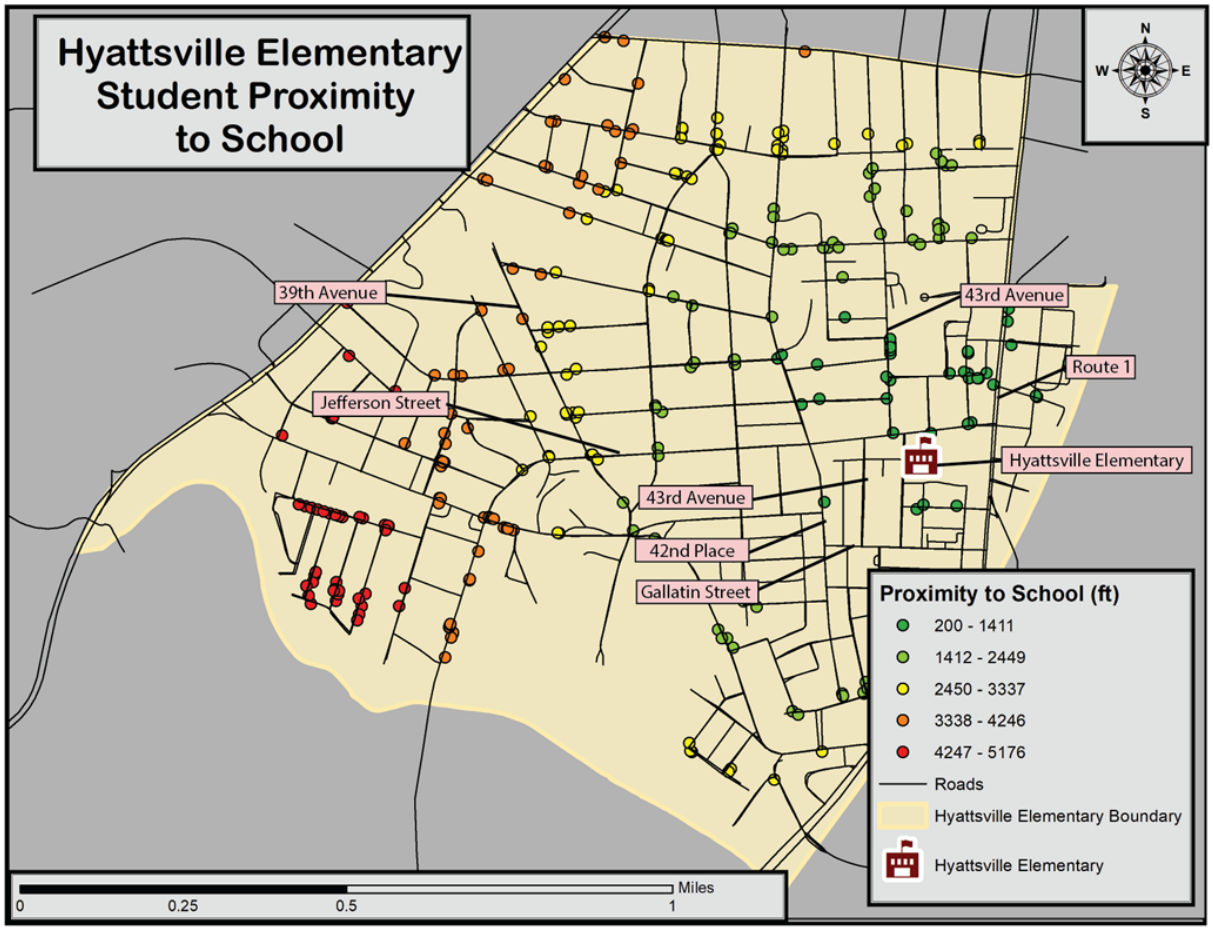

Figure 19: Hyattsville Elementary Student Proximity to School

Table 12. Hyattsville Elementary Student Count and Proximity to School

Hyattsville Elementary		
Distance (ft)	Distance (mi)	Student Count
200-1411	.04-.27	72
1412-2449	.28-.46	131
2450-3337	.46-.63	116
3338-4246	.64-.80	96
4247-5176	.81-.98	89

All Hyattsville Elementary School students live within one mile of the school. Most students live within a quarter- to a half-mile of the school (see Figure 15 and Table 12). Since most students live close to the school, they are more likely to use an active transportation mode than if they lived farther away from the school. [70]

Socio-demographic Analysis

Hyattsville Elementary	
Enrollment Count	561
FARM Student Percentage	73%
Hispanic or Latino Student Percentage	45%
African American Student Percentage	31%
Asian Student Percentage	2%
White Student Percentage	19%
Two or More Races Percentage	2%

Table 13: Hyattsville Elementary Enrollment Count, FARM Percentage, and Demographic Information

As seen in Table 13, 73 percent of the Hyattsville Elementary students receive FARM. As noted in prior research, students receiving FARM have a high correlation with using active transportation to and from school. [71] This school also exhibits a diverse student population consisting of Hispanic or Latino, African American, and White students, 45 percent, 31 percent, and 19 percent respectively. Since the student population is diverse, a conclusion cannot be drawn between demographics and active student transportation for this school.

[70] Ewing, R, W Schroeer, and W Greene. 2004. "School Location and Student Travel: Analysis of Factors Affecting Mode Choice." *Transportation Research Record* 1895 (1895): 55–63.

[71] Lee SM, Tudor-Locke C, and Burns EK. 2008. "Application of a Walking Suitability Assessment to the Immediate Built Environment Surrounding Elementary Schools." *Health Promotion Practice* 9 (3): 246–52. doi:10.1177/1524839907301403.

Zero Car Households

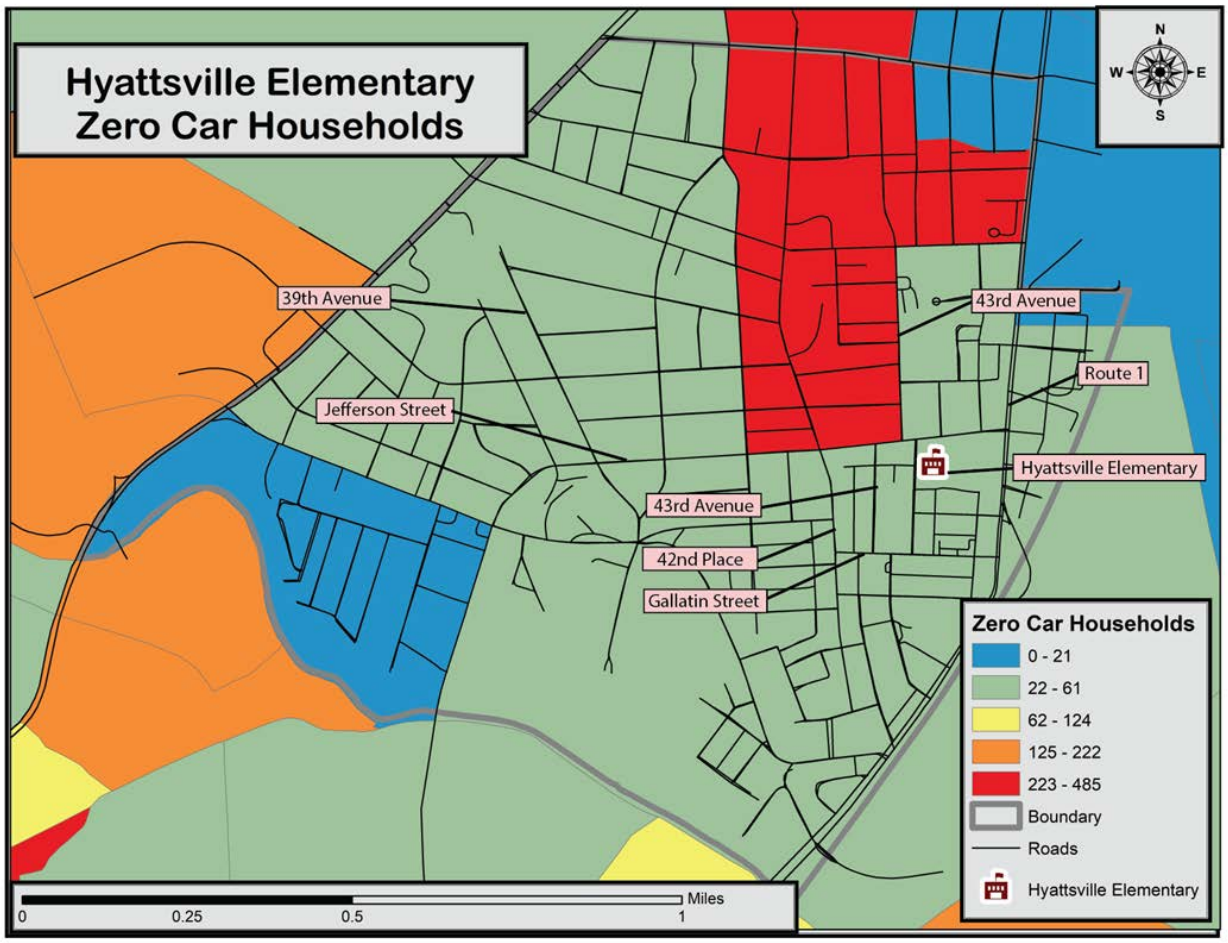

Figure 20: Hyattsville Elementary Zero Car Households

According to Figure 20, most households own cars, but one census block to the north of the school has a higher number of households who own zero cars. As noted in previous research, households that own a car are less likely to have a student who uses an active transportation mode to and from school. [72] This is a hindering factor for an SR2S program. To increase the feasibility of students using an active transportation mode, programmatic factors should incentivize students to use active transportation.

[72] Ewing, R, W Schroeer, and W Greene. 2004. "School Location and Student Travel: Analysis of Factors Affecting Mode Choice." *Transportation Research Record* 1895 (1895): 55–63.

Median Household Income

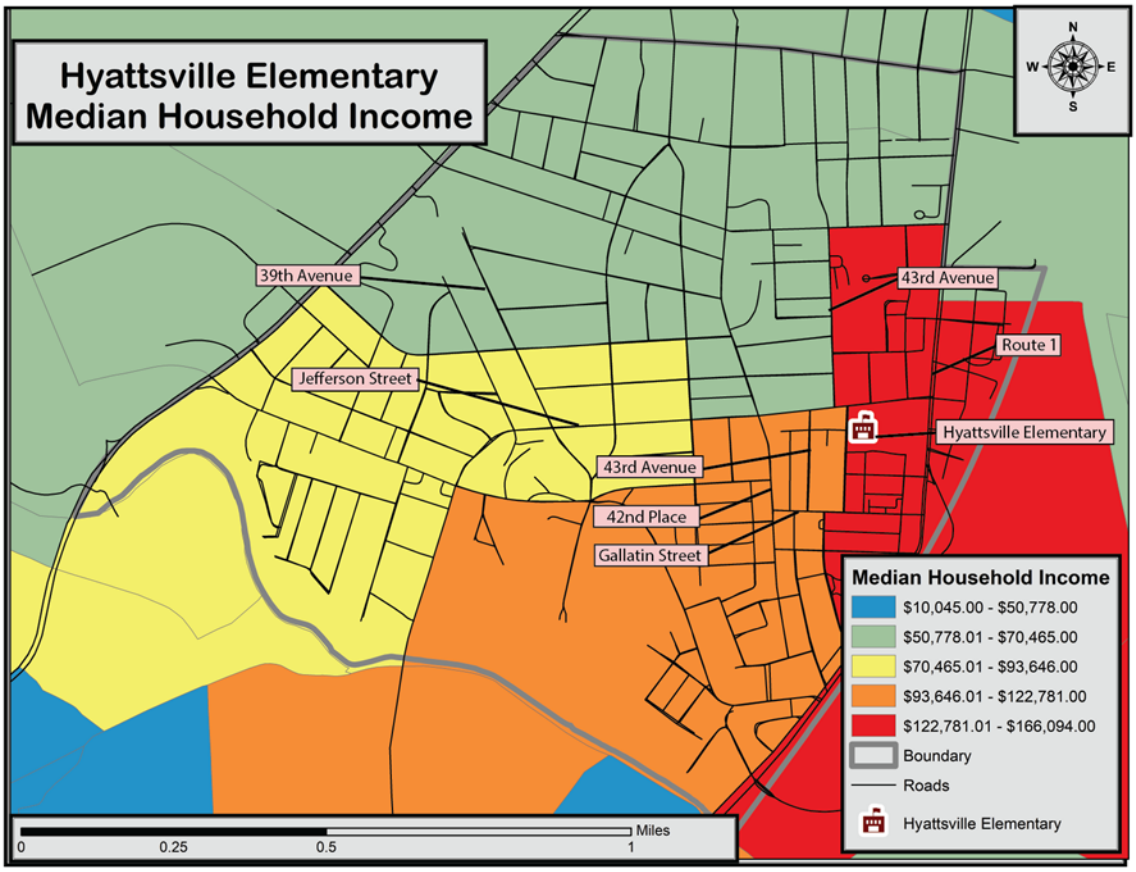

Figure 21: Hyattsville Elementary Median Household Income

According to Figure 21, household incomes within the Hyattsville boundary area have a range of median incomes from $50,788.01 to $166,094.00. This income range is very wide and research has found that households with higher incomes are less likely to have students who use an active transportation mode.[73] With this information it is possible that some students use an active transportation mode while others do not.

[73] Ewing, R, W Schroeer, and W Greene. 2004. "School Location and Student Travel: Analysis of Factors Affecting Mode Choice." *Transportation Research Record* 1895 (1895): 55–63.

Conclusions

Core Findings

Multiple findings support and hinder the feasibility of active student transportation to and from school. The high density of sidewalks, students' proximity to the school, highly walkable streets, low ADTL, and two crossing guards all support active transportation. Factors that could hinder an SR2S program are the high incomes, low number of zero car households, and intermittent buffers between the sidewalk and the street, which create a safety concern.

Recommendations

Since this school is highly walkable and students live close to the school, the district could take steps toward educating students and piloting the National Bike to School Day program at this school on May 9, 2018 to get a better idea of students', parents' and guardians' perceptions of an SR2S program.

Recommendations to Increase the Feasibility of an SR2S program

Table 14: Hyattsville Elementary Goals

Short Term Goal	Programming and Education • prepare programming and education materials for students and parents for National Bike to School Day, May 9, 2018 • create other days to continue momentum of students using an active transportation mode • create formal education for student bike, walking, and crossing safety
Medium Term Goal	Reevaluation of Bus Eligibility • use Arc GIS analysis to see which students ride the bus • conduct multiple observations to see who rides the bus vs. who are just bus eligible • create standardized bus eligibility criteria
Long Term Goal	Funding • apply for funding • use funding for participation in an SR2S program • track and monitor funding use for an SR2S program and seek more funding as necessary

William W. Hall Academy Analysis

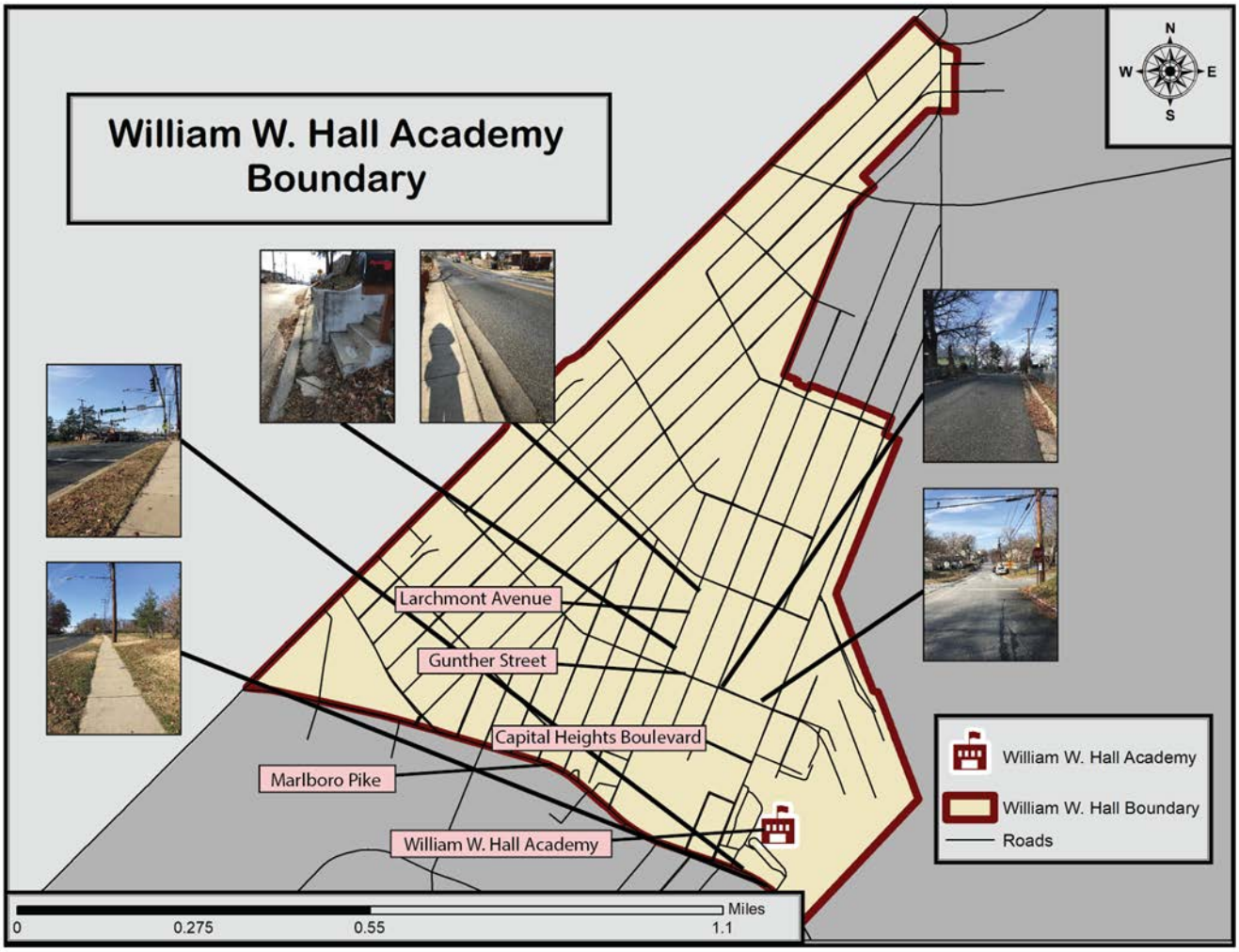

Figure 22: William W. Hall Academy Boundary with photos from site visit

Introduction

William W. Hall Academy is located at 5200 Marlboro Pike, Capitol Heights, MD 20743 and in 2016, had a student enrollment of 523.[74] All students live northwest and northeast of the school. This area has a moderately dense housing and students are evenly spread throughout the boundary area. William W. Hall Academy was chosen for this study because of its student population and their proximity to school.

[74] "Demographics." Demographics : Prince George's County - William W. Hall Academy : 2017 Maryland Report Card. http://reportcard.msde.maryland.gov/Demographics.aspx?K=161830&WDATA=School.

Built Environment/ Infrastructure

Sidewalks

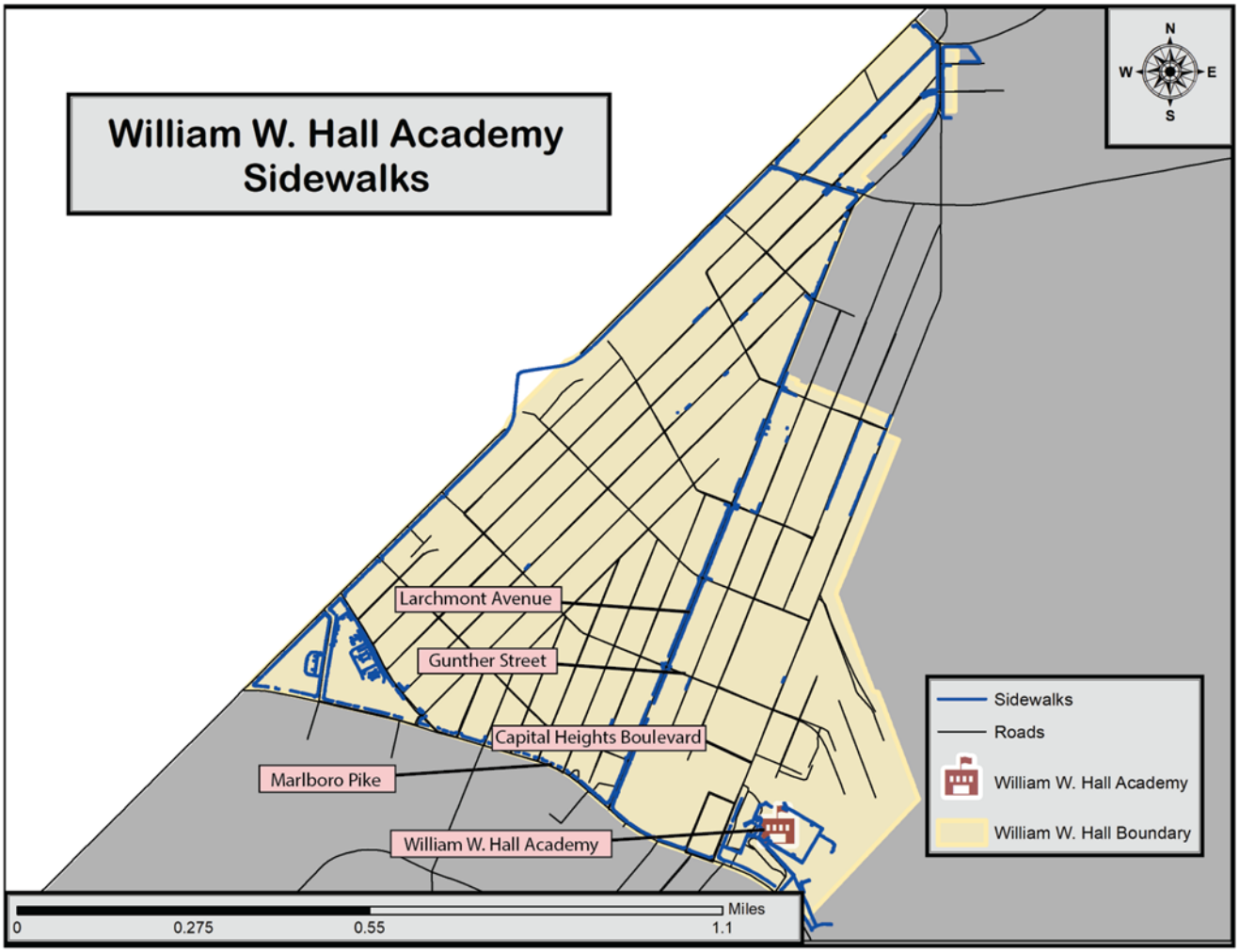

Figure 23: William W. Hall Academy Sidewalks

According to Figure 23, William W. Hall Academy has a low number of sidewalks within the school boundary area. Larchmont Avenue has a three-foot-wide sidewalk and some areas were difficult to pass due to blockages. Sidewalks cover the perimeter of the school but sidewalks don't continue off school property. In addition, there is light and crosswalk at the intersection of Capital Heights Boulevard and Marlboro Pike. When there are sidewalks, such as on Larchmont Avenue, there is no buffer between the street and the sidewalk. Gunther Street did not have any sidewalks and cars were parked on both sides of the street, which forces students to walk in the street, a safety hazard for both

students and drivers. There are also multiple traffic calming devices such as stop signs and speed humps within the school boundary area.

Safety

Annual Daily Traffic Load and Accidents

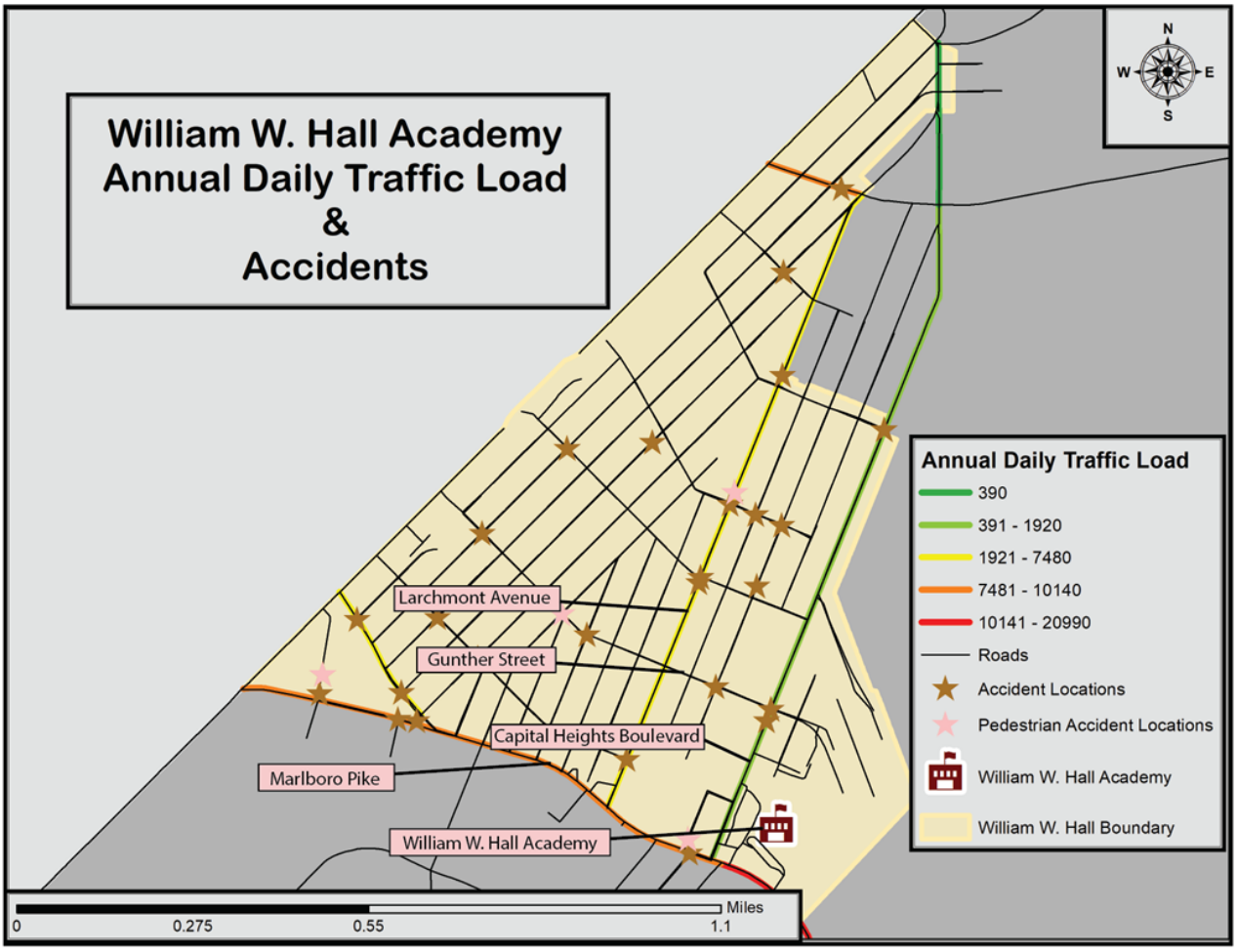

Figure 24: William W. Hall Academy Annual Daily Traffic Load and Accidents

In 2012, there were 36 accidents, four that involved pedestrians in 2012 (see Figure 24). The accidents occurred on both arterial roads and secondary roads.[75] Two accidents occurred at the intersection of Gunther Street and Capital Heights Boulevard, roads that lead to the school. Capital Heights Boulevard, shown in green in Figure 20, has an average 390 vehicles per day and Larchmont Avenue has an

[75] See footnote 27

average of 1,921- 7,480 vehicles per day. Streets with low traffic are more likely to see students using an active transportation mode . [76]

Walkshed Analysis

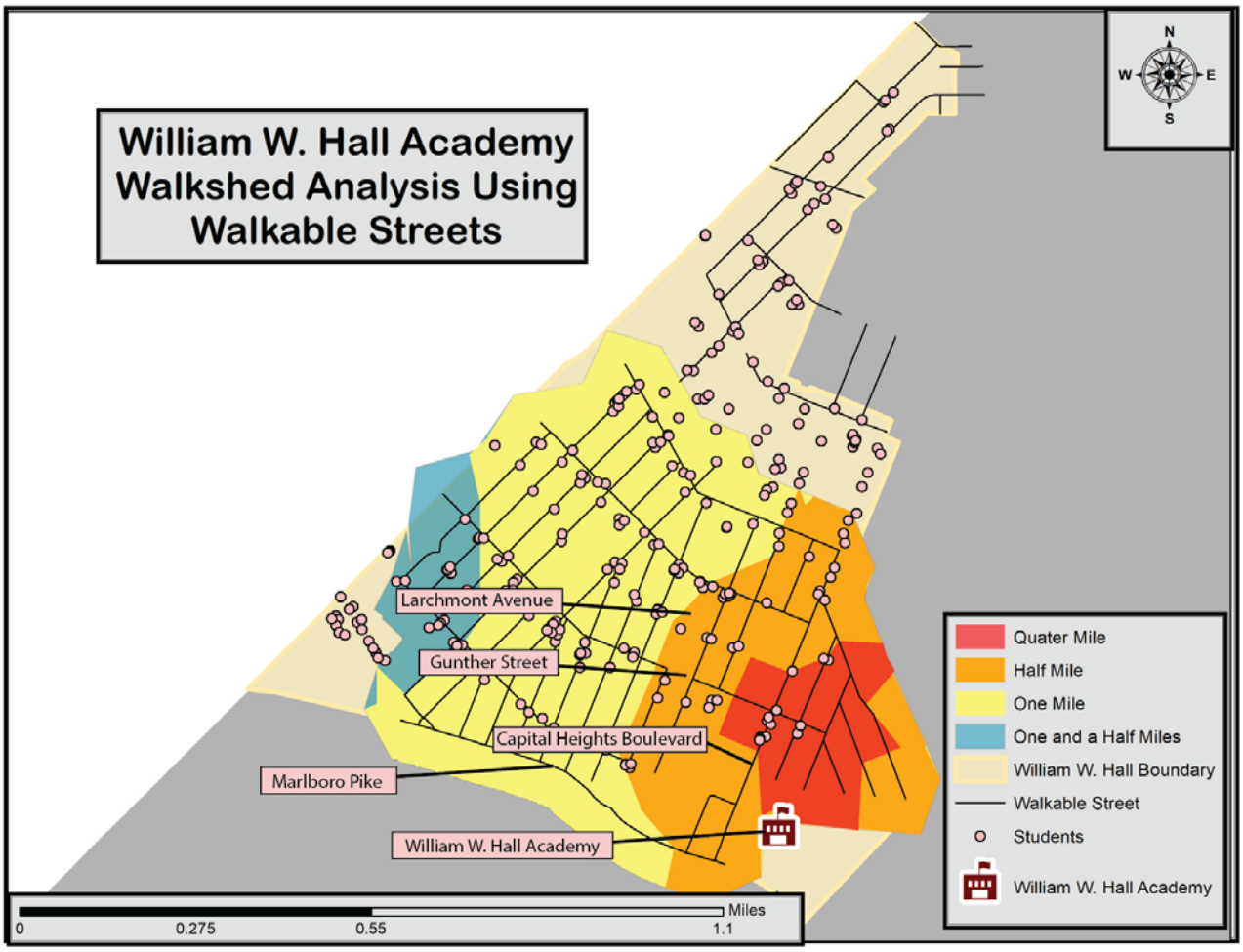

Figure 25: William W. Hall Academy Walkshed Analysis Using Walkable Streets

[76] Giles-Corti B, Wood G, Pikora T, Learnihan V, Bulsara M, Van Niel K, Timperio A, McCormack G, and Villanueva K. 2011. "School Site and the Potential to Walk to School: The Impact of Street Connectivity and Traffic Exposure in School Neighborhoods." *Health & Place* 17 (2): 545–50. doi:10.1016/j.healthplace.2010.12.011.

Table 15: William W. Hall Academy Student Count within the walkable streets

William W. Hall Academy	
Distance	**Student Count within distance**
Quarter Mile	22
Half Mile	72
One Mile	272
One and a Half Miles	308

As seen in Figure 25, the County considers many streets within the walkshed boundary area to be walkable.[77] Within the walkshed, only 66 percent of students live on a walkable street (see Table 15). This equates to 157 students who do not live on a walkable street. Most students who do not live on a walkable street are located to the far north or southwest portions of the school boundary area. Students who live farther away from the school are found to be less likely to use an active transportation mode. [78]

[77] See footnote 29

[78] Ewing, R, W Schroeer, and W Greene. 2004. "School Location and Student Travel: Analysis of Factors Affecting Mode Choice." *Transportation Research Record* 1895 (1895): 55–63.

Crossing Guard

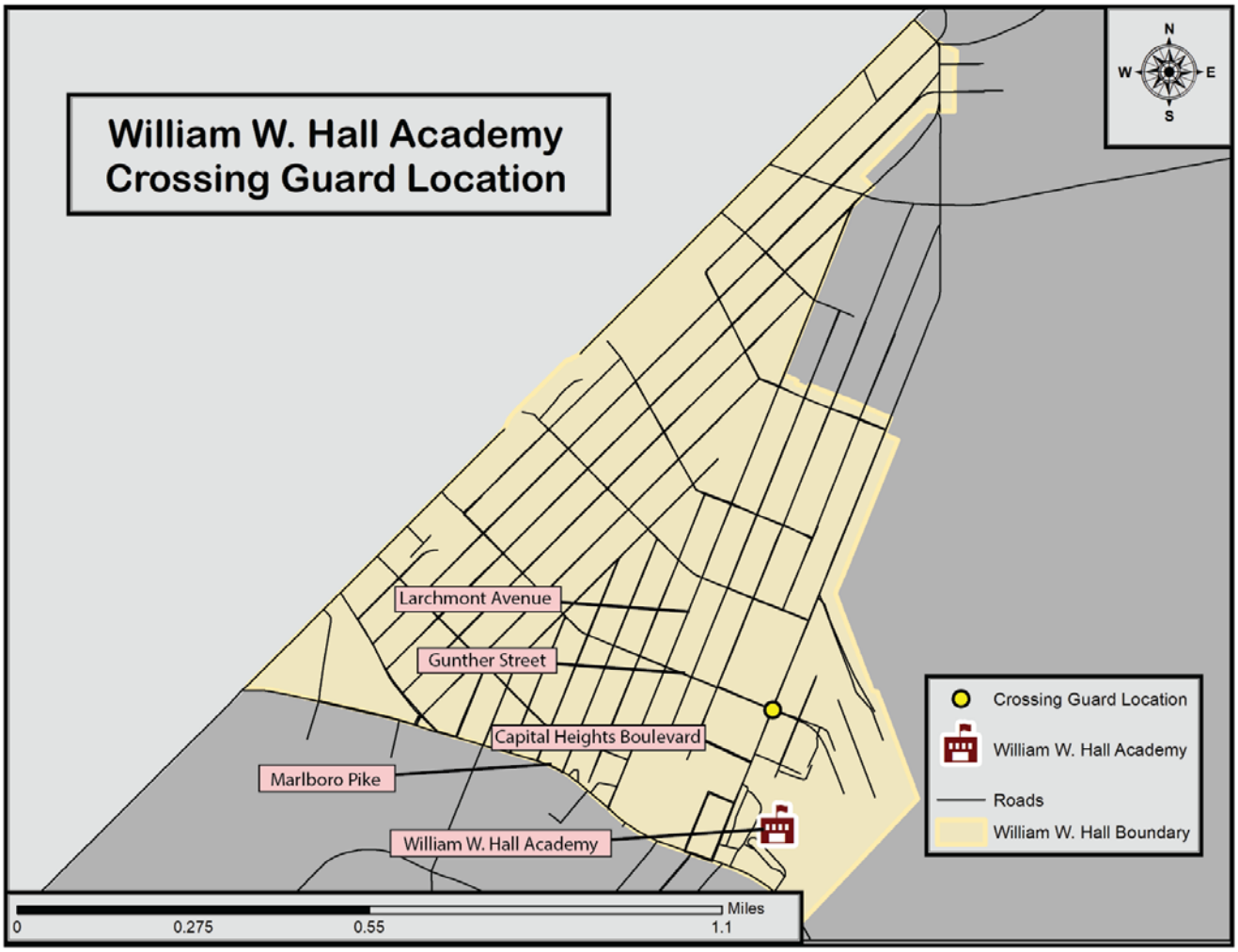

Figure 26: William W. Hall Academy Crossing Guard Location

As seen in Figure 26 and according to the County, this school has one crossing guard at the intersection of Capitol Heights Boulevard and Gunther Street. As stated above in the ADTL and Accidents section, this intersection had two accidents in 2012. It is not known if there was a crossing guard at this location prior to the two accidents. Having a crossing guard allows students to safely cross the street and can put parents'/guardians' minds at rest when allowing their child to use active transportation. Research shows that schools with crossing guards increase the likelihood of students using an active transportation. [79]

[79] Jones S.E, and Sliwa S. 2016. "School Factors Associated with the Percentage of Students Who Walk or Bike to School, School Health Policies and Practices Study, 2014." *Preventing Chronic Disease* 13 (5). doi:10.5888/pcd13.150573.

Demand/ Mode Choice

Student Proximity to School

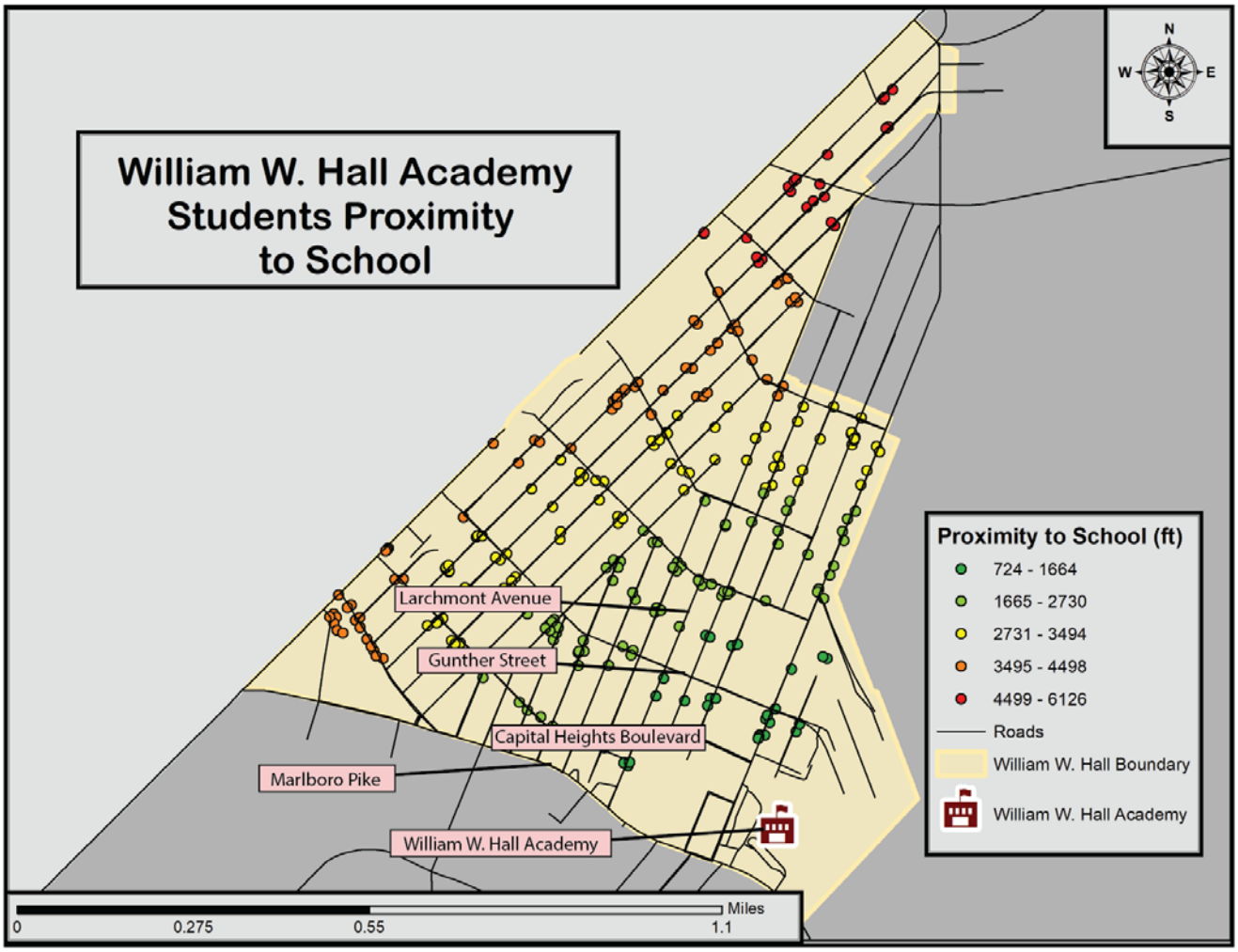

Figure 27: William W. Hall Academy Students Proximity to School

Table 16: William W. Hall Academy Student Count and Proximity to School

William W. Hall Academy		
Distance (ft)	Distance (mi)	Student Count
724-1664	.14-.32	46
1665-2730	.33-.52	130
2731-3494	.53-.66	135
3495-4498	.67-.85	122
4499-6126	.86-1.16	32

As seen in Figure 27 and Table 16, all the students live within one and one-tenth miles of the school, with 93 percent living less than one mile from the school. Students who live closer to their school are more likely to use active transportation. [80] This is an important supporting factor for the feasibility of active student travel to and from school.

Socio-demographic Analysis

Table 17: William W. Hall Academy Enrollment Count, FARM Percentage, and Demographic Information

William W. Hall Academy	
Enrollment Count	523
FARM Student Percentage	51%
Hispanic or Latino Student Percentage	22%
African American Student Percentage	76%
Asian Student Percentage	N/A
White Student Percentage	N/A
Two or More Races Percentage	N/A

As shown in Table 17, 51 percent of the students receive a Free and Reduced Meal (FARM).[81] In addition almost all of the students are either Hispanic or Latino and African American, 22 percent and 76 percent, respectively.[82] This school's FARM and demographics have a positive correlation with using an active mode of transportation to get to and from school. Hispanics and non-Hispanic Blacks were found to be the most likely to use an active transportation mode compared to other demographic

[80] Giles-Corti B, Wood G, Pikora T, Learnihan V, Bulsara M, Van Niel K, Timperio A, McCormack G, and Villanueva K. 2011. "School Site and the Potential to Walk to School: The Impact of Street Connectivity and Traffic Exposure in School Neighborhoods." *Health & Place* 17 (2): 545–50. doi:10.1016/j.healthplace.2010.12.011.
[81] "Demographics." Demographics: Prince George's County - William W. Hall Academy: 2017 Maryland Report Card. http://reportcard.msde.maryland.gov/Demographics.aspx?K=161830&WDATA=School.
[82] "Demographics." Demographics: Prince George's County - William W. Hall Academy: 2017 Maryland Report Card. http://reportcard.msde.maryland.gov/Demographics.aspx?K=161830&WDATA=School.

groups such as Asians or whites.[83] Also, research found a high positive correlation between students using active transportation and receiving FARM.

Zero Car Households

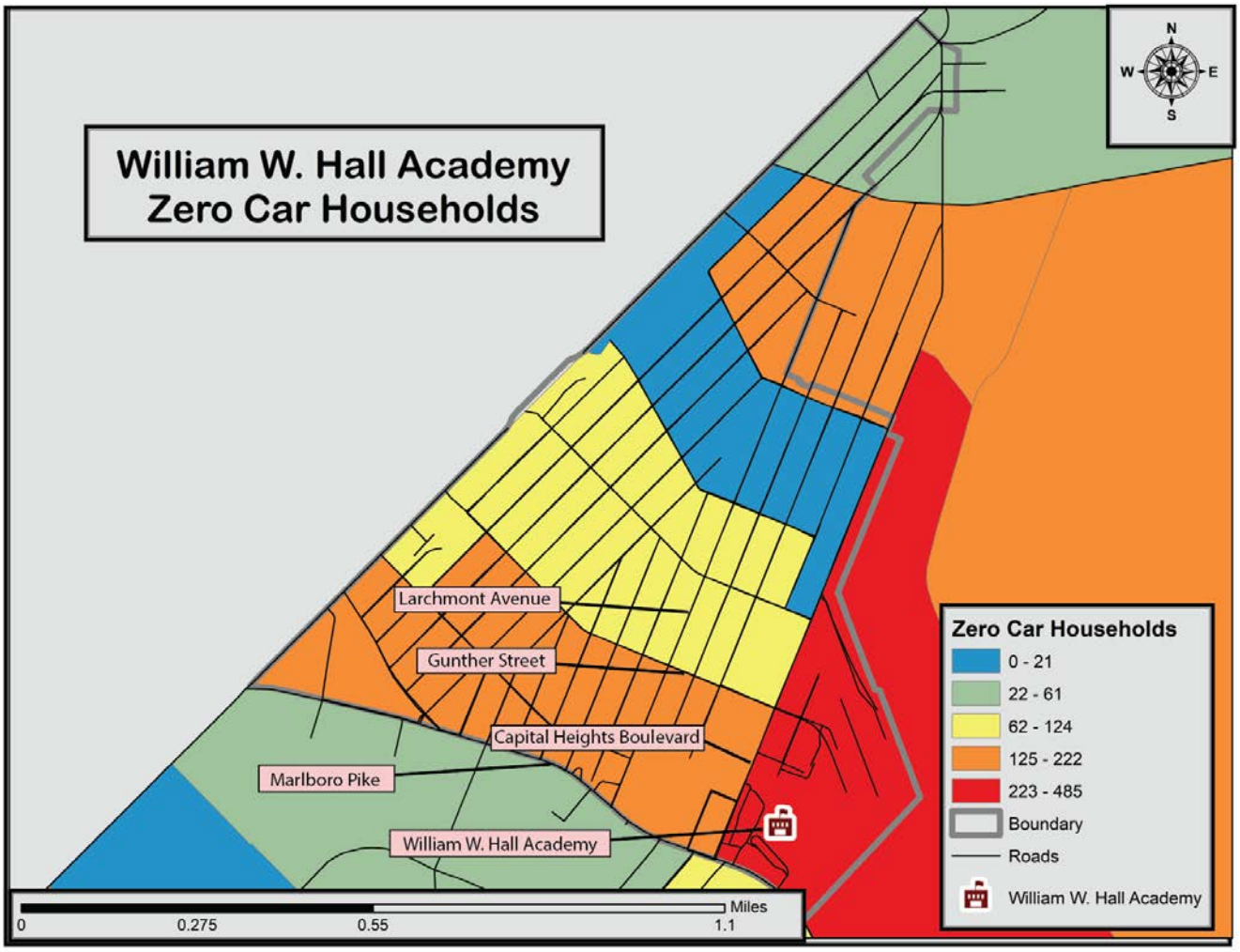

Figure 28: William W. Hall Academy Zero Car Households

[83] McDonald NC. 2008. "Critical Factors for Active Transportation to School among Low-Income and Minority Students. Evidence from the 2001 National Household Travel Survey." *American Journal of Preventive Medicine* 34 (4): 341–44. doi:10.1016/j.amepre.2008.01.004.

As seen in Figure 28, some households within the William W. Hall Academy boundary have a car while others do not. Also, fewer people own cars closer to the school, which increases the likelihood of students using active transportation to and from school. This is supported by research that shows people who do not own a car are more likely to use an active transportation modes. [84]

Median Household Income

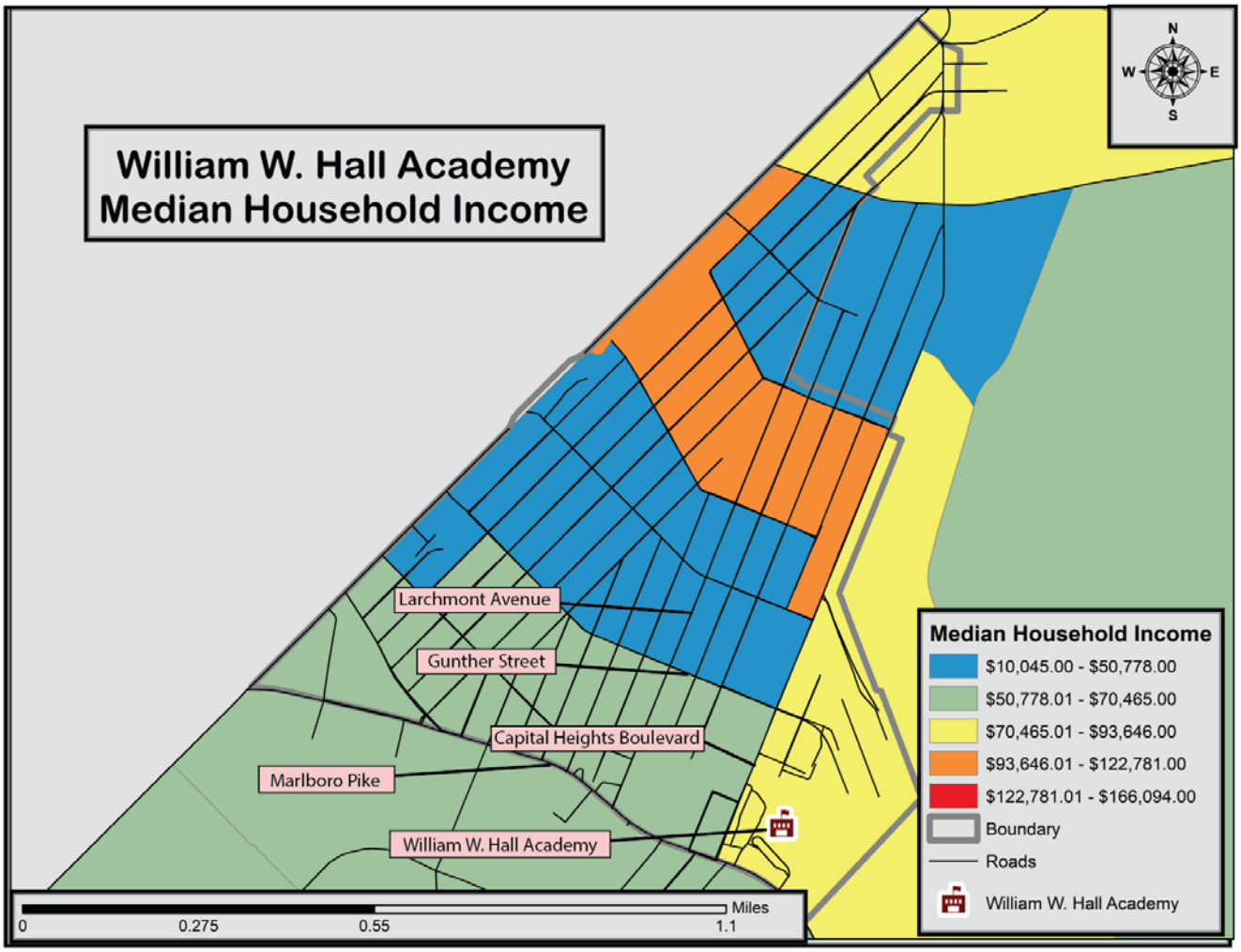

Figure 29: William W. Hall Academy Median Household Income

[84] Ewing, R, W Schroeer, and W Greene. 2004. "School Location and Student Travel: Analysis of Factors Affecting Mode Choice." *Transportation Research Record* 1895 (1895): 55–63.

According to Figure 29, households within the William W. Hall Academy boundary area have varied median household incomes. The lowest median household income is between $10,045.00 and 50,776.00; the highest median household income is between $93,646.01 and $122,781.00. This creates a diverse neighborhood so a conclusion about active student transportation based on income cannot be established. Students whose households own vehicles or have multiple drivers are less likely to use active transportation, unlike households with zero cars. [85]

Conclusions

Core Findings

Multiple findings supports and hinder the feasibility of active student transportation to and from school. Supporting factors are are students' proximity to school, a crossing guard, walkable streets, and low to medium ADTL. On the other hand, a lack of sidewalks, streets with steep slopes, and multiple pedestrian-involved accidents hinder active student transportation.

Recommendations

Because there is already a crossing guard at Capitol Heights Boulevard and Gunther Street, adding another crossing guard at Larchmont Avenue and Gunther Street could increase students using active transportation. Also, increasing the sidewalk infrastructure throughout the boundary area could increase the number of students using active transportation.

[85] Ewing, R, W Schroeer, and W Greene. 2004. "School Location and Student Travel: Analysis of Factors Affecting Mode Choice." *Transportation Research Record* 1895 (1895): 55–63.

Recommendations to Increase the Feasibility of an SR2S program

Table 18: William W. Hall Goals

Short Term Goal	Better understand student/family mode choice • survey walkability and infrastructure improvements • survey family mode choice and perception of safety • collect and synthesize survey data
Medium Term Goal	Sidewalk feasibility • on-site observations for data about streets without sidewalks • understand street feasibility for sidewalks • understand connectivity and network of existing and potential sidewalks
Long Term Goal	Funding and implementation of new sidewalks • search local, state, federal, and capital improvements for potential sidewalk infrastructure funding • apply for and obtain funding • implement new sidewalks

Promising Practices

Montgomery, Howard, and Anne Arundel Counties are near Prince George's County and each has different demographics, bus eligibility distance criteria, and SR2S participation. These counties were chosen to examine as promising practices because they have similar FARM percentages, demographics, and student populations. The comparative information from these counties has the potential to increase the participation in SR2S programs in Prince George's County if they were to adopt some of the practices in Montgomery, Howard, or Anne Arundel Counties.

Demographics/ FARM Percentage

Demographics

To better understand how Prince George's County student characteristics compare to Montgomery, Howard, and Anne Arundel Counties, demographics and FARM percentages were collected. As seen in Table 19, PGCPS has the second highest number of students. They also have the highest percentage of Black/African American and Hispanic/Latino students. Montgomery County has a similar percentage of Hispanic/Latino students compared to Prince George's County but a lower number of Black/African American Students. Howard and Anne Arundel Counties have a similar number of enrolled students and demographics with some similar student demographics to Prince George's County. This is useful information to give Prince George's County a sense of how their student demographics compare with bordering counties who participate or are planning to participate in SR2S programming.

Table 19: Demographics of Students attending Prince George's County[86], Montgomery County[87], Howard County[88], and Anne Arundel County[89] School Districts.

	Prince George's	Montgomery	Howard	Anne Arundel
All Students Enrolled	**130,814**	159,010	55,626	81,379
American Indian/ Alaskan Native	**417**	287	118	233
Asian	**3,588 (2.74%)**	22,680 (14.26%)	11,785 (21.86%)	2,997 (2.82%)
Black/African American	**78,288 (59.85%)**	33,902 (21.32%)	12,696 (22.82%)	16,769 (20.60%)
Hispanic/Latino	**40,928 (31.29%)**	47,855 (30.09%)	5,767 (10.37%)	5,767 (7.09%)
Hawaiian/Pacific Islander	**264**	77	71	175
White	**5,530 (4.23%)**	46,599 (29.30%)	21,739 (39.08%)	45,067 (55.38%)
Two or more races	**1,799 (1.38%)**	7,610 (4.79%)	3,450 (6.20%)	4,991 (6.13%)

FARM Percentage

Research shows that Free and Reduced Meals has a high correlation with students using active transportation to and from school. [90] Table 20 shows that all of the counties have similar percentages

[86] Prince George's County Demographics. 2017 Maryland Report Card. http://reportcard.msde.maryland.gov/Demographics.aspx?K=16AAAA&WDATA=Local+School+System#ENROLLMENTgrade3all

[87] Montgomery County Demographics. 2017 Maryland Report Card. http://reportcard.msde.maryland.gov/Demographics.aspx?K=15AAAA&WDATA=Local+School+System#MOBILITYgrade3all

[88] Howard County Demographics. 2017 Maryland Report Card. http://reportcard.msde.maryland.gov/Demographics.aspx?K=13AAAA&WDATA=Local+School+System

[89] Anne Arundel County Demographics. 2017 Maryland Report Card. http://reportcard.msde.maryland.gov/Demographics.aspx?K=02AAAA&WDATA=Local+School+System#ENROLLMENTgrade3all

[90] Lee SM, Tudor-Locke C, and Burns EK. 2008. "Application of a Walking Suitability Assessment to the Immediate Built Environment Surrounding Elementary Schools." *Health Promotion Practice* 9 (3): 246–52. doi:10.1177/1524839907301403.

of students who receive FARM and that, overall, only about a quarter of students in elementary, middle, and high school participate in the FARM program.

Table 20: Farm Percentage for Students attending Prince George's County, Montgomery County[91], Howard County[92], and Anne Arundel County[93] School Districts.

	Prince George's	Montgomery	Howard	Anne Arundel
Elementary	**26.3%**	21.9%	26.9%	26.0%
Middle	**22.2%**	18.5%	22.5%	23.3%
High	**27.7%**	20.4%	25.8%	15.4%

Student Bus Transportation

As seen in Table 21, all of the counties use different distances to determine student bus eligibility. Prince George's County has the farthest distance for bus eligibility students, while Howard County has the closest. Montgomery, Howard, and Anne Arundel Counties all have the same bus eligible criteria for elementary school students but vary at the middle and high school levels. Prince George's and Montgomery Counties have the same bus eligible distances for high school students.

[91] Montgomery County Demographics. 2017 Maryland Report Card. http://reportcard.msde.maryland.gov/Demographics.aspx?K=15AAAA&WDATA=Local+School+System#MOBILITYgrade3all
[92] Howard County Demographics. 2017 Maryland Report Card. http://reportcard.msde.maryland.gov/Demographics.aspx?K=13AAAA&WDATA=Local+School+System
[93] Anne Arundel County Demographics. 2017 Maryland Report Card. http://reportcard.msde.maryland.gov/Demographics.aspx?K=16AAAA&WDATA=Local+School+System

Table 21: Transportation Zones for Students attending Prince George's County, Montgomery County[94], Howard County[95], and Anne Arundel County[96] School Districts.

	Prince George's	Montgomery	Howard	Anne Arundel
Elementary	**1.5 miles**	1 mile	1 mile	1 mile
Middle	**2 miles**	1.5 miles	1 mile	1.5 miles
High	**2 miles**	2 miles	1.5 miles	1.5 miles

Montgomery County Student Transportation Regulation

Montgomery County's transportation regulations, EEA-RA Student Transportation, address different aspects of student transportation. The following information was taken from this regulation.[97] The aspects that pertain to this study are bus routes, student safety, and parent responsibility. Bus eligibility In Montgomery county is measured from the student's house to the curb of the nearest school door. [98] Students who live outside the criteria listed in Table 21 are eligible for bus transportation. Students are also bus eligible in special cases such as Individuals with Disabilities Education Act (IDEA), Section 504 of the Rehabilitation Act, No Child Left Behind Act of 2001 (NCLB), and McKinney-Vento Homeless Assistance Act of 1987. [99]

Walking routes are established by analyzing internet aerial views of neighborhood roadways, onsite visits by Department of Transportation (DOT) staff, comparing walking routes in other neighborhoods, noting safety features and impediments to safety, and observing pedestrians and vehicles in the walking areas.[100] Bus routes are established by DOT to maximize safety and efficiency.[101] The routes

[94] Regulation Montgomery County Public Schools. EEA-RA Student Transportation http://www.montgomeryschoolsmd.org/departments/policy/pdf/eeara.pdf. April 21, 2010
[95] Board of Education. Howard County Public School System. Policy 5200 Pupil Transportation. http://www.hcpss.org/f/board/policies/5200.pdf. July 1, 2005
[96] Regulation Anne Arundel County Public Schools Eligible Riders. http://aacpsschools.org/boardpolicies/wp-content/uploads/bsk-pdf-manager/2016/08/EAA-RA-Eligible-Riders.pdf
[97] Regulation Montgomery County Public Schools. EEA-RA Student Transportation http://www.montgomeryschoolsmd.org/departments/policy/pdf/eeara.pdf. April 21, 2010.
[98] Ibid.
[99] Ibid.
[100] Ibid.
[101] Ibid.

are established so that walking distance to the bus stop is no farther than the bus eligible distance.[102] Parents have multiple responsibilities for the student's safety along the walking route and at the bus stops.[103] Parents are responsible for picking their students' walking routes to and from either the bus stop or school.[104] They are also responsible for supervising the students along those routes.[105]

Howard County Student Transportation Policy

Howard County's transportation regulations, Policy 5200 Pupil Transportation, address aspects pertaining to student transportation. The following information was taken from this policy.[106] The aspects addressed in this policy that relate to this study are standards, student eligibility, establishing bus routes, and resources used to determine different facets of student transportation.[107] The superintendent/ designee are responsible for designing bus routes that serve both public and non-public schools.[108] The standards for bus service consider equity, safety, program efficiency, IEP or 504 plan requirements, and economy of operations.[109] Students eligible for the bus are expected to walk up to four tenths of a mile to and from the bus stop. [110] In addition, each bus stop is at least a quarter-mile apart.[111] The County posts and maintains a student eligibility map/chart on their website to show the locations of student bus eligibility.[112] The Pupil Transportation Office identifies any geographic area where bus eligibility exceptions could be made due to safety reasons.[113] To determine suitability for bus stops, walkways, crossing, etc. the Police Department, Public Works Traffic Engineering Division, Recreation and Parks, Columbia Association, and other State or County Agencies are consulted.[114]

[102] Ibid.
[103] Ibid.
[104] Ibid.
[105] Ibid.
[106] Board of Education. Howard County Public School System. Policy 5200 Pupil Transportation. http://www.hcpss.org/f/board/policies/5200.pdf. July 1, 2005.
[107] Ibid.
[108] Ibid.
[109] Ibid.
[110] Ibid.
[111] Ibid.
[112] Ibid.
[113] Ibid.
[114] Ibid.

Anne Arundel County Student Transportation Regulation

Anne Arundel County regulations are brief regarding student transportation and the following information was taken from these regulations. The supervisor of transportation is responsible for operation related to any aspect of transportation services.[115] Students are allowed to ride the bus if they have to walk on a road with a shoulder less than three feet and speed limit of more than 40 miles per hour; if they have to cross a divided highway, active railroad crossing, bridge, tunnel, or overpass that has inadequate walkways; or if they have to walk through or along an isolated wooded area.[116] Anne Arundel County measures bus eligibility by using the most direct route from the student's residence to the closest entrance of the school.[117] A bus route extension is given when one or more students have to walk more than one mile to their bus stop.[118]

Safe Routes to School Participation

Montgomery County

Montgomery County has the most developed SR2S Program compared to Howard and Anne Arundel Counties. To improve student access to schools, the department collected input from school administrators, and PTAs, then conducted field observations to see the conflicts between pedestrian and vehicular movements that could endanger students using active transportation.[119] They also evaluated pedestrian sidewalks and crosswalks.[120] Montgomery County's SR2S programs have received grant funds from the Maryland State Highway Administration, which are being used for SR2S education and enforcement.[121] They have also used funding to enhance built environment conditions and safety.[122] As part of the SR2S program, a portion of the County's Department of Transportation's website is

[115] Transportation Division. Regulation Anne Arundel County Public Schools. EAA-RA- Eligible Riders. Issued March 18, 2015.
[116] Ibid.
[117] Transportation Division. Regulation Anne Arundel County Public Schools. EAD-RA- School Bus Scheduling. Issued June 6, 2012.
[118] Ibid.
[119] "The Safe Routes to Schools Story." Safe Routes to School Story. 2017. https://www.montgomerycountymd.gov/DOT-PedSafety/SRTS/Story.html.
[120] Ibid.
[121] Ibid.
[122]"Safe Routes to School." Safe Route to Schools - Montgomery County, MD. https://www.montgomerycountymd.gov/DOT-PedSafety/SRTS/home.html.

dedicated to the SR2S program with resources for students and parents. [123] Montgomery's Department of Transportation has partnered with the Police Department and collaborated with schools to establish the SR2S program. [124] SR2S programs include bicycle and pedestrian safety education classes or assemblies, participation in International Walk to School Day, and free services to encourage students to walk and bike safely to school such as crosswalk simulation activities and training on developing walking school busses and bicycle trains.[125]

Howard County

According to a 2011 study, Howard County has no formal SR2S program, but a number of schools have participated in Walk to School Day.[126] In December 2017, the Baltimore Sun reported that Howard County's Pedestrian Master Plan now includes implementation of a SR2S program County-wide.[127] Watching how Howard County plans and develops a SR2S program can potentially be a resource and guide for Prince George's County.

Anne Arundel County

According to a 2100 study, Anne Arundel County has no formal SR2S program, but a number of schools have participated in Walk to School Day.[128] Through SR2S funding, the County is planning educational initiatives and walk audits.[129] No resources were found on specific schools in Anne Arundel County with SR2S programs.

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[123] "Safe Routes to School." Safe Route to Schools - Montgomery County, MD. https://www.montgomerycountymd.gov/DOT-PedSafety/SRTS/home.html.

[124] "The Safe Routes to Schools Story." Safe Routes to School Story. 2017. https://www.montgomerycountymd.gov/DOT-PedSafety/SRTS/Story.html.

[125] Montgomery County Safe Routes to School. Rockville, MD: Montgomery County Department of Transportation, 2013.

[126] Maryland Statewide Student Travel Policy Survey. Maryland Department of Transportation. February 2011. http://www.mdot.maryland.gov/Office_of_Planning_and_Capital_Programming/Bicycle/Documents/School_Survey_Report_Revised.pdf

[127] Magill, Kate. "Pedestrian plan update looks to make Howard County more walker-friendly." Columbia Flier. December 15, 2017. http://www.baltimoresun.com/news/maryland/howard/columbia/ph-ho-cf-pedestrian-master-plan-1214-story.html.

[128] Maryland Statewide Student Travel Policy Survey. Maryland Department of Transportation. February 2011. http://www.mdot.maryland.gov/Office_of_Planning_and_Capital_Programming/Bicycle/Documents/School_Survey_Report_Revised.pdf

[129] Anne Arundel OCunty Pedestrian and Bicycle Master Plan: 2013 Update. http://www.aacounty.org/departments/transportation/forms-and-publications/2013_Pedestrian_Bicycle_Master_Plan.pdf. June 2013.

Table 22: SR2S Programming Summary

Montgomery County[130,131]	Howard County[132, 133]	Anne Arundel County[134,135]

• Participation in Walk to School Day
• SR2S website
• DOT partnered with Police Department and collaborated with schools
• Bicycle and pedestrian safety education classes or assemblies
• Free services to encourage students to walk and bike safely to school
  ◦ Crosswalk simulation activities
  ◦ Training to develop a walking school busses and bicycle trains
	• No formal SR2S program
	• Participated in Walk to School Day
	• Pedestrian Master Plan now includes implementation of a SR2S program
		• No formal SR2S program
		• Participated in Walk to School Day
		• Plans to have educational initiatives and conduct walk audits using SR2S funding

[130] "The Safe Routes to Schools Story." Safe Routes to School Story. 2017. https://www.montgomerycountymd.gov/DOT-PedSafety/SRTS/Story.html.
[131] Montgomery County Safe Routes to School. Rockville, MD: Montgomery County Department of Transportation, 2013.
[132] Maryland Statewide Student Travel Policy Survey. Maryland Department of Transportation. February 2011. http://www.mdot.maryland.gov/Office_of_Planning_and_Capital_Programming/Bicycle/Documents/School_Survey_Report_Revised.pdf
[133] Magill, Kate. "Pedestrian plan update looks to make Howard County more walker-friendly." Columbia Flier. December 15, 2017. http://www.baltimoresun.com/news/maryland/howard/columbia/ph-ho-cf-pedestrian-master-plan-1214-story.html.
[134] Maryland Statewide Student Travel Policy Survey. Maryland Department of Transportation. February 2011. http://www.mdot.maryland.gov/Office_of_Planning_and_Capital_Programming/Bicycle/Documents/School_Survey_Report_Revised.pdf
[135] Anne Arundel OCunty Pedestrian and Bicycle Master Plan: 2013 Update. http://www.aacounty.org/departments/transportation/forms-and-publications/2013_Pedestrian_Bicycle_Master_Plan.pdf. June 2013.

Future Studies and Additional Analysis

The following ideas for future studies and additional analysis to determine the feasibility of active student transportation can guide implementation of an SR2S program in Prince George's County. These additional studies and analyses help fill gaps in the current study. This study's major limitations were time, data availability, and the scope of work. Collecting and analyzing additional information will allow for a more rounded study.

Survey Perception of Active Student Travel

A survey could help understand the community's perceptions of active student transportation. Currently there is observational data and GIS analysis but no information from parents, principals, and community members about their perceptions of current walking conditions. Obtaining this information could help facilitate the next steps to increase the feasibility of active student transportation and implementation of a SR2S program. To look more deeply into active student transportation, this survey should examine safety, distance, and routes. These factors could not be included in the current study due to time and access to community members who could proctor the survey. Questions to consider include:

- How safe do you perceive the areas around your child's school is currently?
- Are you involved in any community organizations or the PTA? If so which ones?
- How far is your residence from the school? And what mode of transportation does your child currently use to get to/from school?
- Would you be willing to allow your child to participate in a SR2S program, which supports students walking and biking to school?

Collect and Analyze Crime Data around Schools

Collecting and analyzing crime and safety data around schools allows insight into another aspect of the feasibility of active student transportation. In an unsafe area, parents and guardians are less likely to allow their child to use active transportation to and from school. The current study was not able to obtain crime and safety data, which is why it was not included in the study. Questions to consider include:

- What are the current crime and safety conditions around the school?
- What aspects are already in place or could be put in place to make this area safer for active student transportation (both programs and infrastructure)?
- Are there locations of crime within the school boundary area? If so, what are those locations?
- What type of crimes took place within the school boundary area?

Compare Fiscal Costs and Benefits of Current Transportation with Implementing an SR2S Program

Understanding the costs and benefits of current transportation costs can help the PGCPS understand how much they would save by implementing an SR2S program and stricter bus eligibility standards. In addition, pinpointing specific transportation areas to save money would be beneficial. Even though this was discussed, the topic was outside the scope of work for the current study. Questions to consider include:

- What is the current budget for transporting students and the breakdown? (per student, per school, bus maintenance, bus cost, bus driver costs, dispatcher costs, other factors)
- How much does it cost per crossing guard?
- How much would transporting students cost if the SR2S program was implemented? (different for every school)

Funding Options for an SR2S Program

The County must obtain funding for programs and infrastructure to make SRS2 a success. There are many different funding outlets, including federal, State, County, grants, community groups, and local businesses. Maryland SR2S programs are 80 percent federally funded and 20 percent or more government entity sponsored.[136] Government entities include local governments, transit agencies, school districts, or individual schools. More information and details about funding can be found on the Maryland Department of Transportation State Highway Administration website under safety programs. Due to the current scope of work and time limitation, funding options were not addressed in this study. Questions to consider include:

- What is the process to get funding?

[136] "Safe Routes to School." Maryland Department of Transportation State Highway Administration. http://www.roads.maryland.gov/Index.aspx?PageId=735.

- How can each funding option be used to its full potential? (programs and infrastructure)
- How will this funding assist an SR2S program now and in the future?
- What are some funding options and what can they be used for? (infrastructure, programming, education)

Conclusions and Recommendations

This study provides some insight about the current conditions of the built environment, safety, and demand/mode choice at Arrowhead Elementary, Beltsville Academy, Hyattsville Elementary, and William W. Hall Academy schools in Prince George's County, Maryland. This insight has helped answer the question "To what extent does current conditions at these four schools support or hinder the feasibility of active student transportation?"

Based on current conditions (shown in Table 23), Hyattsville Elementary has the highest feasibility for active student transportation, while Arrowhead Elementary has the lowest feasibility. Arrowhead has a variety of factors that hinder active student transportation such as a lack of sidewalks and no crossing guards, which can greatly affect student safety while walking or biking to school. Once better sidewalk infrastructure is implemented, the feasibility of active student transportation at this school would dramatically increase.

Hyattsville has the highest feasibility for active student transportation a few key reasons. The Hyattsville Elementary School boundary area has a dense network of sidewalks with grass buffers between the sidewalk and the street. This area also has low-volume traffic, multiple crossing guard locations, and all students live within a mile of the school.

The other two schools, Beltsville Academy and William W. Hall Academy are considered to have potential feasibility. They both had some sidewalks but not a dense network, which is a potential safety concern. William W. Hall Academy has one crossing guard, which increased its feasibility while Beltsville Academy did not have any crossing guards. Students at these schools also live near them. Both William W. Hall and Beltsville require additional sidewalk infrastructure and crossing guards to increase safety and feasibility.

Table 23: Current Conditions

School	Student Population	Student Proximity (Miles)	Sidewalks	Crossing Guards	Bike Racks	ADTL Surrounding School based on Maps	Feasibility based on Current Conditions
Arrowhead	**379**	.25-2.42	Low Coverage	None Present	None Present	Low to Medium (less than 13,840 vehicles)	Not Feasible
Beltsville	**1092**	.06-1.22	Some Coverage	None Present	None Present	Low (Montgomery Road) to High (Route 1)	Potentially Feasible
Hyattsville	**561**	.04-.98	High Coverage	Present	Present	Low (Jefferson Street) to High (Route 1)	Feasible
William W. Hall	**523**	.14-1.16	Some Coverage	Present	None Present	Low (Capital Heights Blvd) to Medium (Marlboro Pike)	Potentially Feasible

The best way to move forward is to concentrate on the highest feasibility school, Hyattsville. A pilot program is recommended to introduce the SR2S program without overwhelming the students and parents/guardians. National Bike to School Day is May 9, 2018 and would be a good day to kick off a pilot program. Educational and programmatic preparations would be required to ensure a safe and smooth Bike to School Day for students.

Appendix 1: Preliminary Study and Findings

Introduction

The preliminary study examined how current conditions at 11 elementary and academy schools in Prince George's County either support or hinder an SR2S program by examining demand and mode choice factors of active student transportation. The County chose the 11 schools examined in the preliminary study and their school boundary areas ranged in size. The data used was a walkable streets layer, school location/boundary, and student address points, provided by the county, and no vehicle access households collected from census data. Since the walk zone defined by Prince George's County is 1.5 miles for elementary schools, a 1.5-mile radius was placed around each school.

Demand/Mode Choice

Student Distance from School

Table 1 shows that all the schools chosen for the preliminary study had 79 percent or more students within the walk zone. Figure 30 shows that student distance (determined by students' addresses) are predominately clustered around the schools.

School Name	Total Enrollment	Number of Students within 1.5mi of Walk zone	Percentage of Students within 1.5mi of Walk zone
Beacon Heights Elementary	489	446	91%
Beltsville Academy	1092	982	90%
Catherine T Reed Elementary	527	424	80%
Glassmanor Elementary	341	269	79%
Hyattsville Elementary	561	504	90%
James Mc Henry Elementary	757	666	88%
Laurel Elementary	583	535	92%
Port Towns Elementary	1077	980	91%
Ridgecrest Elementary	721	638	88%
Riverdale Elementary	795	726	91%
William W Hall Academy	523	465	89%

Table 1: Number and Percentage of Students living within the 1.5 Mile Walk zone

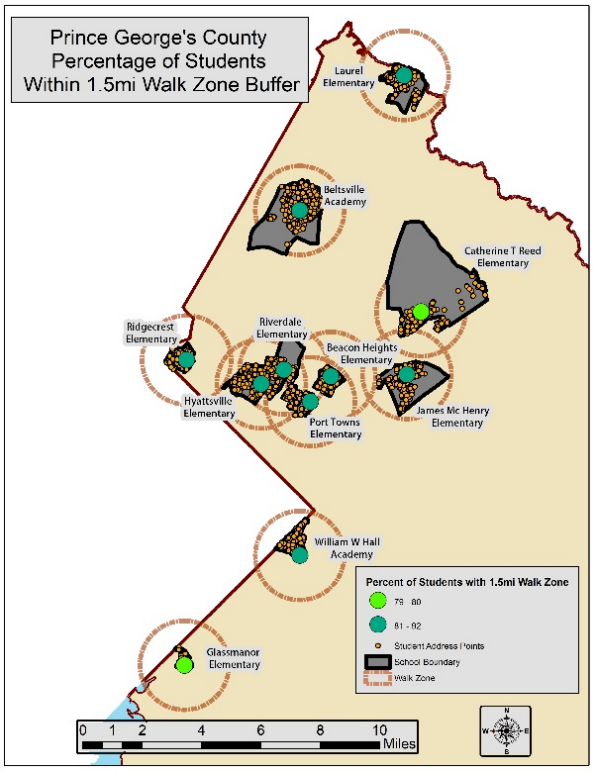

Figure 1: Percentage of Students living within the 1.5 mile walk zone buffer

Walkable Streets

Looking at the percentage of walkable streets within the school boundary, there is a trend throughout this analysis (Figure 2 and Table 2). Beltsville Academy always came in with a low walkability rating while Riverdale Elementary came in with one of the highest walkability ratings. In the following maps, the schools are color coded based on different criteria, with the lower numbers shown in red and blue for areas with the highest number of walkable streets. The eleven schools studied had between 13 percent and 94 percent walkable streets within the school boundary areas. In addition, the percentage of walkable streets did not correlate to the size of the boundary area, even though the larger boundary areas had a lower percentage of walkable streets.

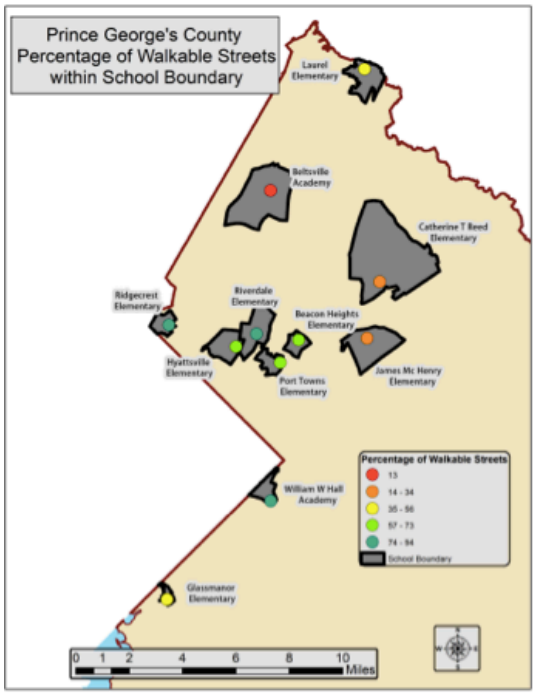

Figure 2: Percentage of Walkable Streets within the School Boundary

Percentage of Walkable Streets Within School Boundary

	Percent of Walkable Streets				
School Name	Very Poor	Poor	Fair	Good	Very Good
Beltsville Academy	✓				
Catherine T Reed Elementary		✓			
James Mc Henry Elementary		✓			
Glassmanor Elementary			✓		
Laurel Elementary			✓		
Port Towns Elementary				✓	
Hyattsville Elementary				✓	
Beacon Heights Elementary				✓	
Riverdale Elementary					✓
Ridgecrest Elementary					✓
William W Hall Academy					✓

Table 2: Percentage of walkable streets

Figure 3 and Table 3 show the miles of walkable streets within the 1.5-mile radius. As you can see, within the radius there are between 16 and 95 miles of walkable streets. Hyattsville Elementary has the most miles of walkable streets while Beltsville Academy has the lowest miles of walkable streets. Most of the schools had between 35 and 56 miles of walkable streets.

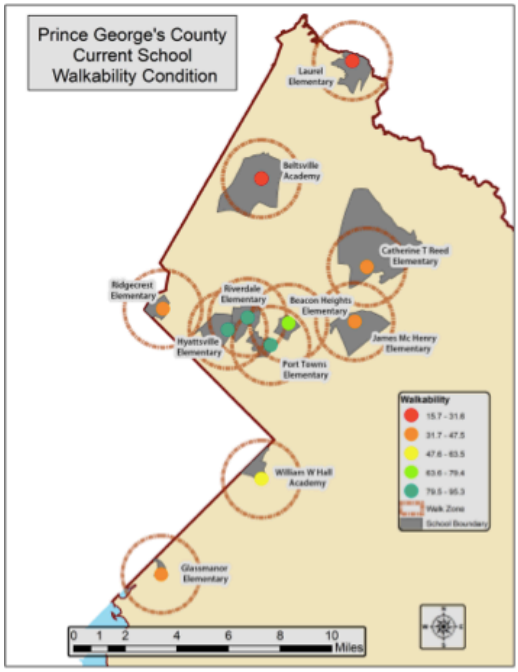

Figure 3: Current walkability conditions using the walk zone buffer and walkable streets

Miles of Walkable Streets Within 1.5 Mile Walk Zone Buffer Around Schools

School Name	Walkable Streets One and a Half Mile Buffer (mi)
Beltsville Academy	16
Laurel Elementary	26
Catherine T Reed Elementary	35
Glassmanor Elementary	36
Ridgecrest Elementary	44
James Mc Henry Elementary	44
William W Hall Academy	56
Beacon Heights Elementary	70
Riverdale Elementary	83
Port Towns Elementary	89
Hyattsville Elementary	95

Table 3: Miles of walkable streets within the 1.5-mile buffer

Walkable Street Proximity to Students

Within School Boundary			
School Name	Number of Students on Walkable Street	Number of Students Not On Walkable Street	Percentage of Student On Walkable Street
Beltsville Academy	166	819	17%
Catherine T Reed Elementary	152	287	35%
James Mc Henry Elementary	211	455	32%
Glassmanor Elementary	115	154	43%
Laurel Elementary	202	329	38%
Port Towns Elementary	767	217	78%
Hyattsville Elementary	484	20	96%
Beacon Heights Elementary	358	87	80%
Riverdale Elementary	606	120	83%
Ridgecrest Elementary	382	256	60%
William W Hall Academy	333	132	72%

Percent of Students on Walkable Street					
School Name	Very Poor	Poor	Fair	Good	Very Good
Beltsville Academy	✓				
Catherine T Reed Elementary		✓			
James Mc Henry Elementary		✓			
Glassmanor Elementary		✓			
Laurel Elementary		✓			
Port Towns Elementary				✓	
Hyattsville Elementary					✓
Beacon Heights Elementary				✓	
Riverdale Elementary				✓	
Ridgecrest Elementary			✓		
William W Hall Academy				✓	

Table 4: Number of students on walkable streets and how they correlate to very poor to very good walkable streets

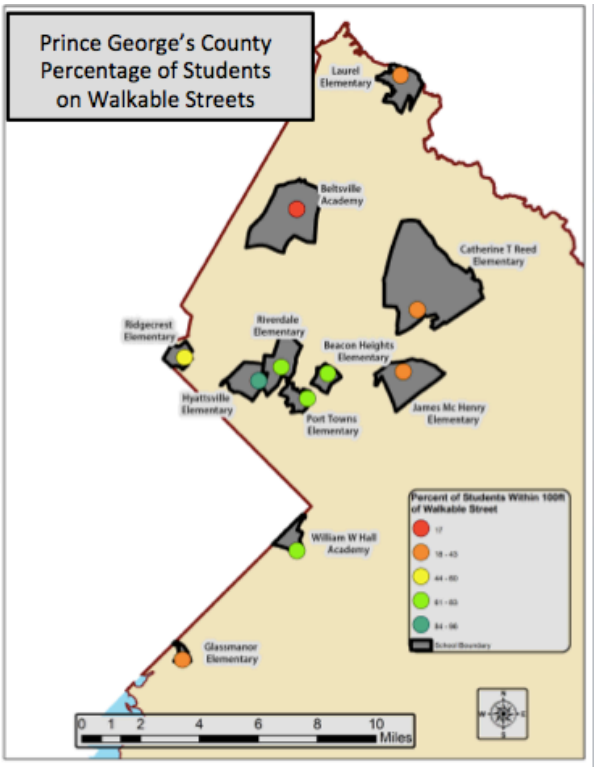

Figure 4: Percentage of students on walkable streets

Analyzing the percentage of students who live on walkable streets is important because when students do not live on walkable streets, they are less likely to use active transportation to and from school. The Figure 4 and Table 4 shows students within the school boundary who do and don't live on walkable streets. It was found that again Hyattsville had the highest percentage of students living on walkable streets while Beltsville Academy had the lowest number. Also, 72 percent of William W. Hall Academy students live on walkable streets.

Table 5 shows how the 1.5-mile radius of walkable streets compares to the percentage of walkable streets within the school boundary area. Here, the miles and percentages were color coded with the previous maps to paint a clearer picture. In addition, the County provided labels for each school as having either potential or existing walkability. Through further examination, it was found that two schools were listed as having potential walkability; it was found that they have existing walkability using the data provided.

Table 5.

How does 1.5mile buffer of walkable streets compare to percentage of walkable streets within school boundary?

School Name	Walkable Streets One and a Half Mile Buffer (mi)	Percentage of Walkable Streets within the School Boundary (%)	County: Existing or Potential for high Walkability
Beltsville Academy	16	13	Potential
Laurel Elementary	26	56	Potential
Catherine T Reed Elementary	35	28	Potential
Glassmanor Elementary	36	43	Existing
Ridgecrest Elementary	44	87	Potential
James Mc Henry Elementary	44	34	Potential
William W Hall Academy	56	94	Potential
Beacon Heights Elementary	70	73	Existing
Riverdale Elementary	83	84	Existing
Port Towns Elementary	89	70	Existing
Hyattsville Elementary	95	71	Existing

Figure 5 shows that William W. Hall Academy and Ridgecrest Elementary school have existing walkability. Some reasons why these schools are considered potentially walkable instead of existing is because Ridgecrest is off of Riggs Road, which is heavily traveled while, William W. Hall Academy also has heavily traveled streets with few sidewalks, and hilly topography.

Figure 5: William W. Hall Academy and Ridgecrest Elementary school walkable streets

The last analysis preformed in the preliminary study overlaid no vehicle access and the percentage of walkable streets, since previous studies indicated a correlation between not having a vehicle and using active transportation. The lighter color indicates a low number of no vehicle households, meaning a lot of people have access to a vehicle. Darker colors indicate more people have no access to a vehicle. William W. Hall has a high percentage of walkable streets and high number of people with no vehicle access. In addition, Glassmanor, Ridgecrest, and Hyattsville all have pockets of no vehicle access nearby.

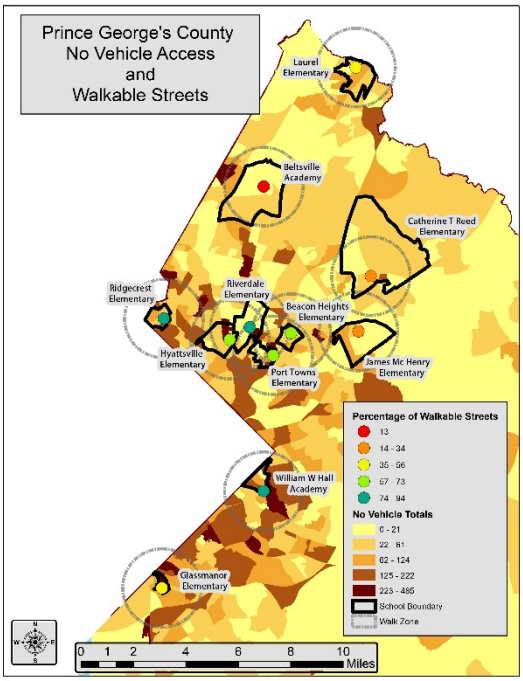

Figure 6: Prince George's County No vehicle Access and Walkable Streets

Conclusion

The preliminary study shows that each school has different walkability, boundaries, walkable streets, and student proximity to walkable streets. Each school exhibits different assets and barriers. Three of schools were initially chosen for further examination in the revised study—Hyattsville Elementary, William W. Hall Academy, and Beltsville Academy.

After meeting with the County to present the preliminary findings, the County indicated that some of the walkable street data was inaccurate. Some streets that were considered walkable, either lack sidewalks or are on a steep incline, which make it difficult for students to get to and from school.

The preliminary findings helped shift the scope of work to focus on two academy and two elementary schools, which were further evaluated to see how current conditions support on hinder students using active transportation to and from school, using sidewalk data, proximity to school, traffic, and observational data.

Appendix 2A: Revised Walkability Environment Assessment

Walking Environment Assessment: ***Street Within School Boundary***

School Name: _____

Street Assessed: _____

Date: _____ Start Time: _____End Time: _____

Starting Intersection: _____

Ending Intersection: _____

Weather Condition: _____

Answer the following questions below based on current built environment conditions to help determine the walkability and likelihood of students walking or biking to school (To capture visual aspects of the observation, it is highly recommended to take photos during this assessment).

1. Are their sidewalks? Yes ☐ No ☐

   If Yes:

   A) Is the sidewalk on both sides of the street? Yes ☐ No ☐

   B) How wide is the sidewalk? _____

   C) Is there anything obstructing or blocking parts of the sidewalk? Yes ☐ No ☐,

      a. If yes, list the obstructions. _____

2. Is there a buffer between the sidewalk and the street (For example grass between the street and the sidewalk or a metal guard between the street and the sidewalk)? Yes ☐ No ☐ N/A☐

   If yes, what type of buffer and how wide is it? _____

   _____

3. Describe the condition of the sidewalk (Good, Fair, Poor, non-existent)

_____

4. Are the sidewalks continuous on this street? Yes ☐ No ☐ N/A☐
5. What is the traffic speed on this street? _____
6. How many lanes is the street in both directions? _____

7. Are there any barriers to get to school from this street? Yes ☐ No ☐

   If yes, what are the barriers? _____

   _____

8. Are their street trees? Yes ☐ No ☐

   If yes, how far apart are they? _____

9. Are there Traffic calming devices on this street (For example speed humps, traffic circle, or raised median)?

   Yes ☐ No ☐

   If yes, what are they and how many? _____

_____

Notes/ suggested observational infrastructure improvements/ feelings while conducting the site assessment:

_____

_____

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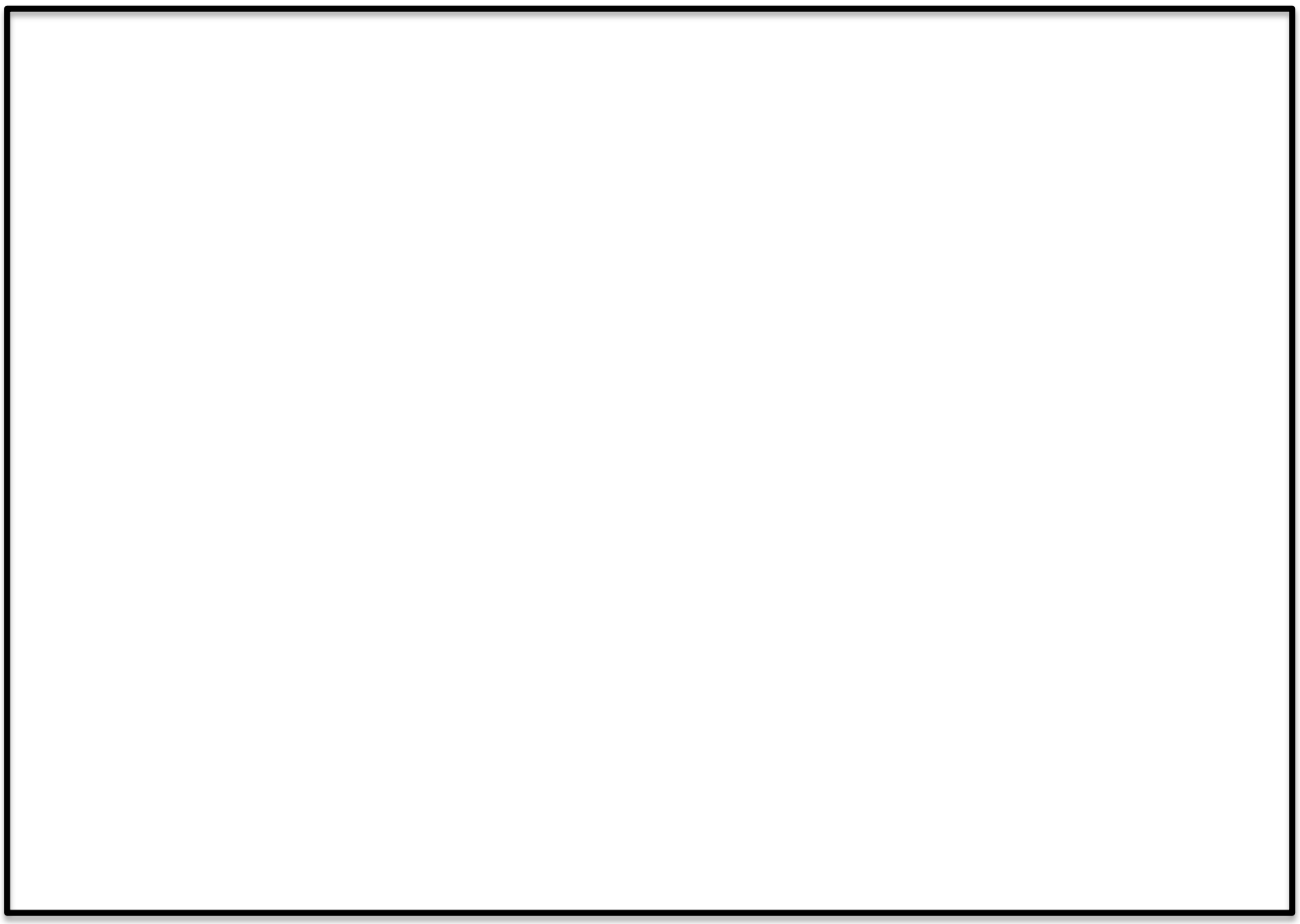
Use the space below to sketch out aspects, which stood out to you. These could be positive, negative, or just something that was memorable about the street.



Walking Environment Assessment: ***School Perimeter***

School Name: _____

Date: _____ Start Time: _____ End Time: _____

Weather Condition: _____

Answer the following questions below based on current built environment conditions to help determine the walkability and likelihood of students walking or biking to school (To capture visual aspects of the observation, it is highly recommended to take photos during this assessment):

1. Are their sidewalks? Yes ☐ No ☐

   If Yes:

   D) Is the sidewalk on both sides of the street? Yes ☐ No ☐

   E) How wide is the sidewalk? _____

   F) Is there anything obstructing or blocking parts of the sidewalk? Yes ☐ No ☐,

      a. If yes, list the obstructions. _____

2. Is there a buffer between the sidewalk and the street (For example grass between the street and the sidewalk or a metal guard between the street and the sidewalk)? Yes ☐ No ☐ N/A☐

   If yes, what type of buffer and how wide is it? _____

   _____

3. Describe the condition of the sidewalk (Good, Fair, Poor, non-existent) _____

_____

4. Are the sidewalks continuous around the school perimeter? Yes ☐ No ☐ N/A☐
5. What is the traffic speed during school hours? _____
6. Are their traffic cameras in front of the school? Yes ☐ No ☐
7. How many lanes is the street in both directions? _____
8. Are their bike racks at the school? Yes ☐ No ☐ Not Visible ☐
9. Are their multiple paths to get to school (For example, sidewalks, or trails to get from the sidewalk to the school building)? Yes ☐ No ☐
10. What are the modes to cross? Light? Stop Sign? Just cross walk? None?

_____

11. Are their any barriers faced in the immediate surrounding area of the school?

    Yes ☐ No ☐

    If yes, what are the barriers?

    _____

12. What is the aesthetics around the school? Is it inviting for walking? _____

    _____

13. Are their street trees? Yes ☐ No ☐

    If yes, how far apart are they?

    _____

14. Are there crosswalks to get to school? Yes ☐ No ☐

    If yes how many and what intersections? _____

    _____

15. Are there any major intersections? Yes ☐ No ☐

    If yes how many and what are the streets? _____

_____

_____

_____

16. Are there Traffic calming devices on the streets adjacent to the school (For example speed humps, traffic circle, or raised median)? Yes ☐ No ☐

    If yes, what are they and how many? _____

_____

Notes/ suggested observational infrastructure improvements/ feelings while conducting the site assessment:

_____

_____

_____

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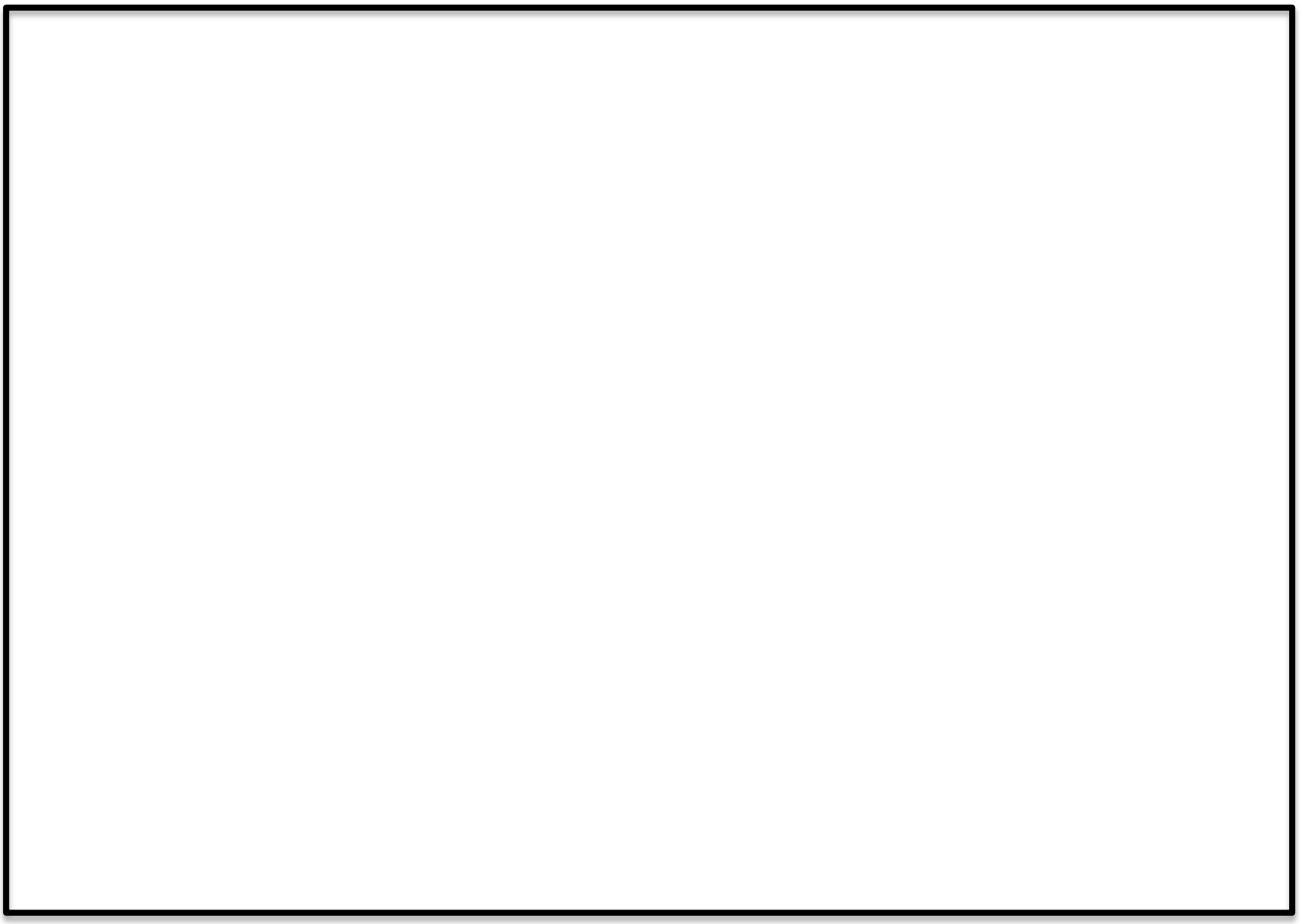
Use the space below to sketch out aspects, which stood out to you. These could be positive, negative, or just something that was memorable about the school perimeter.



This walkability assessment was created through an Independent Study Research Course through the PALS program at University of Maryland, College Park in conjunction with the following resources: Prince George's County Public Schools current Walk Area/Bus Stop Evaluation Procedure,

Jones S.E, and Sliwa S. 2016. "School Factors Associated with the Percentage of Students Who Walk or Bike to School, School Health Policies and Practices Study, 2014." Preventing Chronic Disease 13 (5). doi:10.5888/pcd13.150573.

Emery J, and Crump C. 2003. The WABSA Project: Assessing and Improving Your Community's Walkability & Bikeability" http://www.unc.edu/~jemery/WABSA/documents/wabsa%20guidebook%2003-1029.pdf

Appendix 3: GIS Data Layer Sources and Years

Data	Year	Source
School Boundaries	N/A	County
All Roads	2017	Maryland iMap
Sidewalks	2014	PG Opendata: Layer Name Transporation_2014_Py
Crossing Guard Location	2015-2016	County
Annual Daily Traffic Load	2012	Maryland iMap
Accident Data	2012	County
Student Address Points	September 2016	County
School Locations	2015	County
Median Income	2015	Census
Zero Car Households	2015	Census
County Boundary	N/A	County