

Clackamas County – Whitcomb Elementary

Baseline Data Evaluation Report



FINAL August 18, 2020

Introduction

This Case Study Evaluation measures the impacts of Oregon Safe Routes to School (SRTS) 2019-2020 Competitive Infrastructure (IN) Grants in communities across the state. The evaluation will assess the effectiveness of individual SRTS projects, techniques, and programs designed to reduce barriers to biking and walking to and from school. Evaluation research questions include:

- What are the impacts for standalone Infrastructure grants, and combined Non-Infrastructure and Infrastructure grants?
- How do different combinations of interventions effectively address the barriers identified by communities and affect mode shift, safety and perceptions of safety, program lifespan, and equity?

The Baseline Data Evaluation Report represents the “pre-construction” data and provides an overview of existing travel conditions and school site attributes. The Baseline Data Evaluation Report is intended to contain the majority of the information needed to plan for the post-construction data collection. The baseline report summarizes the funded improvement project, demographics of affected schools, and data from Oregon Department of Transportation (ODOT) and local roadway authority crash records, parent surveys, and student travel hand tallies.

Plan for the Final Case Study Evaluation Report

The Final Case Study Evaluation Report will represent the “post-construction” data. A draft outline for this report is included in Appendix A. For data consistency, the post-construction data will be collected in the spring immediately after construction is complete. This will reduce weather-related impacts and also allow time during the school year for families to establish or change their travel habits. In addition to the standard parent surveys and student travel hand tallies, post-construction data collection methods for the evaluation report may also include: parent focus groups and surveys or interviews with school staff.

The Final Case Study Evaluation Report will measure shifts using the evaluation metrics laid out in this document to identify the successes of SRTS projects and provide insight on opportunities for further improvement. SRTS performance metrics measured during this evaluation process will include:

- **Mode split:** Are more students walking and biking to school after a project’s completion than at the time of baseline data collection?
- **Access to safe infrastructure:** Do students have better access to sidewalks, bike lanes, or safe crossing locations on their route to school after the completion of the project?
- **Safety/perception of safety:** Do parents and students feel safer or more comfortable walking and biking to school after the project’s completion?
- **Program lifespan/partnerships:** Is the SRTS program functioning efficiently and providing adequate support for partner jurisdictions, schools, and districts?
- **Equity:** Are students from a diversity of ethnic/racial and socioeconomic backgrounds benefiting from the investments being made?

In addition to reporting on grant effectiveness, data presented in the Baseline Data Evaluation Report and the Final Case Study Evaluation could be used for a variety of transportation and program planning purposes at the local level. Having a comprehensive set of quantitative data and qualitative feedback on transportation conditions and trends around these sites could help inform decisions on school/district policy, SRTS event and program planning by schools/districts/local jurisdictions, planning future infrastructure projects, as well as providing supporting documentation for future grant applications.

Baseline SRTS Snapshot: Lot Whitcomb Elementary

Summary

Lot Whitcomb Elementary is a racially and linguistically-diverse school located in the City of Milwaukie, in Clackamas County and within the Portland Metro Region. Lot Whitcomb Elementary serves a low-income community, where 84% of students qualify for the federal Free and Reduced-Price Lunch Program.

To date, encouragement activities at Lot Whitcomb Elementary School include participation in International Walk and Roll to School Day. Additionally, Lot Whitcomb Elementary students participate in four in-class pedestrian safety education sessions each school year. Lot Whitcomb Elementary plans to host Bike Fairy giveaways to reward students who bike to school and participate in May Bike + Walk Challenge Month.

Lot Whitcomb Elementary School staff have been evaluating progress towards SRTS Action Plan Goals, including new secure bike parking east of the school entrance and improvements to on-site circulation, including defined pedestrian routing to prevent conflict between students walking and vehicles dropping students off.

The Oregon SRTS 2019-2020 Competitive IN Grant funded an improved crossing at SE Causey Ave-SE Harmony Dr and SE Fuller Rd, illustrated in the map in Appendix B, that will further progress on the community's SRTS goals and respond to family concerns that the intersection is too dangerous to cross in its current state. This project will address a large known barrier for students who wish to bike and walk to school.

Key information from Lot Whitcomb Elementary School parent surveys:

- 54% of students live within a mile of the school.
- Approximately 80% of students ride in a family vehicle or take the bus to and from school.
- Many students walk to school: 13% in the morning and 16% after school.
- Parents report that distance is the most common barrier to walking/biking to school. Other barriers include:
 - traffic volumes,
 - intersection/crossing safety,
 - vehicle speeds,
 - presence of sidewalks/pathways, and
 - time spent traveling.
- Most parents recognize the value of walking/biking to school—91% described it as healthy and 74% described it as fun for their students.

Contact Information

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SCHOOL DISTRICT:	North Clackamas School District
CONTACT:	District Office: (503)353-6000
OTHER CONTACTS:	None

Enrollment and Demographics

Lot Whitcomb Elementary is a Title 1 public school enrolling 442 students from Kindergarten to 5th grade. The school serves low income populations in the City of Milwaukie and Clackamas County, with 84% of students qualifying for Free and Reduced-Price Lunch. Lot Whitcomb Elementary is more ethnically and racially diverse than the broader region, with 46% of students identifying as Hispanic or Latino. Additionally, approximately 37.6% of students are Ever English Learners.⁴ At the district level, Spanish is the second most commonly spoken language (behind English), followed by Russian, Vietnamese, and Chinese.¹

ENROLLMENT: 442	GRADE LEVELS SERVED AND SCHOOL TYPE: K-5, Public
STUDENT ETHNIC/RACIAL DEMOGRAPHICS: American Indian/Alaska Native: 0.9% Asian: 2.3% Hispanic or Latino: 46.4% Native Hawaiian/Pacific Island: 0.9% Multiracial: 5.7% Black/African American: 1.6% White: 42.3%	PREDOMINANT LANGUAGES SPOKEN IN NORTH CLACKAMAS SCHOOL DISTRICT: English: 13,380 Spanish: 2,093 Russian: 651 Vietnamese: 518 Chinese: 334
STUDENTS LIVING WITHIN 1-MILE OF SCHOOL: 54% ²	TITLE 1 STATUS: Yes ³
EVER ENGLISH LEARNERS: 37.6% ⁴	FREE AND REDUCED-PRICE LUNCH ELIGIBILITY: 84.0%

¹ Unless otherwise noted below, demographic data are from the Oregon Department of Education 19-20 SY, collected October 1, 2019

² SRTS Program parent surveys 2015

³ Title 1 schools are schools where 40% or more of students are enrolled in USDA's Free and Reduced-Price Meals Program.

⁴ Number of students who have been served or were eligible for an English language development program during 2018-19 or at any time in the past. Oregon Department of Education 18-19 SY collected May 1, 2019.

Community Context and Place Type

Place type describes attributes of a built environment, including: access to destinations, density, walkability, mixing of uses, and presence of transit. The evaluation team compiled Oregon Department of Land Conservation and Development's (DLCD) measures of [place type](#) for each community studied.⁵ Each attribute is rated as “**Very Low, Low, Medium, or High**” by block group. Place type characteristics provide important context for transportation opportunities and challenges in a community and influence the transportation decisions people make.

Lot Whitcomb Elementary School is located in the unincorporated Clackamas County, and the block group encompasses a small area in the eastern portion of the city limits. According to the Place Type Tool, the area surrounding Lot Whitcomb Elementary is categorized as a Close-in Community, meaning it contains medium density development and the surrounding census block group generally contains more residential than commercial development, with 1,942 people residing and 206 people working within the census block group. The area has a medium level of access to regional employment centers and destinations, partially facilitated by a high degree of access to transit. The overall level of street connectivity in the area is characterized as “low.”

AREA TYPE describes the role of each neighborhood district compared to the rest of the region (regional center, close-in community, suburban/town, low density/rural)

Close-In Community

- Medium densities of housing and employment
- Located adjacent and with good access to the region's employment center
- Lower densities decrease multi-modal access to jobs

DEVELOPMENT TYPE describes more detailed physical characteristics of each neighborhood (transit supportive development, mixed use, employment, residential, rural/ low density):

Residential

- Land use is dominated by housing
- Low diversity of land uses
- Jobs/Housing balance: mostly housing
- Missing either the density or street design required of mixed use

JURISDICTION POPULATION (2019):	Clackamas County, 418,187 people
CENSUS BLOCK GROUP POPULATION (2010):	1,942 people
NUMBER OF JOBS IN CENSUS BLOCK GROUP (2010):	206 jobs
ACCESS TO DESTINATIONS describes the number of regional jobs within 5 miles:	Medium
DENSITY LEVEL- jobs and households per acre within ¼ mile:	Medium
DESIGN LEVEL- level of street connectivity, pedestrian-oriented street density:	Low
DIVERSITY LEVEL- Mix of housing and employment:	Medium
TRANSIT LEVEL- Afternoon peak hourly transit service within ¼ mile:	High

⁵ More information about OLCD's Place Type Tool is available at: www.oregon.gov/lcd/CL/Pages/Place-Types.aspx

Project Description

A map of the project improvements from the Lot Whitcomb Elementary School grant application is included in Appendix B.

PROBLEM STATEMENT:	SE Fuller Road is a collector consisting of three travel lanes and 30 mph posted speed. At the intersection with SE Causey Avenue there are sidewalks but not a marked crosswalk. The lack of a crosswalk creates a barrier to walking and biking to school.
DESCRIPTION OF BARRIERS TO WALKING AND BIKING:	This barrier was selected because SE Fuller Road north-south vehicle traffic is not controlled at the intersection with SE Harmony Drive and SE Causey Avenue East. West traffic on SE Causey Avenue and SE Harmony Drive are stop-controlled at the SE Fuller Road intersection. Students east of SE Fuller Road must cross three travel lanes of a collector roadway with Annual Average Daily Traffic (AADT) volumes in excess of 6,500. Further, the intersection lacks Americans with Disabilities Act (ADA) compliant curb ramps on the east and west side of SE Fuller Road. Community survey results indicate parents are reluctant to allow children to cross SE Fuller Road given the current environment.
PROJECT DESCRIPTION:	Construct crosswalk at intersection of SE Fuller Road and SE Causey Avenue-SE Harmony Drive. The project will consist of advance warning signs; rectangular rapid flashing beacons; center lane pedestrian refuge and ADA ramps on east and west side of SE Fuller Road.
ESTIMATED PROJECT TIMELINE:	March, 2022 Completion
PRIORITY SAFETY CORRIDOR? ⁶	Yes
OUTREACH AND EDUCATION:	The school has participated in multiple walk and bike to school days. This year the school held a Bike Fairy encouragement activity in which a care package is left on the bikes at the rack during the school day for the kids to find upon leaving. Usually the pack consists of small prizes (e.g. stickers, temporary tattoos, pencils), but there's also a bike related item, such as spoke reflectors or a handlebar light. The school also provides a crossing guard at the crosswalk in front of the school every day when school is in session.

⁶ A road where the posted speed or 85th percentile speed of traffic is 40 mph or greater OR if and two of the following apply: posted speed limit of 30 mph or greater, more than two lanes or a crossing distance greater than 30 feet, 12,000 AADT or greater, has a demonstrated history of crashes related to school traffic.

Access Analysis for Students Walking and Biking to School

The project team conducted an analysis to estimate the number of people who would gain walking and biking access to Lot Whitcomb Elementary School when the project improvements are constructed, shown in Table 1 and Figure 1. First, the project improvements were evaluated to understand the geographic areas that would gain safe access to the school once the funded project was constructed. Next, American Community Survey (ACS) data was combined with zoning data to estimate the number of people and school-age children that live within the new access areas.

This analysis estimates that approximately 168 students, or 14% of the Madras Elementary School student body living within a mile of the school, would gain safer walking or biking access to the school.

Table 1. Access Analysis Results⁷

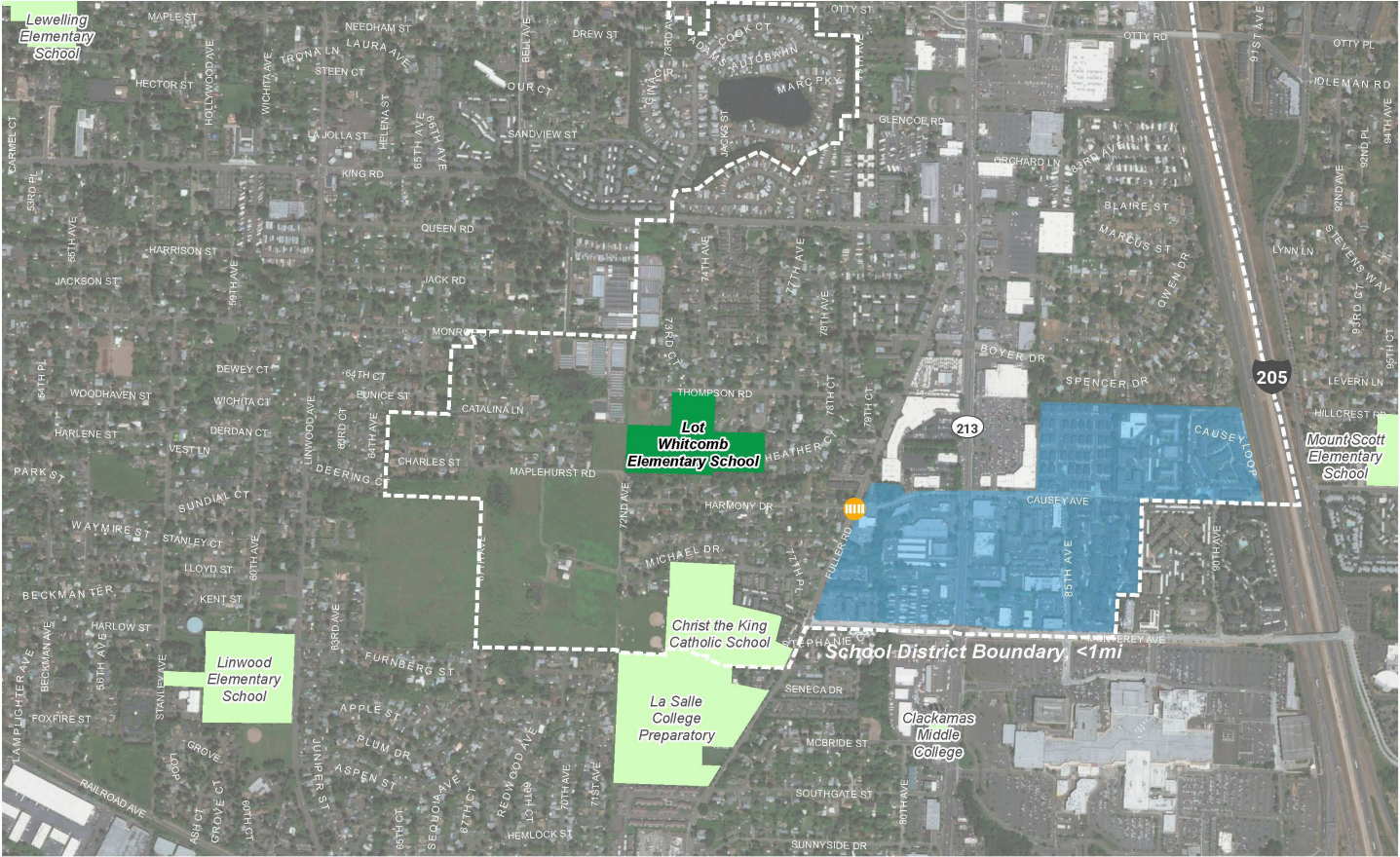
METRIC		VALUE
Total Population of New Access Areas		1,196
School Age Population of New Access Areas ⁸		168
Percentage of Students within the School Areas Gaining Access ⁹		14%

⁷ New Access Area assumptions: The new access area assumes that residents south of Harmony and all residents west of Fuller already have access, and residents east of 82nd but north or connected to SE Monroe St already have access.

⁸ Calculated using the proportion of school-age children (5-17 years old) within the City of Milwaukie.

⁹ The School Area is defined as the area within the school enrollment area that is within one mile of the school.

Figure 1. Lot Whitcomb Elementary New Access Area for Students Walking and Biking



Lot Whitcomb Elementary School
Students with New Access to Walking and Biking

Estimated Number of Students: 168
Proportion of Students within 1 Mile: 14%
To view the methods for this analysis, please see Appendix

Applicant School

Other School

New Access Area

New Crossing Improvement

SafeRoutes
Oregon Safe Routes To School

alta
PLANNING + DESIGN

Baseline Data

The following section presents pre-construction data, which will be compared against similar data collected after the project has been construction, in order to estimate the impact of the improvements.

Hand Tallies

DATE COLLECTED:	September, 2015
DATA COLLECTION PROCESS:	17 classrooms surveyed about their trip to and from school
NUMBER OF STUDENTS:	409 students participated in hand tallies
TRIPS RECORDED	2,037 trips recorded by the hand tallies

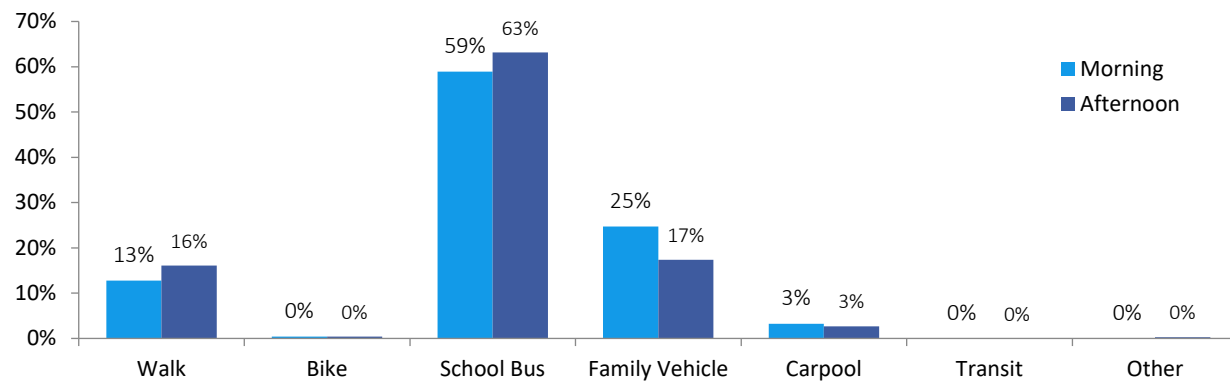
SUMMARY OF DATA COLLECTION AND METHODOLOGY

The September 2015 baseline hand tally data from Lot Whitcomb Elementary includes 2,037 recorded trips collected from 409 students in 17 classrooms. The hand tally process surveyed all students in each classroom on which transportation mode(s) they had used to get to and from school the day of the survey and the day prior to the survey. The National Center for SRTS's standard hand tally data collection forms and process were used. This data provides a snapshot of student travel behavior trends.

SUMMARY OF RESULTS:

Lot Whitcomb Elementary hand tally data from 2015 indicates that a majority of students surveyed ride the school bus in the morning and afternoon (see Figure 2 and Table 2). Riding in a family vehicle was the second most common student travel mode. Eight percent of students reported they are dropped off by family in the morning and walk or bus in the afternoon. Thirteen percent of students walk in the morning and 16% of students walk home in the afternoon. Four students reported biking to school.

Figure 2. Student Mode Split by Time of Day, 2015 Hand Tally Data



Note: Percentages may not total 100% due to rounding. While four students reported biking to school, that rounds to zero in the chart above.

Table 2. Count of Student Mode Split to and From School, 2015 Hand tally Data

TIME OF DAY	WALK	BIKE	SCHOOL BUS	FAMILY VEHICLE	CARPOOL	TRANSIT	OTHER
Morning	131	4	604	253	33	0	0
Afternoon	163	4	639	176	27	0	3

Parent/Caregiver Surveys

DATE COLLECTED: September, 2015

DATA COLLECTION PROCESS: The National Center for SRTS's parent/caregiver survey was distributed to parents at Lot Whitcomb Elementary School to assess family perceptions about school travel options and behavior.

NUMBER OF SURVEYS: 34; 8% response rate

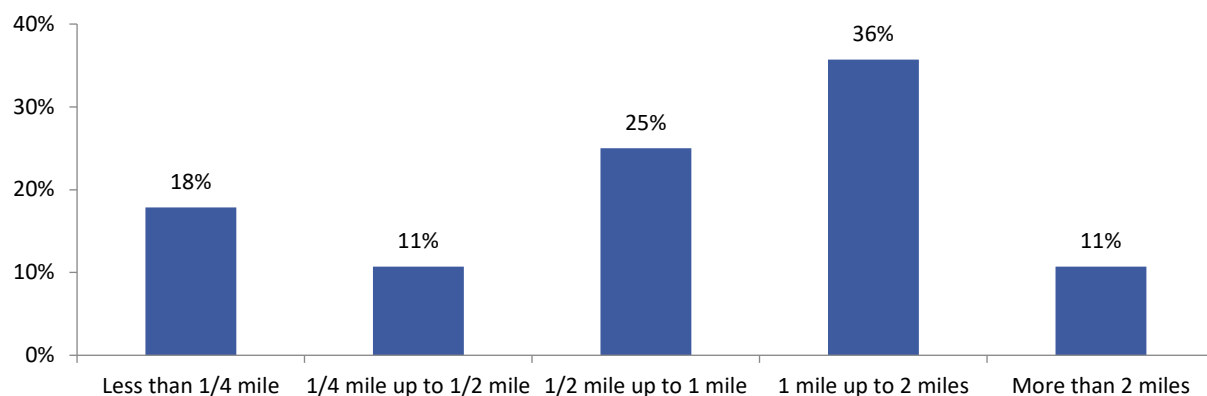
SUMMARY OF DATA COLLECTION AND METHODOLOGY

The parent/caregiver survey data included in this report was collected in September of 2015 from 34 participants with students attending Lot Whitcomb Elementary.

SUMMARY OF RESULTS:

Parent/caregiver survey analysis revealed that over half of respondents live within 1 mile of Lot Whitcomb Elementary, with an additional 36% living between one and two miles of the school site (see Figure 3). Only 11% of surveyed parents and caregivers live more than two miles from the school. Parent survey results show that most students live within walking or biking distance from their school.

Figure 3. How Far Does your Family Live from School?, 2015 Parent/Caregiver Survey



Shared travel modes were the most commonly used transportation option for students living between a quarter-mile and two miles away from school, while 60% of students living within a quarter-mile of school reported walking (see Figure 4 and Table 3). Students living more than two miles from Lot Whitcomb Elementary School do not use active modes to get to school. A large majority of these longer-distance

commuting students travel to and from school in family vehicles (67%), while an additional 33% use shared modes, such as riding the school bus, carpooling, or taking public transit.

Figure 4. Mode Split by Distance from School, 2015 Parent/Caregiver Survey

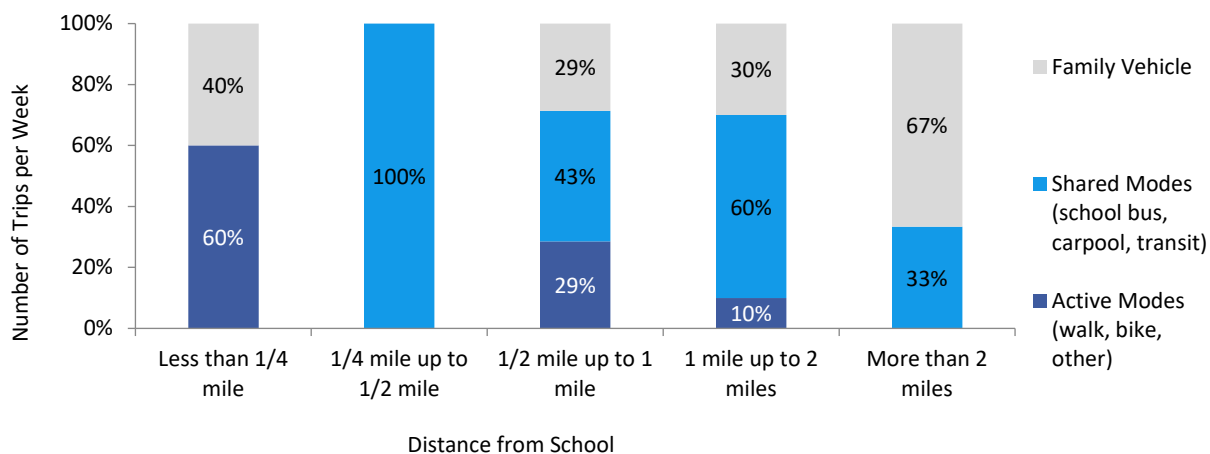
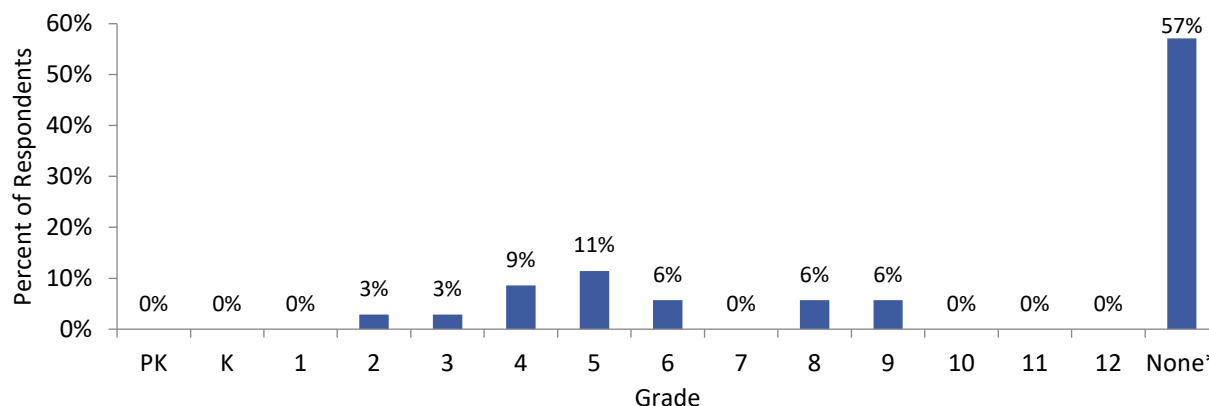


Table 3. Count of Trips by Distance the Family Lives from School, 2015 Parent/Caregiver Survey

DISTANCE	WALK	BIKE	SCHOOL BUS	FAMILY VEHICLE	CARPOOL	TRANSIT	OTHER
Less than 1/4 mile	3	0	0	2	0	0	0
1/4 mile up to 1/2 mile	0	0	3	0	0	0	0
1/2 mile up to 1 mile	2	0	3	2	0	0	0
1 mile up to 2 miles	1	0	6	3	0	0	0
More than 2 miles	0	0	1	2	0	0	0

As Figure 5 illustrates, 57% of parents and caregivers surveyed reported that they would not allow their student to walk or bike to/from school without an adult at any grade. Parents and caregivers that reported they would allow their student to walk or bike had varying opinions on what grade would be an appropriate time to start, but generally seemed to indicate that 4th or 5th graders and older were more suited for walking and biking alone.

Figure 5. At What Grade would you Allow your Student to Walk or Bike to/from School Without an Adult?, 2015 Parent/Caregiver Survey

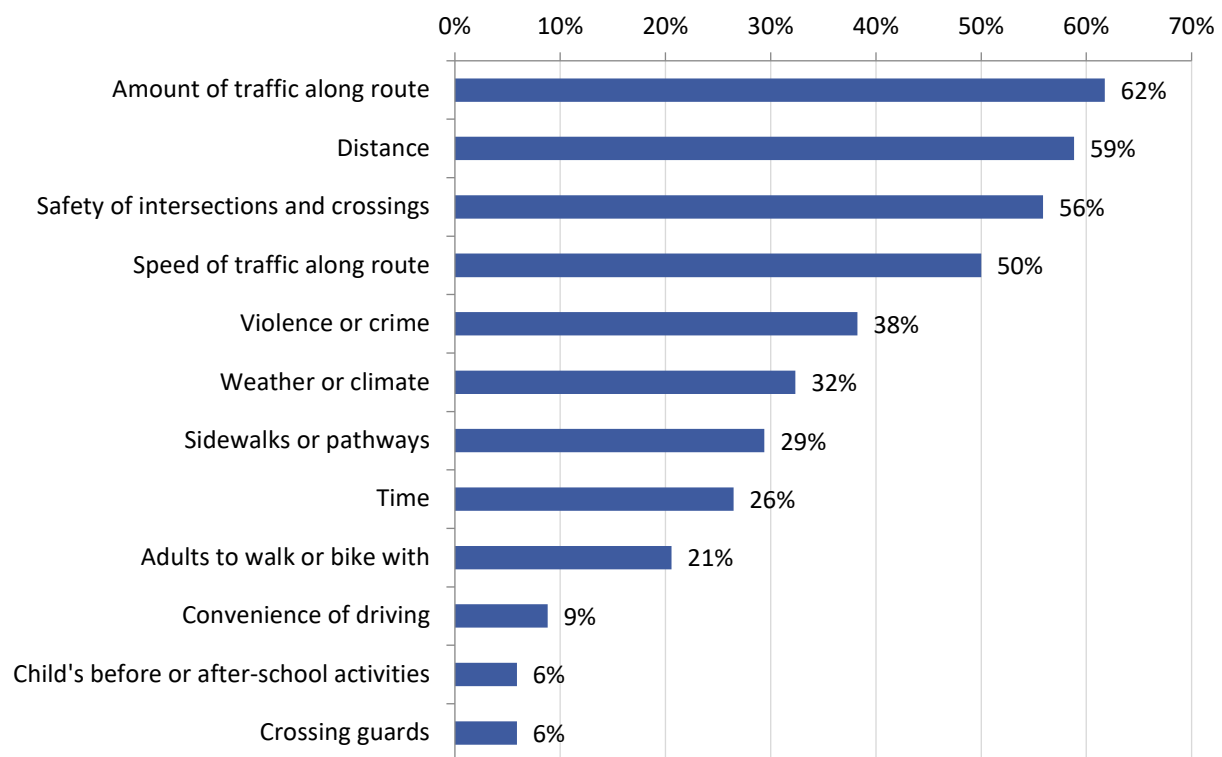


*I would not feel comfortable at any grade.

While parents and caregivers reported varying concerns that limit their student’s ability to walk or bike to school, some were more commonly expressed than others (see Figure 6). Over half of surveyed parents faced the following barriers:

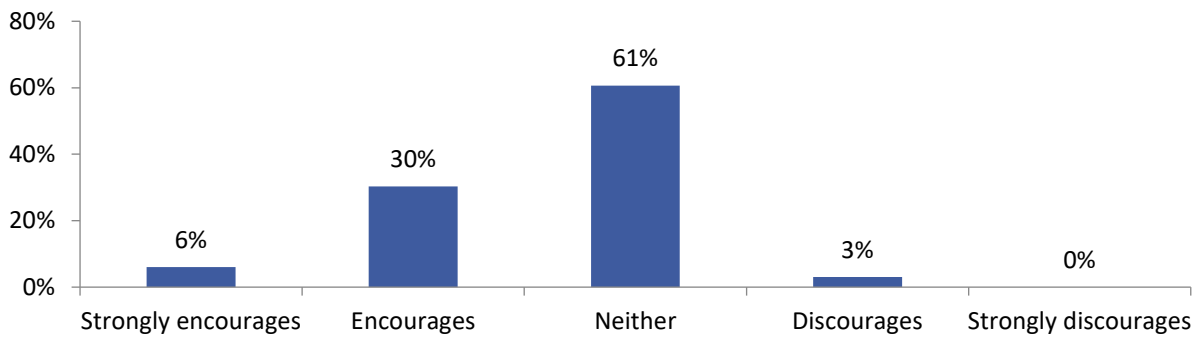
- Traffic volumes along their student’s prospective route to school
- Traffic speeds along their student’s prospective route to school
- The safety of existing intersections and crossings
- Distance between their home and their student’s school

Figure 6. What Issues Affect the Decision to Walk or Bike to School?, 2015 Parent/Caregiver Survey



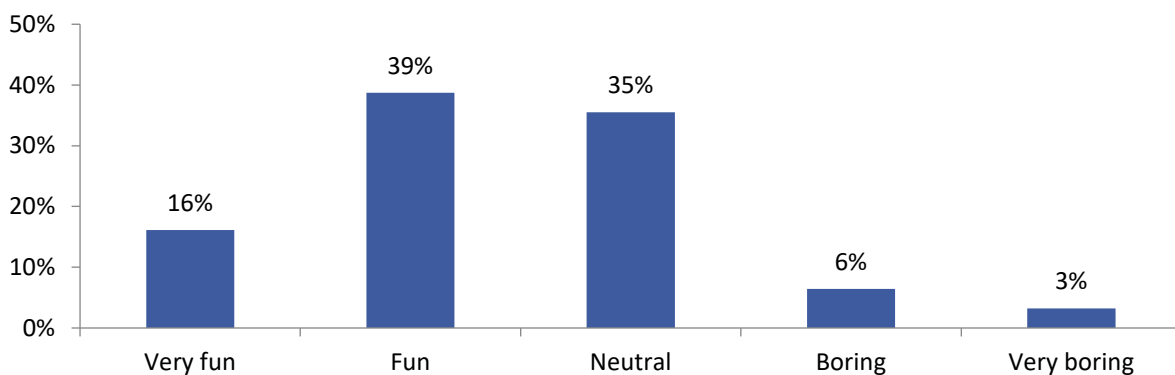
A majority of parent and caregiver respondents felt Lot Whitcomb Elementary neither encouraged or discouraged students from walking and biking to school at the time of the survey. An additional 36% felt the school encouraged or strongly encouraged active transportation, while only 3% characterized the school as discouraging walking and biking (see Figure 7).

Figure 7. Does your School Encourage Walking or Biking to/from School?, 2015 Parent/Caregiver Survey



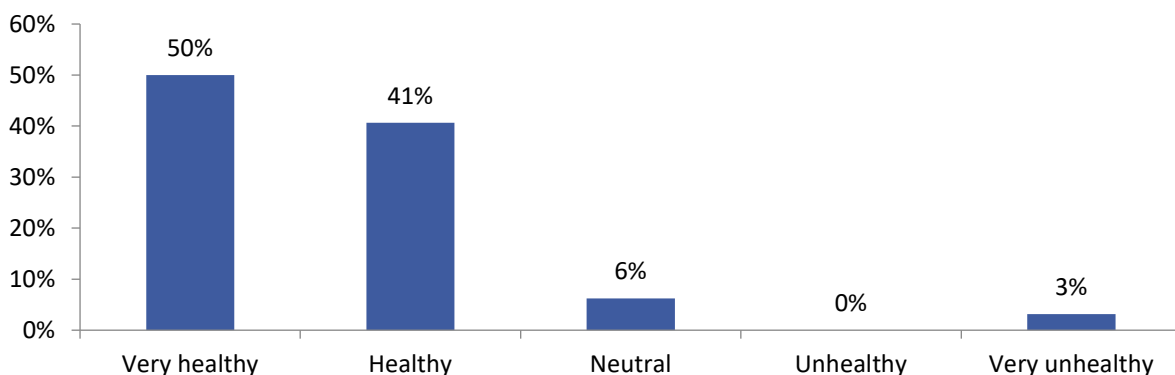
At the time of the survey, over half (55%) of parents and caregivers reported walking or biking to school would be a fun or very fun activity for their students, while only 9% believed the activity would be boring. An additional 35% were neutral or unsure on whether their student would enjoy walking and biking to school (Figure 8).

Figure 8. How Fun is Walking and Biking to School?, 2015 Parent/Caregiver Survey



An overwhelming majority of parents and caregivers recognized the health benefits of active transportation, with 91% reporting that walking or biking to school would be healthy or very healthy for their student. An additional 6% were neutral regarding the health benefits of walking and biking, and just 3% felt the activities would be unhealthy for their student (see Figure 9).

Figure 9. How Healthy is Walking or Biking to School?, 2015 Parent/Caregiver Survey



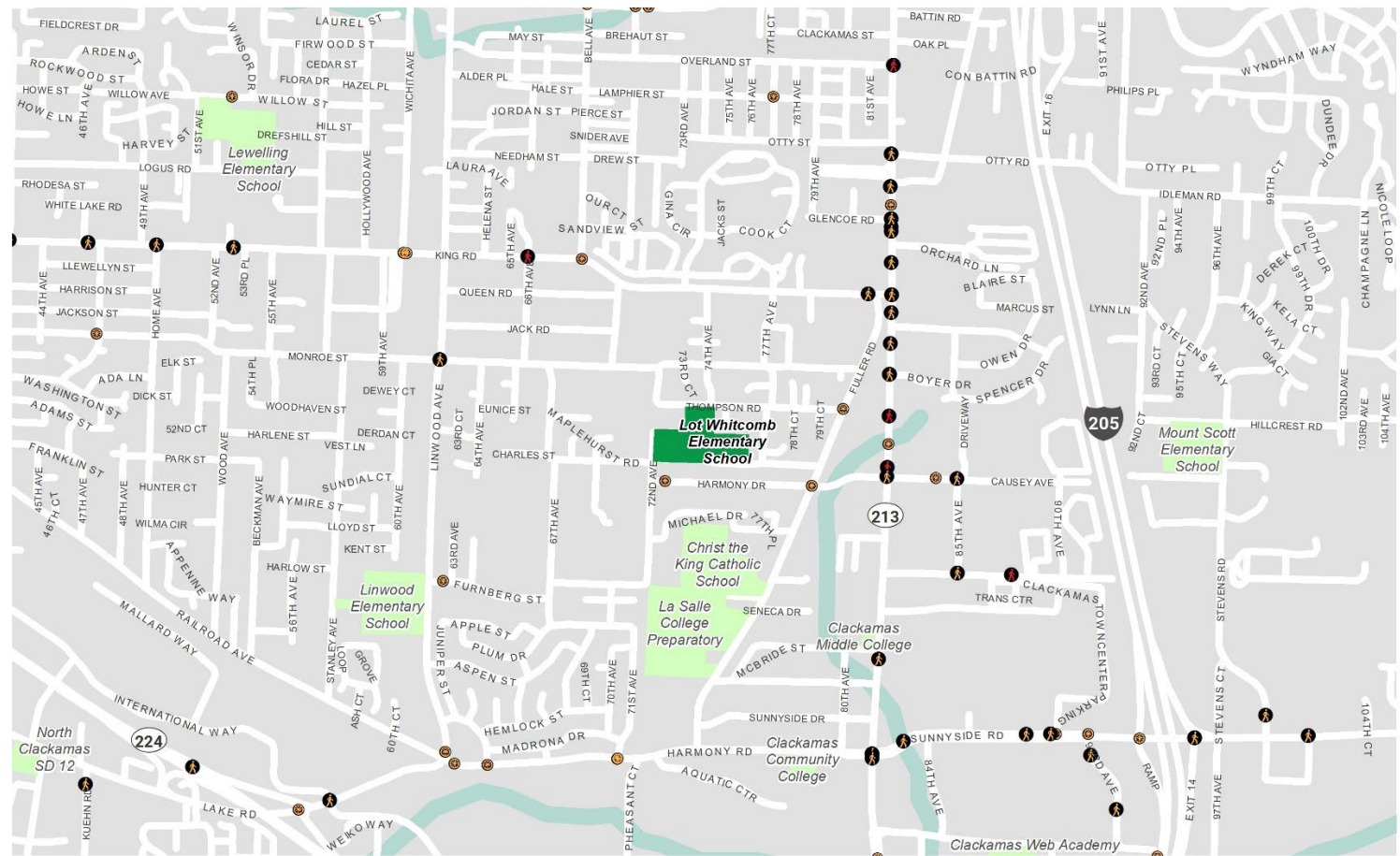
Crash Data

DATE COLLECTED:	2012-2016
DATA COLLECTION PROCESS:	Crash Data included in this report originates from relevant roadway jurisdictions, as well as the ODOT SRTS Web Map Application. This analysis does not seek to determine whether the grant intervention caused any change in the occurrence of crashes, as there is not an adequate sample size of crashes to make this determination. Additionally, because a majority of school sites have insufficient mode split data to calculate crash rates for bicyclists and pedestrians, this report will only offer a count and description of reported incidents.
NUMBER OF REPORTED CRASHES INVOLVING BIKES AND PEDESTRIANS WITHIN 1 MILE OF SCHOOL:	Between 2012 and 2016, 61 crashes involving a bicyclist or pedestrian were reported within one mile of the school.
TIME OF REPORTED CRASHES INVOLVING BIKES AND PEDESTRIANS WITHIN 1 MILE OF SCHOOL*:	51 of these reported crashes occurred during school commuting hours; the majority occurred during PM commuting hours. <i>* For these purposes school commuting hours were defined as 6 AM to 9 PM.</i>
NUMBER OF REPORTED INJURIES BY SEVERITY WITHIN 1 MILE OF THE SCHOOL:	All 61 of these reported crashes involved an injury to a bicyclist or pedestrian. All 25 of the injuries involving a bicyclist were non-fatal. Of the 36 pedestrian injuries, 30 were non-fatal and 6 were fatal. Figure 10 illustrates the location of the crashes by type and injury severity.
ADDITIONAL CRASH DATA CONSIDERATIONS:	The majority of the crashes occurred along 82 nd Ave/SR 213. The planned crosswalk location at the intersection of SE Fuller and SE Harmony/Causey has one reported crash resulting in cyclist injury between 2012 and 2016. In the application, Clackamas County cited 5 vehicle crashes at this intersection between 2008 - 2018. During the same period there was one reported non-fatal injury pedestrian-related crash at the subject intersection.

Notes on Community Context or other Relevant Information:

None.

Figure 10: Lot Whitcomb Elementary School Bicycle & Pedestrian Collisions (2012-2016)



Lot Whitcomb Elementary School Bicycle and Pedestrian Collisions (2012-2016)

- Bicycle: Fatal Injury
- Bicycle: Non-Fatal Injury
- Bicycle: No Injury
- Pedestrian: Fatal Injury
- Pedestrian: Non-Fatal Injury
- Pedestrian: No Injury
- Primary Affected School
- Other School

0 0.25 0.5 Miles

Map displays bike and pedestrian crashes at all times of day.



Source: Crash Analysis and Reporting Unit, ODOT (2012-2016)

Follow-Up Data Collection Plan

Timeline

Post-grant field visits to collect follow-up data will be scheduled to take place the spring following the completion of each grant intervention. Clackamas County estimates project completion is planned for March 2022.

Follow-up Data Collection Process

METHOD	PLANNED AT THIS SITE?	TARGET SAMPLE SIZE	TARGET FIELD WORK DATE
STUDENT HAND TALLIES:	Yes	At least 2 classrooms per grade per school	Late spring 2022 (assuming project completion)
PARENT SURVEYS:	Yes	At least 30 parents per school	Late spring 2022 (assuming project completion)
PARENT FOCUS GROUPS:	Yes	4-10 parents	Late spring 2022 (assuming project completion)
STAFF SURVEYS:	Yes	1-3 school staff and administration	Late spring 2022 (assuming project completion)
CRASH DATA:	Yes	N/A	N/A
OTHER (LIST):	None	N/A	N/A

Appendix A. Final Report DRAFT Outline

Note: The following Final Report outline is subject to change.

Chapter 1. Introduction

- Description of SRTS IN Grant Program
- Description of Final Report purpose and contents

SUMMARY OF FUNDED INFRASTRUCTURE IMPROVEMENTS

- Project description
- Map of improvements
- Project timeline

BACKGROUND

- School demographics
- Summary of Non-Infrastructure SRTS Work
- Place Type

Chapter 2. Data Collection and Results

HAND TALLY DATA

- Data Collection Methods
- Change in walking and biking rates

PARENT SURVEY DATA

- Data Collection Methods
- Change in mode split by distance from school
- Change in barriers to walking and biking
- Change in perceptions of walking and biking
- Other observations

FOCUS GROUPS

- Data Collection Methods
- Change in barriers to walking and biking
- Change in perceptions of walking and biking

CRASH DATA

- Data included in analysis
- Change in crash data (*If available, otherwise this will provide updated baseline crash data from ODOT*)

Chapter 3. Findings

- Impact of Infrastructure improvements on mode split
- Impact of Infrastructure Improvements on Access to Safe Infrastructure

- impact of infrastructure improvements on safety/perception of safety
- Impact of Infrastructure Improvements on Program lifespan/partnerships
- impact of infrastructure improvements on equity
- Other Findings
- Next Steps and Recommendations

Appendix B. Competitive SRTS IN Grant Funded Project Map

Figure 11. Lot Whitcomb Elementary Competitive SRTS IN Grant Funded Project Map



Appendix C. Access to SRTS Detailed Methodology

Purpose

The access map analysis was designed to estimate the number of students with new or significantly improved access to school upon the implementation of a proposed walking or biking facility. While determining the number of students who benefit from a proposed project is not an exact science, this analysis provides a common approach that utilizes school district boundaries, census population data and local zoning codes to generate rough estimates. These estimates lend greater insight into the impact of a particular Safe Routes to School project, allowing facility improvements to be compared and thus aid in prioritizing investments. This memo outlines the data sources, methods, and assumptions that inform the access map analysis described in this report.

Data Sources

Three primary data sources were used in this analysis in conjunction with the information provided in each project application:

Name	Source
American Community Survey (ACS) Population Estimates	US Census Bureau
Oregon School District Boundaries	Oregon Department of Education
2017 Oregon Statewide Zoning Map	Oregon Department of Land Conservation and Development

Methods

The analysis establishes two geographical areas in which census block population data are apportioned to: 1) the school area and 2) the access area. The school area is defined as the area that is within a 1-mile radius of the applicant school or within the enrollment boundary, whichever is closer. This area covers residents within reasonable walking or biking distance of the to school. The access area is the area that covers all residents who would experience new or significantly improved access to school upon the implementation of the proposed walking or biking facility.

Once both of these areas have been established, the consultant team identified the census blocks that intersect each. We then apportioned the population data from the census blocks to the school area and the access area, based on the relative coverage of each census block. To account for varying residential densities in each census block, we used residential zoning data to determine the proportion of the population that should be attributed to the school area and access area.

After the estimated populations of both the school area and the access area are calculated, the local jurisdiction's youth rate is applied to each to get the number of people ages 5-17 in those areas, which we refer to as the 'school age population'. Finally, the school age populations of the access area and the school area are compared. The percentage of school age students with new or improved access to school represents the proportion of students impacted by the project out of all the students in the school area who could reasonably walk or bike to school.

Defining the Access Area

The boundary of the school area is readily calculable using GIS and the rules described above. By contrast, the access area boundary was determined manually based on the project description and professional judgement of impact. While this method inherently includes subjective judgement, the high variability and nuance in the transportation context surrounding the proposed project makes this method more suitable for determining the residential areas would benefit from its implementation than a purely GIS-based workflow. The following assumptions and rules of thumb were adopted in order to make the assessment of the access areas as uniform as possible:

1. The analysis assumes people are willing to "walk around the block" half the distance of their street in the opposite direction of school in order to utilize a safe path to school.
2. The analysis assumes that Google Earth street view imagery is up to date, as this was used to determine sidewalk connectivity and condition, which informed the access areas.
3. Places without sidewalks, particularly in small towns, are considered walkable if the street is narrow, residential, and designed for a low volume of traffic (i.e., lacks a centerline)
4. The access areas consider ADA accessibility and account for those in wheelchairs or other mobility devices.
5. The access areas may include residents who have to walk more than one mile to school, based on the available street network.
6. Even if some residents may have already had access to school, they might be included in the access area if the proposed project would significantly improve their access to school.

Apportioning Census Population Data

As described above, census population data was apportioned to both the school area and the access area based on how much a census block covered them. However, to account for varying population densities across census blocks, residential zones in the census blocks were identified.

The statewide zoning data provided by the Oregon Department of Land Conservation and Development groups residential zones across all jurisdictions in the state into 13 categories of increasing density. Our team further consolidated these categories into just 4: Low Density, Medium-Low Density, Medium-High Density, and High Density. We then weighted these categories by their relative density compared to Low Density:

Residential Zone Group	Population Density Factor
Low Density	1
Medium-Low Density	2
Medium-High Density	5
High Density	15

These factors serve to more accurately distribute the population data across the residential zones within the census block. In other words, if the census block contained only Low Density residential zones, then the population of any given area within that census block is equal to the proportion of the census block that that area covers. By contrast, if a census block contains Low Density residential zones and High Density zones, we attribute 15 times the population of the census block to the High Density zones than the Low Density zones. The density factors were determined using the typical number of dwellings per acre in in each zone.

The analysis uses these four zoning categories to identify the spatial distribution of the population of the census block and apportion it to the overlaying school area and access areas based on how much those areas cover the residential zones of the census block.

General Assumptions

- This analysis assumes that the Oregon Statewide Zoning code reflects the actual residential densities of the current built environment.
- Areas that were zoned for housing that had no development on them according to the latest satellite imagery (and significantly impacted the output) were removed from the analysis in order to improve the accuracy of the estimates. This was only utilized in a few low-population jurisdictions.
- This analysis assumes that families are evenly distributed between each of the four residential zone groups.
- The reported number of school-age students includes all students ages 5-17, not just elementary or middle school students. Thus, the number of students who actually attend the applicant school is likely much lower than the reported figure.