City of Gaston – Gaston Elementary, Gaston Jr./Sr. High School
Baseline Data Evaluation Report

FINAL June 24, 2020

Introduction

This Case Study Evaluation measures the impacts of Oregon Safe Routes to School (SRTS) 2019-2020 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: Gaston Elementary, Gaston Jr./Sr. High School

Summary

Gaston Elementary is a Title 1 school serving 267 students between Kindergarten and 6th grade, 46% of whom are eligible for the Federal Free and Reduced-Price Lunch Programs. The student body is 86% White and 8% Hispanic or Latino. English is the most prominent language spoken across school district students, with less than 5% of students identifying as Ever English Learners.[1]

Gaston Elementary and Gaston Jr./Sr. High School are located on the same campus off of Park St and 3rd St. The area around campus lacks the sidewalk infrastructure needed to allow safe access for students who use active modes to get to/from school. Cottonwood Street is a main route used by students to get to school but also provides vehicular access and is a school bus route. Because it has no sidewalks and significant school traffic, this route is particularly unsafe for students to walk and ride bikes in the street with the increased traffic and buses at school during student arrival and dismissal.

The Oregon SRTS 2019-2020 Competitive Infrastructure Grant funded the installation of sidewalks on the south side of the street and a crosswalk from this sidewalk to the sidewalk on 3rd St. which will provide a safe, continuous off-street route to school. This project will address a large known barrier for students who wish to bike and walk to school.

To date, active transportation encouragement activities at Gaston Elementary School include a section of health education on walking and riding safely for grades K-6. Both the Elementary and Jr./Sr. High Schools have sent out information to parents and students on the safest routes to/from school. Additionally, The City will be working with the Washington County Sheriff's Deputy to setup a safety educational and encouragement program that could be launched the school year of 2019- 2020 in collaboration with the school and PTO.

In addition to these activities, the Gaston School District and City of Gaston created a SRTS Plan through the ODOT Project Identification Program (PIP). The SRTS Plan, completed in the fall of 2019, addressed both additional infrastructure needs and strategies for SRTS outreach and education. The Plan recommended activities such as education programs for parents and students, schoolwide campaigns, and encouragement programs (for example, policies and events). These outreach and education initiatives would complement new SRTS infrastructure near the school and promote safe walking and bicycling for students and families.

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[1] 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.

Key information from Gaston Elementary School parent surveys:

- 31% of students live within a mile of the school, while 63% live more than 2 miles away.
- Approximately 37% of students take the bus to and from school.
- Many students walk to school: 26% in the morning and 32% after school.
- Parents report that distance is the most common barrier to walking/biking to school. Other barriers include:
  - traffic volumes,
  - vehicle speeds,
  - intersection/crossing safety,
  - presence of sidewalks/pathways, and
  - weather/climate.
- Most parents recognize the value of walking/biking to school—88% described it as healthy and 66% described it as fun for their student.

Contact Information

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Enrollment and Demographics

Gaston Elementary is a public school enrolling 267 students ranging from Kindergarten to 6th grade. Gaston Jr./Sr. High School serves 282 students between 7th and 12th grade. The schools serve students in the City of Gaston and Washington County. Among elementary students, 46% qualify for Free and Reduced-Price Lunch. 8.2% of elementary students and 12.8% of Jr./Sr. high school students identify as Hispanic or Latino. At the district level, Spanish is the second most commonly spoken language (behind English)[2], and fewer than 5% of elementary students are Ever English Learners.[4]

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

	GASTON ELEMENTARY (PRIMARILY AFFECTED)	GASTON JR./SR. HIGH SCHOOL
ENROLLMENT	267	282
GRADE LEVELS	K-6	7-12
SCHOOL TYPE	Public	Public
STUDENT ETHNIC/RACIAL DEMOGRAPHICS	American Indian/Alaska Native: 0.7% Asian: 0.7% Hispanic or Latino: 8.2% Native Hawaiian/Pacific Island: 0.7% Multiracial: 2.2% Black/African American: 1.5% White: 85.8%	American Indian/Alaska Native: 0.4% Asian: 0.7% Hispanic or Latino: 12.8% Native Hawaiian/Pacific Island: 1.1% Multiracial: 2.1% Black/African American: 2.5% White: 80.1%
PREDOMINANT LANGUAGES SPOKEN IN GASTON SCHOOL DISTRICT	English: 581 Spanish: 19	
STUDENTS LIVING WITHIN 1 MILE OF SCHOOL	22%[3]	Data not Available
TITLE 1 STATUS	Yes[4]	No
EVER ENGLISH LEARNERS	<5%[5]	< 10 students or data not available.
FREE AND REDUCED-PRICE LUNCH ELIGIBILITY	46%	38%

[3] SRTS Program parent surveys 2018
[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.
[5] 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.[6] 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.

Gaston Elementary School is located in the City of Gaston and serves the city and wider rural Washington County as well as neighboring Yamhill County. The block group encompasses a portion of the city limits and a wide swath of county jurisdiction. According to the Place Type Tool, the area surrounding Gaston Elementary School is categorized as a Low Density/Rural, meaning it contains very low density development and the surrounding census block group generally contains more residential than commercial development, with 1,607 people residing and 361 people working within the census block. The area has a very low level of access to regional employment centers and destinations. The overall level of street connectivity in the area is characterized as "very 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)	Low Density/Rural • Very low densities of jobs and housing • Very low accessibility to jobs and services • Generally outside of UGB or undeveloped areas within UGB • Auto dependent transportation, due to low densities of jobs and services
DEVELOPMENT TYPE describes more detailed physical characteristics of each neighborhood (transit supportive development, mixed use, employment, residential, rural/ low density):	Low Density/Rural • Very low densities of jobs and housing • Very low accessibility to jobs and services • Generally outside of UGB, or undeveloped areas within UGB • Auto dependent transportation, due to low activity densities
JURISDICTION POPULATION (ACS 5-YEAR ESTIMATES):	City of Gaston 546 people
CENSUS BLOCK GROUP POPULATION (2010):	1,607 people
NUMBER OF JOBS IN CENSUS BLOCK GROUP (2010):	361 jobs
ACCESS TO DESTINATIONS - describes the number of regional jobs within 5 miles	Very Low
DENSITY LEVEL- jobs and households per acre within ¼ mile:	Very Low
DESIGN LEVEL- level of street connectivity, pedestrian-oriented street density:	Very Low
DIVERSITY LEVEL- Mix of housing and employment:	Very Low
TRANSIT LEVEL- Afternoon peak hourly transit service within ¼ mile:	Very Low

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[6] 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 City of Gaston grant application is included in Appendix B.

PROBLEM STATEMENT:	Cottonwood St, with no sidewalks, is a main route used by students to get to school; provides vehicular access to the school from Front St./Hwy 47; and is also the street that all the school buses leaving the school take to get to Front St./Hwy 47.
DESCRIPTION OF BARRIERS TO WALKING AND BIKING:	There are no sidewalks or any ADA accessibility. Students have to walk/bike/ride in the street with an increase of cars and buses at school start and end times.
PROJECT DESCRIPTION:	The Cottonwood St. Safe Routes to School Project will provide sidewalks on the South side of the street and a crosswalk from this sidewalk to the sidewalk on 3rd St. which will provide a safe, continuous off-street route to school.
ESTIMATED PROJECT TIMELINE:	December 2019 Completion
PRIORITY SAFETY CORRIDOR?[7]	Yes
OUTREACH AND EDUCATION:	Gaston Elementary: The school has in its Health education for grades K-6, a section on walking and riding safely. The school has also sent out information to parents about the safest routes to and into the school in an effort to make traveling to school safer. The City will be working with the Washington County Sheriff's Deputy to setup a safety enforcement/educational/encouragement program that could be launched the school year of 2019 - 2020 in conjunction with the school and PTO. The City is evaluating whether they will apply for the Non-Infrastructure SRTS Grant Program during the next round of funding. Gaston Jr./Sr. High: The school has sent out information to parents about the safest routes to and into the school in an effort to make traveling to school safer. The City will be working with the Washington County Sheriff's Deputy to setup a safety assembly.

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[7] 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 Gaston Schools (including the Elementary and Jr./Sr. High Schools) 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 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 10 students, or 26% of the Gaston Schools student body living within a mile of the school, would gain safer walking or biking access to the school.
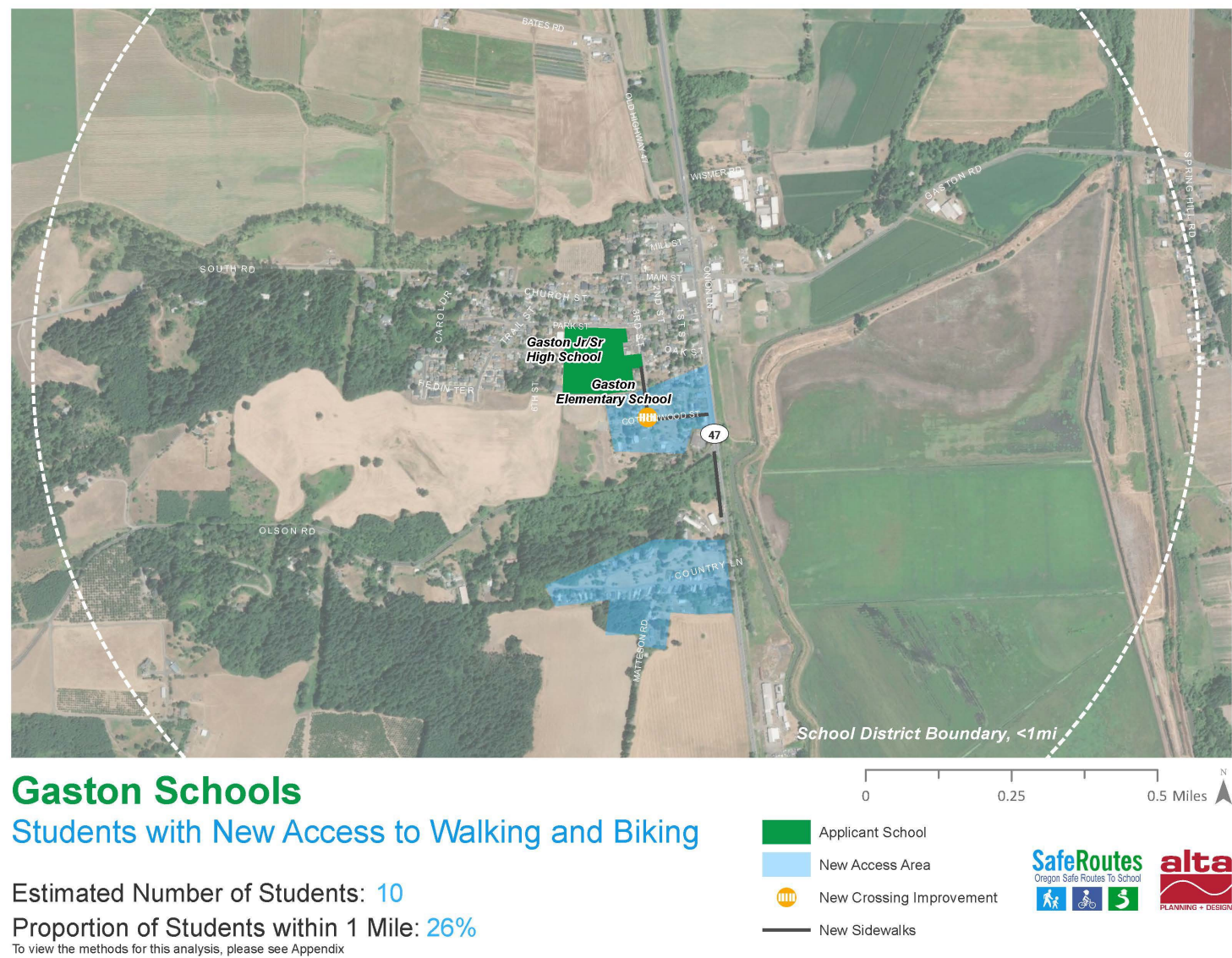
Table 1. Access Analysis Results[8]

METRIC	VALUE
Total Population of New Access Areas	55
School Age Population of New Access Areas[9]	10
Percentage of Students within the School Areas Gaining Access[10]	26%

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[8] New Access Area assumptions: Note that for smaller towns, the estimates become more precarious as zoning and reality don't align as closely. For the purposes of this analysis, it is assumed that stages 1,2,3 of the project description all become built. For the southern polygon, this analysis assumes students will walk down N Country Lane to get to the sidewalk on Hwy 47.

[9] Calculated using the proportion of school-age children (5-17 years old) within the City of Gaston.

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

Figure 1. Gaston Schools New Access Area for Students Walking and Biking

Gaston Schools

Students with New Access to Walking and Biking

Estimated Number of Students: 10
Proportion of Students within 1 Mile: 26%
To view the methods for this analysis, please see Appendix

Legend:
- Applicant School
- New Access Area
- New Crossing Improvement
- New Sidewalks

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:	April, 2018
DATA COLLECTION PROCESS:	The City and School District collaborated to collect hand tally data from 12 classrooms about their trip to and from school.
NUMBER OF STUDENTS:	Data not available
TRIPS RECORDED	1,393 trips recorded by the hand tallies

SUMMARY OF DATA COLLECTION AND METHODOLOGY

The April 2018 baseline hand tally data from Gaston Elementary includes 1,393 recorded trips collected from students in 12 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. Gaston Jr. and Sr. High School did not collect hand tally or parent survey data.

SUMMARY OF RESULTS

Gaston Elementary hand tally data from 2018 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. Eighteen percent of students walk in the morning and 21% of students walk home in the afternoon. No students reported biking to school.

Figure 2. Student Mode Split by Time of Day, 2018 Hand Tally Data
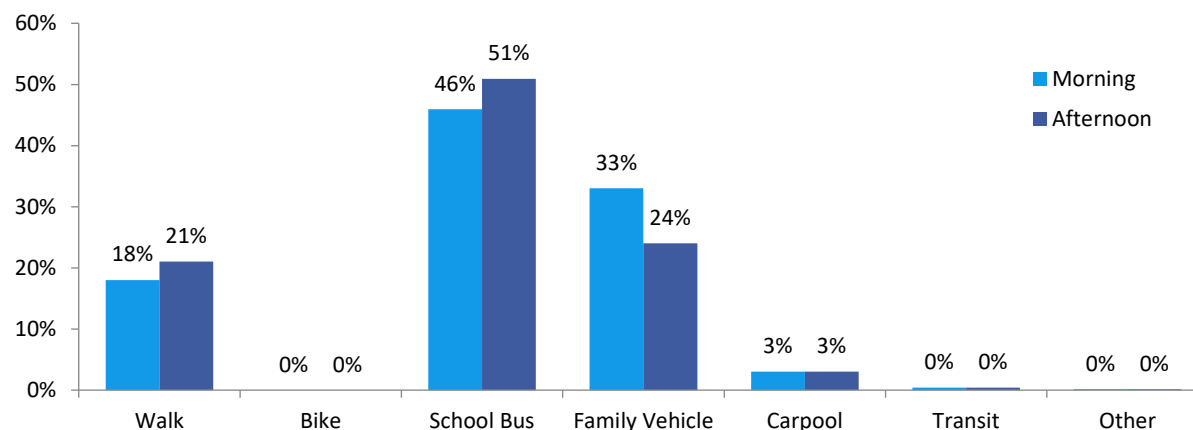
Note: Percentages may not total 100% due to rounding.

Table 2. Count of Student Mode Split to and From School, 2018 Hand tally Data

TIME OF DAY	WALK	BIKE	SCHOOL BUS	FAMILY VEHICLE	CARPOOL	TRANSIT	OTHER
Morning	125	0	319	229	21	3	1
Afternoon	147	0	356	168	21	3	1

Parent/Caregiver Surveys

|	
DATE COLLECTED:	April, 2018
DATA COLLECTION PROCESS:	The National Center for SRTS's parent/caregiver survey was distributed to parents at Gaston Elementary School online and via paper survey to assess family perceptions about school travel options and behavior.
NUMBER OF SURVEYS:	20; 7% response rate

SUMMARY OF DATA COLLECTION AND METHODOLOGY

The parent/caregiver survey data included in this report was collected in April of 2018 from 20 participants with students attending Gaston Elementary. The school distributed the survey with support from the City of Gaston.

SUMMARY OF RESULTS:

Parent/caregiver survey analysis revealed that 32% of respondents live within one mile of Gaston Elementary, 63% live two miles or more from the school site (see Figure 3).

Figure 3. How Far Does your Family Live from School?, 2018 Parent/Caregiver Survey
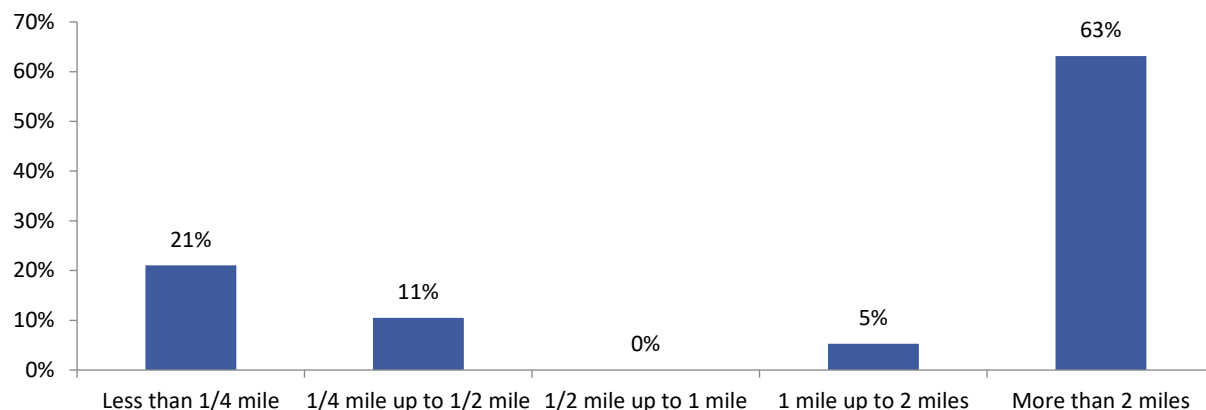
All students who live a quarter mile or less from the school were reported to use active travel modes (see Figure 4 and Table 3). For students who live between a quarter and a half mile from school, half rode in a family vehicle and half used active modes. For students living more than a mile from school, shared modes were most commonly used (79% for those who live more than two miles away), along with family vehicles. Students living more than one mile from Gaston Elementary do not use active modes to get to school.

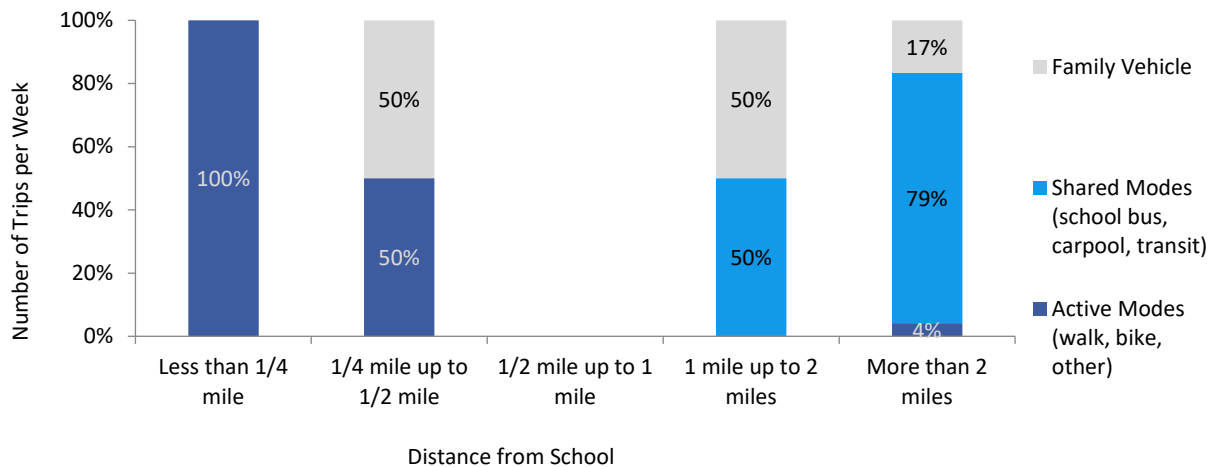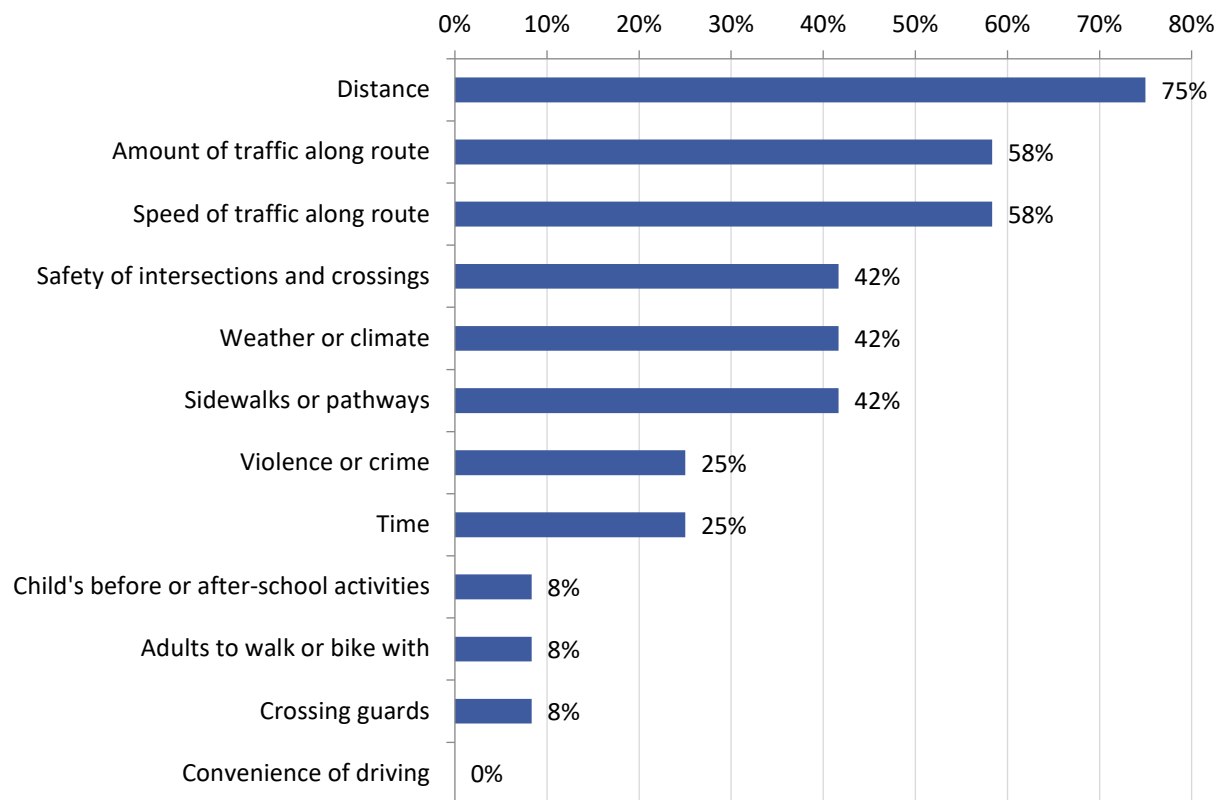Figure 4. Mode Split by Distance from School, 2018 Parent/Caregiver Survey

Table 3. Count of Trips by Distance the Family Lives from School, 2018 Parent/Caregiver Survey

DISTANCE	WALK	BIKE	SCHOOL BUS	FAMILY VEHICLE	CARPOOL	TRANSIT	OTHER
Less than 1/4 mile	4	0	0	0	0	0	0
1/4 mile up to 1/2 mile	1	0	0	1	0	0	0
1/2 mile up to 1 mile	-	-	-	-	-	-	-
1 mile up to 2 miles	0	0	0	1	0	0	0
More than 2 miles	0	0	7	2	3	0	0

Over half (56%) of respondents said their student had asked permission to walk or bike to/from school in the last year. 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 5). The following were top concerns for the Gaston Elementary School community:

- Distance between their home and their student's school
- Traffic speeds along their student's prospective route to school
- Traffic volumes along their student's prospective route to school

Figure 5. What Issues Affect the Decision to Walk or Bike to School?, 2018 Parent/Caregiver Survey

Issue	Percentage
Distance	75%
Amount of traffic along route	58%
Speed of traffic along route	58%
Safety of intersections and crossings	42%
Weather or climate	42%
Sidewalks or pathways	42%
Violence or crime	25%
Time	25%
Child's before or after-school activities	8%
Adults to walk or bike with	8%
Crossing guards	8%
Convenience of driving	0%

A majority of parent and caregiver respondents felt Gaston Elementary neither encouraged or discouraged students from walking and biking to school at the time of the survey. An additional 33% felt the school encouraged active transportation, while only 6% characterized the school as strongly discouraging walking and biking (see Figure 6).

Figure 6. Does your School Encourage Walking or Biking to/from School?, 2018 Parent/Caregiver Survey

Response	Percentage
Strongly encourages	0%
Encourages	33%
Neither	61%
Discourages	0%
Strongly discourages	6%
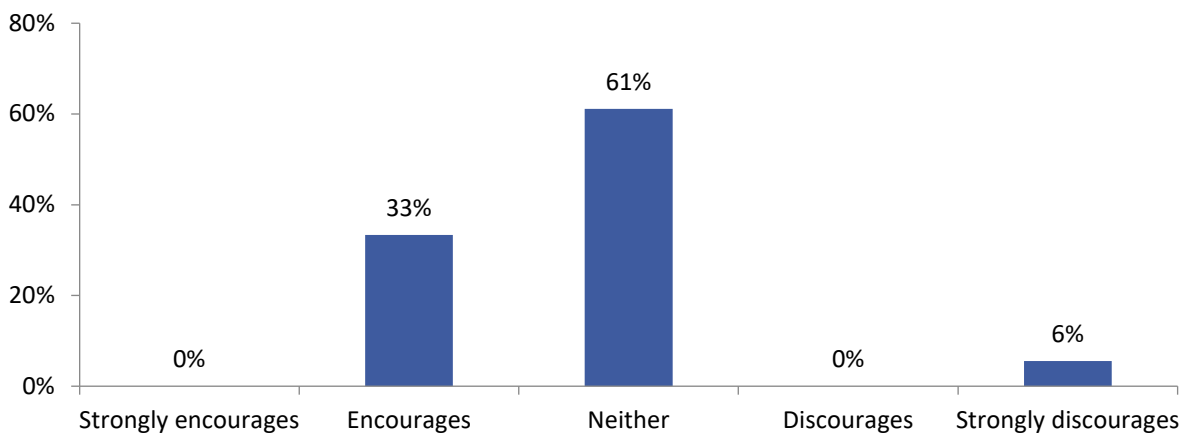
At the time of the survey, over half (66%) of parents and caregivers reported walking or biking to school would be a fun or very fun activity for their students, while no respondents reported that the activity would

be boring. An additional 33% were neutral or unsure on whether their student would enjoy walking and biking to school (Figure 7).

Figure 7. How Fun is Walking and Biking to School?, 2018 Parent/Caregiver Survey
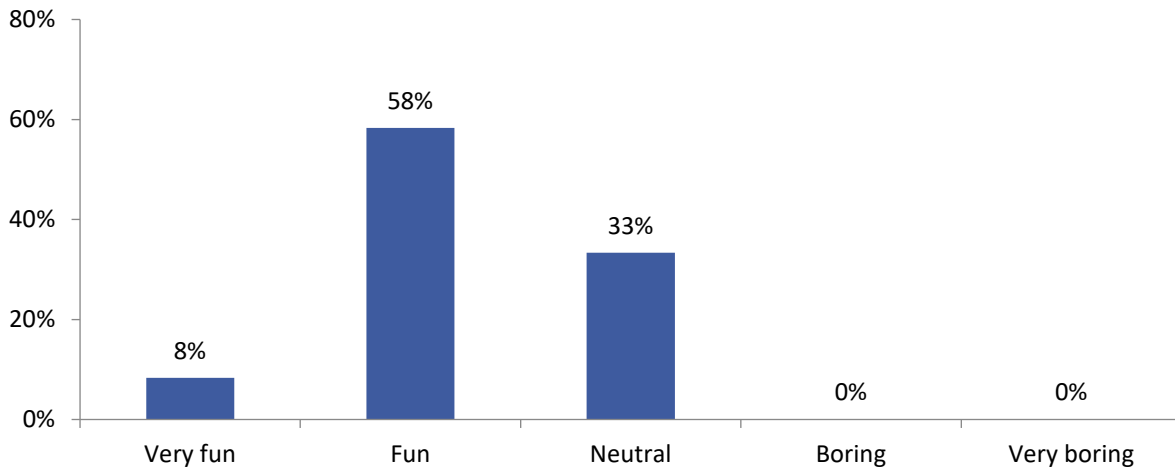
A large majority of parents and caregivers recognized the health benefits of active transportation, with 88% reporting that walking or biking to school would be healthy or very healthy for their student. Only 12% felt the activities would be unhealthy for their student (see Figure 8).

Figure 8. How Healthy is Walking or Biking to School?, 2018 Parent/Caregiver Survey
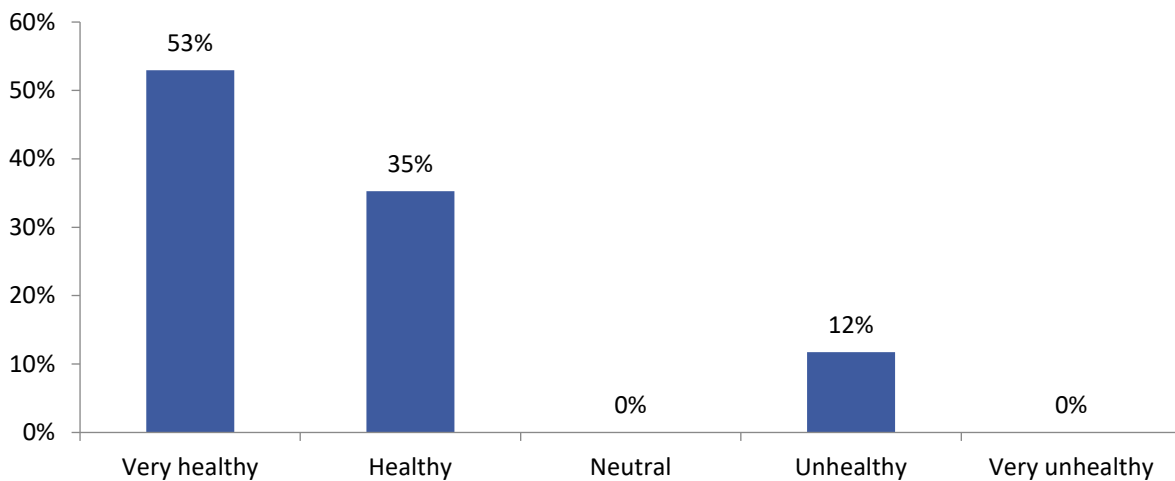
Crash Data

DATE COLLECTED:	2012-2016
DATA COLLECTION PROCESS:	Crash Data included in this report originates the ODOT SRTS Web Map Application, with supplemental data from roadway jurisdictions as available. This analysis does not determine whether the grant intervention *caused* any change in the occurrence of crashes, due to small sample size. Additionally, due to insufficient mode split data to calculate crash *rates*, this report offers a count and description of reported incidents.
NUMBER OF REPORTED CRASHES INVOLVING BIKES AND PEDESTRIANS WITHIN 1 MILE OF SCHOOL:	Between 2012 and 2016, no crashes involving a bicyclist or pedestrian were reported within 1 mile of the schools.
TIME OF REPORTED CRASHES INVOLVING BIKES AND PEDESTRIANS WITHIN 1 MILE OF SCHOOL*:	Between 2012 and 2016, no crashes involving a bicyclist or pedestrian were reported within 1 mile of the school.
NUMBER OF REPORTED INJURIES BY SEVERITY WITHIN 1 MILE OF THE SCHOOL:	Between 2012 and 2016, no crashes involving a bicyclist or pedestrian were reported within 1 mile of the school.
ADDITIONAL CRASH DATA CONSIDERATIONS:	It is possible that unreported incidents have occurred, as minor incidents and near misses are not always recorded.

Notes on Community Context or other Relevant Information:

While no pedestrian or bicycle crashes were officially documented and reported, the City and School District have heard of at least three incidents of pedestrians being hit along Hwy 47. With large vehicles passing pedestrians at speeds of 45 mph or greater, and only a narrow shoulder for people to walk or bike along, it is unsurprising that many individuals opt not to walk or bike here unless out of necessity.

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. The City of Gaston estimates project completion is planned for December 2019.

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 infratructure 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 5. Gaston Elementary Competitive SRTS IN Grant Funded Project Map
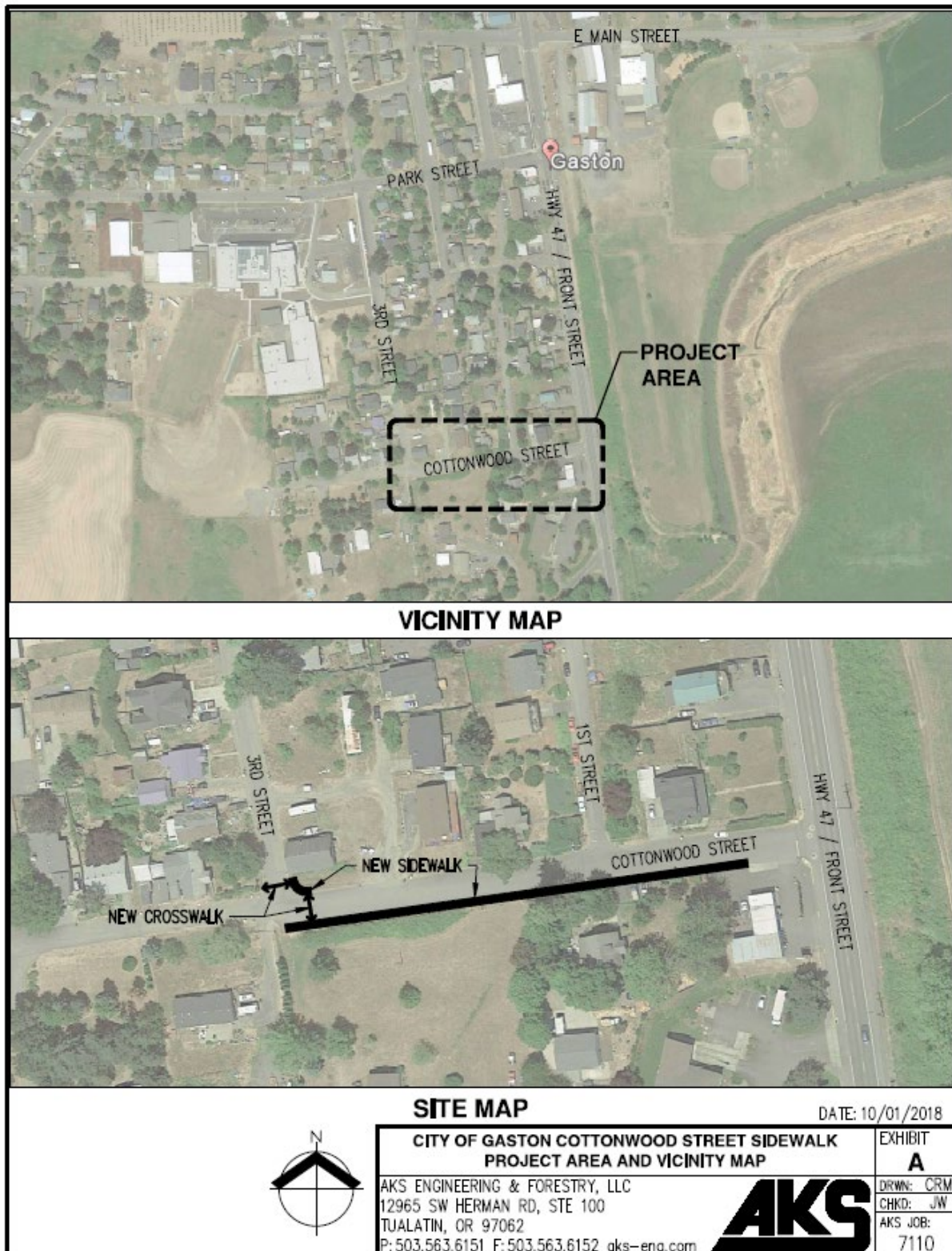
Appendix C. Access to SRTS Detailed Methodology

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.