City of Cottage Grove – Lincoln Middle School 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 Construction 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 construction grants, and combined outreach and education and construction 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 as soon as possible after construction is complete, likely starting in spring 2022. 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: Lincoln Middle School

Summary

Lincoln Middle School is a Title 1 public school enrolling 587 students in 6th through 8th grade. The school serves populations in the City of Cottage Grove and rural Lane County, with 57% of students eligible for the Federal Free and Reduced-Price Lunch Program. English is the primary language spoken by students and 6% of are registered as Ever English Learners.[1]

The City of Cottage Grove identified Lincoln Middle School as a destination underserved by pedestrian facilities. All roads leading to Lincoln Middle School and from there to Harrison Elementary School lack the basic infrastructure needed for children to safely walk or bike to school. Missing sidewalks and crosswalks mean that students are walking to school in the roadway. Additionally, conflicts between parents dropping off kids and school buses and other rush hour traffic makes walking near the school dangerous.

The Oregon SRTS 2019-2020 Competitive Infrastructure Grant funded the construction of new sidewalks, marked crossings, and ADA curb ramps necessary to ensure the safety of students commuting by active modes. This project will address a large known barrier for students who wish to bike and walk to school.

In addition to planned infrastructure upgrades at Lincoln Middle, the City's SRTS program (in partnership with South Lane School District) recently formed a Safe Routes to School Action Committee to guide the development of a district-wide SRTS plan. In recent years, the SRTS team has also partnered with internal and external stakeholders to provide free bicycle education events, helmet giveaways, and free bicycle lights.

Key information from Lincoln Middle School parent surveys:

- 37% of students live within a mile of the school.
- To get to school, 54% of students ride in a family vehicle, and 26% take the school bus.
- To return home from school, 40% of students ride in a family vehicle, while 27% take the school bus.
- While 12% of students walk to school, a quarter (25%) of students walk home from school.
- Parents report that distance is the danger of intersections and crossings. Other barriers include:
    - the distance between home and the student's school,
    - the amount of traffic along the route, and
    - presence of sidewalks/pathways.

[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

- Most parents recognize the value of walking/biking to school—90% described it as healthy and 41% described it as fun for their student.

Contact Information

JURISDICTION:	City of Cottage Grove
CONTACT:	Amanda Ferguson, planner@cottagegrove.org
SCHOOL DISTRICT:	South Lane School District
CONTACT:	None
OTHER CONTACTS:	None

Enrollment and Demographics

Lincoln Middle School is a public school enrolling 587 students ranging from 6th to 8th grade. The school serves populations in Cottage Grove and rural Lane County, with 57% of students eligible for the Free and Reduced-Price Lunch Program. English is the primary language spoken by students, and 6% are registered to be Ever English Learners.[2]

ENROLLMENT: 587

GRADE LEVELS SERVED AND SCHOOL TYPE: 6-8, Public

STUDENT ETHNIC/RACIAL DEMOGRAPHICS:

- American Indian/Alaska Native: 2.4%
- Asian: 1.2%
- Hispanic or Latino: 11.1%
- Native Hawaiian/Pacific Island: 0.0%
- Multiracial: 1.4%
- Black/African American: 0.7%
- White: 83.3%

PREDOMINANT LANGUAGES SPOKEN IN SOUTH LANE SCHOOL DISTRICT:

- English: 2,857
- Spanish: 183
- Chinese: 3

STUDENTS LIVING WITHIN 1-MILE OF SCHOOL: 37%[3]

TITLE 1 STATUS: Yes[4]

EVER ENGLISH LEARNERS: 6%[5]

FREE AND REDUCED-PRICE LUNCH ELIGIBILITY: 57%

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

[3] SRTS Program parent surveys 2018

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

[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.

Lincoln Middle School is located in the City of Cottage Grove and serves the city and wider unincorporated Lane County. The block group encompasses a portion of the city limits and a small swath of county jurisdiction. According to the Place Type Tool, the area surrounding Lincoln Middle School is categorized as Suburban/Town, meaning it contains low density development and the surrounding census block group generally contains more residential than commercial development, with 1,929 people residing and 435 people working within the census block group. The area has a 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)	Suburban/Town • Lower densities of jobs and/or housing • Lower accessibility to regional jobs • 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 (ACS 5-YEAR ESTIMATES):	City of Cottage Grove 10,083 people
CENSUS BLOCK GROUP POPULATION (2010):	1,929 people
NUMBER OF JOBS IN CENSUS BLOCK GROUP (2010):	435 jobs
ACCESS TO DESTINATIONS describes the number of regional jobs within 5 miles:	Low
DENSITY LEVEL- jobs and households per acre within ¼ mile:	Low
DESIGN LEVEL- level of street connectivity, pedestrian-oriented street density:	Very Low
DIVERSITY LEVEL- Mix of housing and employment:	High
TRANSIT LEVEL- Afternoon peak hourly transit service within ¼ mile:	Low

[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 Lincoln Middle School grant application is included in Appendix B.

PROBLEM STATEMENT:	All roads leading to Lincoln Middle School and from there to Harrison Elementary School lack the basic infrastructure needed for children to safely walk or bike to school. Missing sidewalks and crosswalks push kids into hazards on the street.
DESCRIPTION OF BARRIERS TO WALKING AND BIKING:	Approximately 15% of Lincoln Middle School students routinely bike or walk to school, even though over 70% live within two miles of the school. Students are currently walking and biking in the street to get to school, and crossing at unmarked intersections, through at times dense and aggressive drivers. Many barriers exist for those with mobility challenges. Parents state that the greatest barriers to their children walking or bicycling to school is the lack of safety of intersections and crossings, amount of traffic on the route, and lack of sidewalks.
PROJECT DESCRIPTION:	The construction of accessible sidewalks, crosswalks and ramps within the project is vitally necessary to ensure the safety of middle and elementary school students. The project includes 40,000 sq ft of sidewalks and 40 crosswalks in 11 intersections.
ESTIMATED PROJECT TIMELINE:	Spring 2021 Completion
PRIORITY SAFETY CORRIDOR?[7]	Yes
OUTREACH AND EDUCATION:	The City and South Lane School District have recently formed a Safe Routes to School Action Committee, which will be working on developing a SRTS plan for the entire SLSD. Surveys of student transportation choices have been performed for Lincoln Middle School as part of this project, and will be performed for 2 elementary schools this school year. For the last two years, bike safety has been the primary focus of the City, Lincoln Middle and community partners, with a Bicycle Coalition holding bike safety round-ups teaching bike safety, an elective bicycle safety class giving out over 150 bicycle helmets, and bike light distribution by the fire district and police department.

[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 Lincoln Middle 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 494 students, or 44% of the Lincoln Middle School 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]

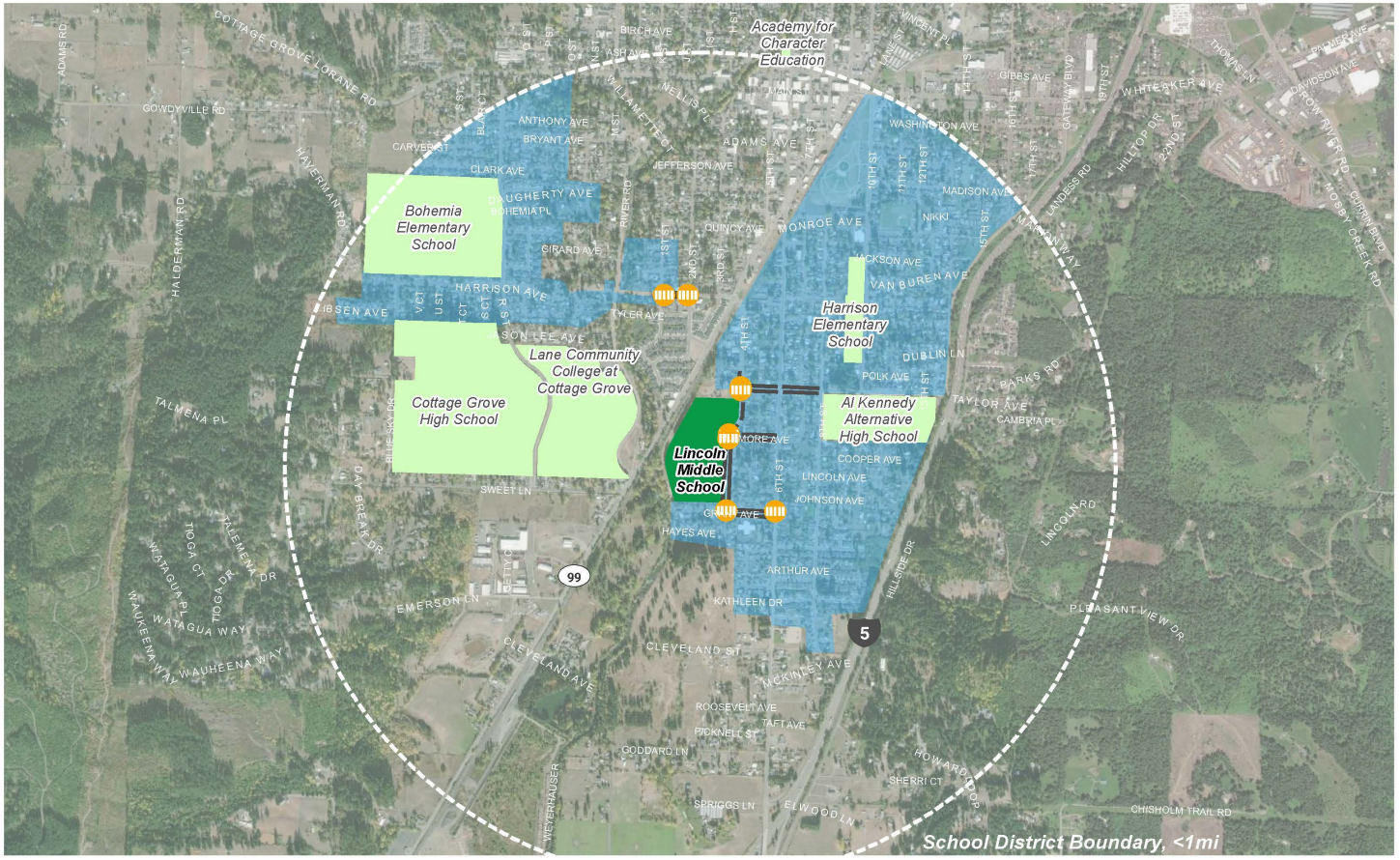
METRIC	VALUE
Total Population of New Access Areas	2,855
School Age Population of New Access Areas[9]	494
Percentage of Students within the School Areas Gaining Access[10]	44%

[8] New Access Area assumptions: For the eastern access area, it is assumed that unimproved roads in the neighborhood just south of Harrison Elementary are accessible by walking and rolling. It also assumes that people on 8th street will use 6th or 10th St to travel south, as there is a small section of incomplete sidewalk on the west side of 8th street. For the western access area, it is assumed that people east of the sidewalk projects already have access to Lincoln Middle School via walking and rolling. Additionally, residents who would likely utilize River Road to walk or roll to school would still face River Road as a barrier as the sidewalks are incomplete in this area. Finally, the southern portion of this access area excludes some housing just north of Cottage Grove High school because it is assumed that they use the bridge over the stream to move east.

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

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

Figure 1. Lincoln Middle School New Access Area for Students Walking and Biking



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, 2018
DATA COLLECTION PROCESS:	18 classrooms surveyed about their trip to and from school
NUMBER OF STUDENTS:	No Data
TRIPS RECORDED	2,298 trips recorded by the hand tallies

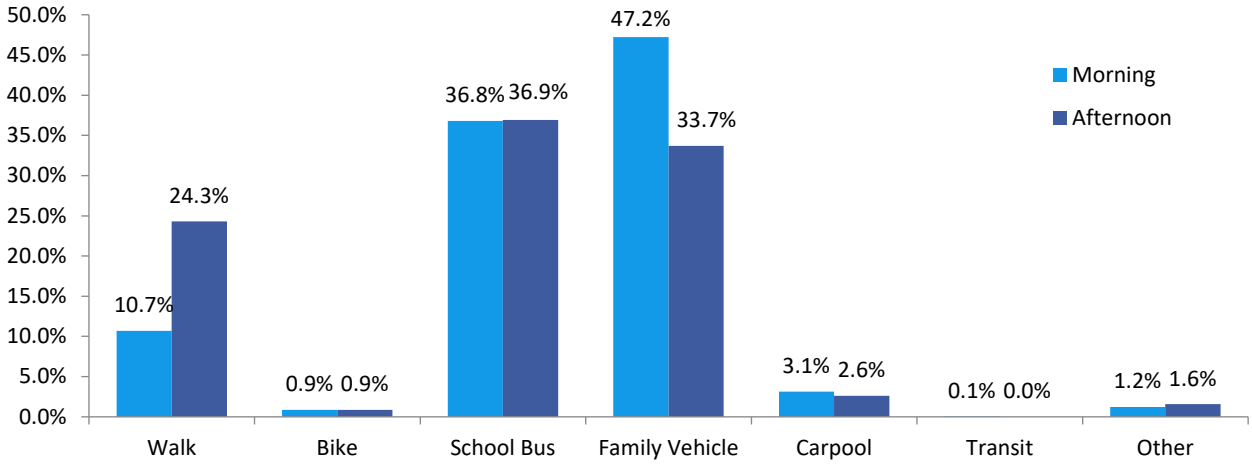
SUMMARY OF DATA COLLECTION AND METHODOLOGY

The September 2018 baseline hand tally data from Lincoln Middle School includes 2,298 recorded trips collected from students in 18 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. This data provides a snapshot of student travel behavior trends.

SUMMARY OF RESULTS:

Lincoln Middle School hand tally data from 2018 indicates that a majority of students surveyed ride the in a family vehicle or school bus in both the morning and afternoon (see Figure 2 and Table 2). More students commute by family vehicle in the morning (47%) than in the afternoon (34%), however. 11% of students walk in the morning and 24% of students walk home in the afternoon. Ten 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	123	10	423	543	36	1	14
Afternoon	279	10	424	387	30	0	18

Parent/Caregiver Surveys

DATE COLLECTED:	September, 2018
DATA COLLECTION PROCESS:	The National Center for SRTS's parent/caregiver survey was distributed to parents at Lincoln Middle School through efforts of the City's SRTS Action Committee to assess family perceptions about school travel options and behavior.
NUMBER OF SURVEYS:	125; 21% response rate

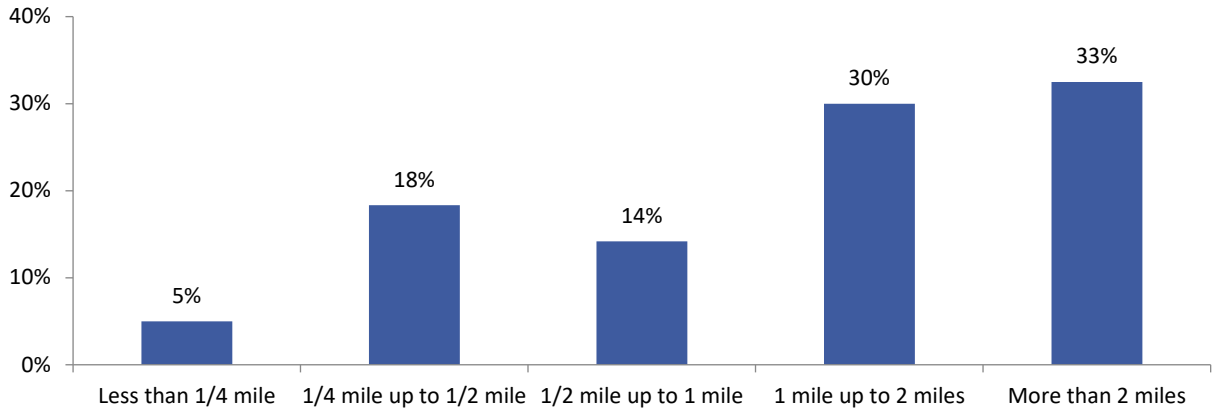
SUMMARY OF DATA COLLECTION AND METHODOLOGY

The parent/caregiver survey data included in this report was collected in September of 2018 from 125 participants with students attending Lincoln Middle School.

SUMMARY OF RESULTS:

Parent/caregiver survey analysis indicate that 37% of respondents live within a mile of Lincoln Middle School, with an additional 30% living between one and two miles of the school site (see Figure 3). Approximately one-third (33%) of surveyed parents and caregivers live more than two miles from Lincoln Middle School.

Figure 3. How Far Does your Family Live from School?, 2018 Parent/Caregiver Survey



Family vehicles were the most commonly used transportation option among Lincoln Middle School students for both arriving at school and leaving school (see Figure 4 and Table 3). The second most popular mode choice was the school bus with about a quarter of students riding both to and from school. Approximately 12% of students walk to school in the morning, while a quarter walk home from school.

Figure 4. Student Travel Mode to/from School, 2018 Parent/Caregiver Survey

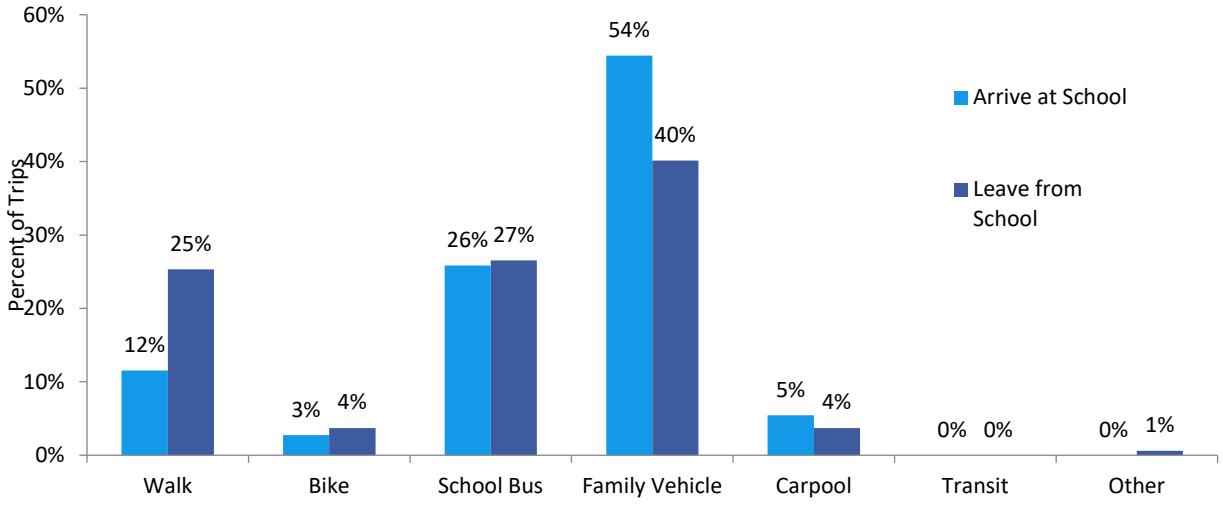
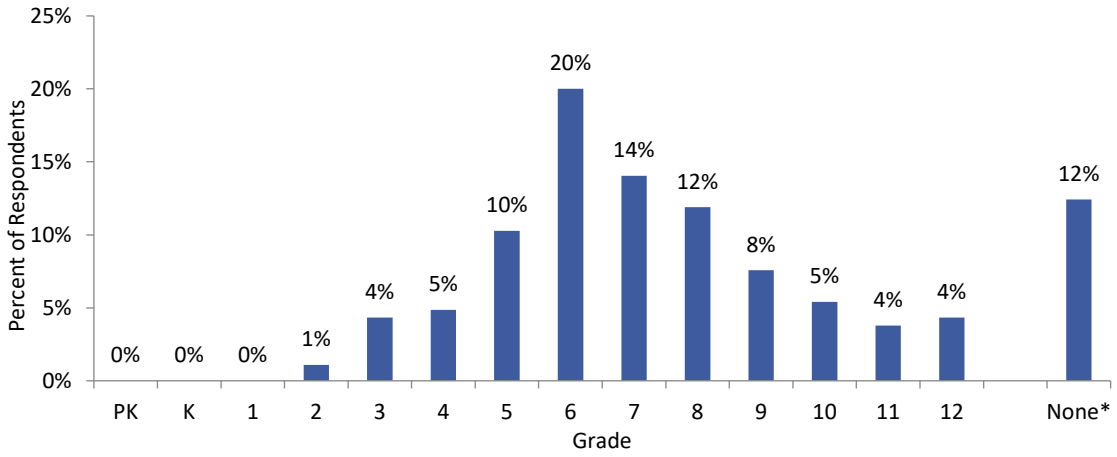


Table 3. Count of Trips by Time of Day, 2018 Parent/Caregiver Survey

TIME OF DAY	WALK	BIKE	SCHOOL BUS	FAMILY VEHICLE	CARPOOL	TRANSIT	OTHER
Arrive at School	17	4	38	80	8	0	0
Leave from School	41	6	43	65	6	0	1
Total Trips	58	10	81	145	14	0	1

As Figure 5 illustrates, 12% 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 6th 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?, 2018 Parent/Caregiver Survey

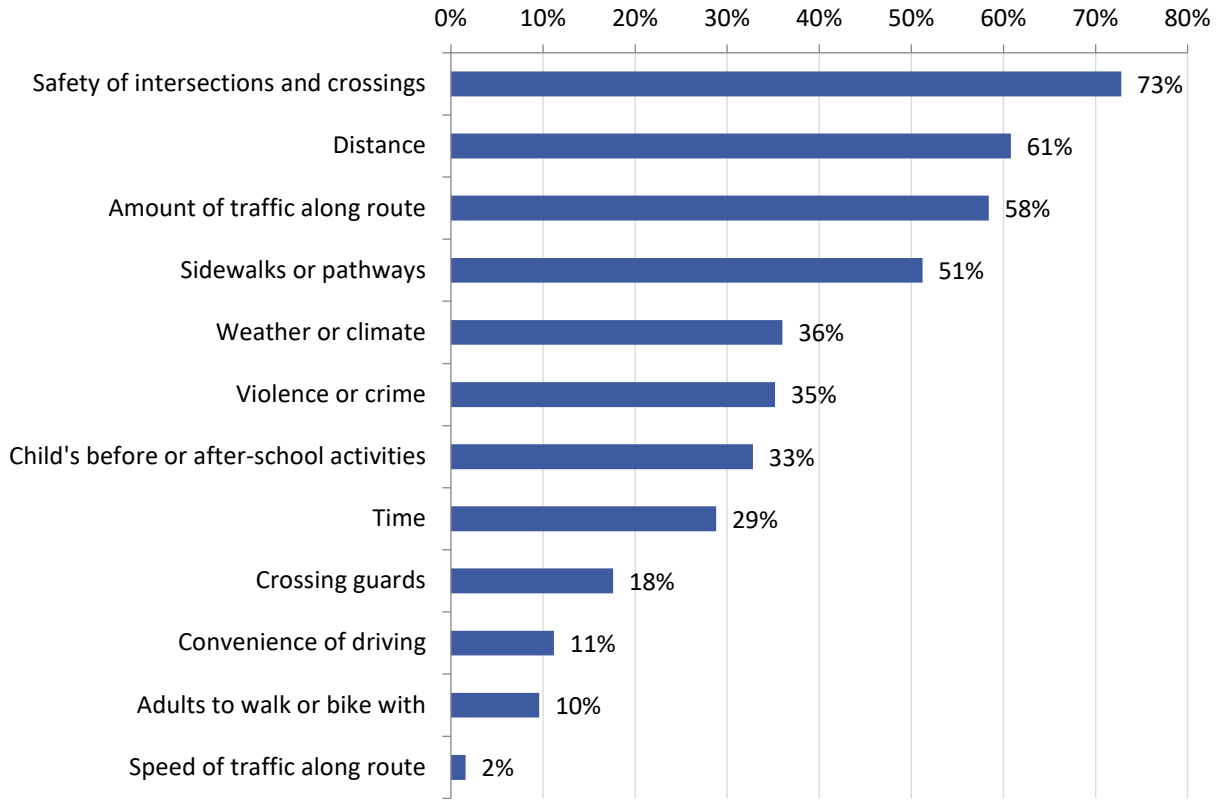


**I would not feel comfortable at any grade*

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:

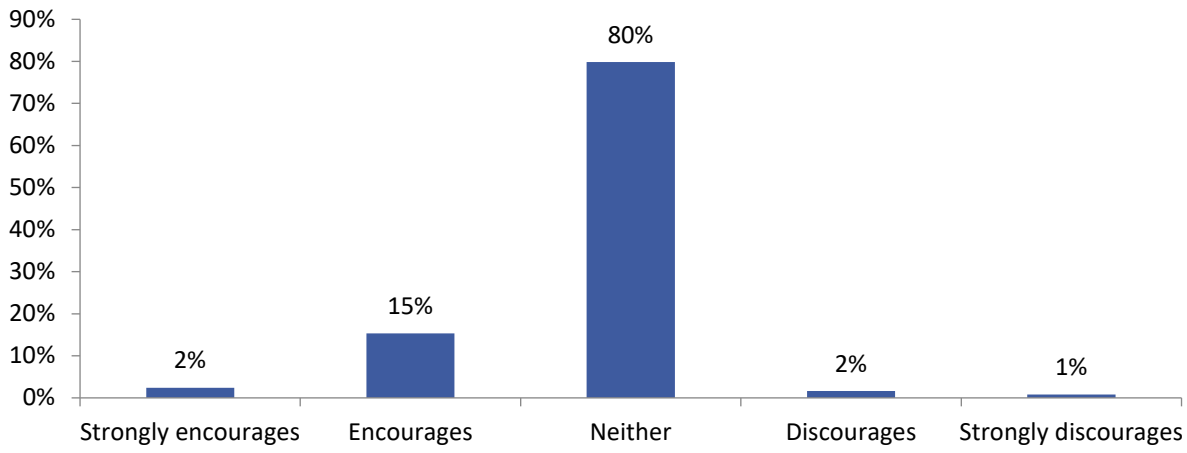
- The safety of existing intersections and crossings
- Distance between their home and their student's school
- Traffic volumes along their student's prospective route to school
- The lack of sidewalks and pathways

Figure 6. What Issues Affect the Decision to Walk or Bike to School?, 2018 Parent/Caregiver Survey



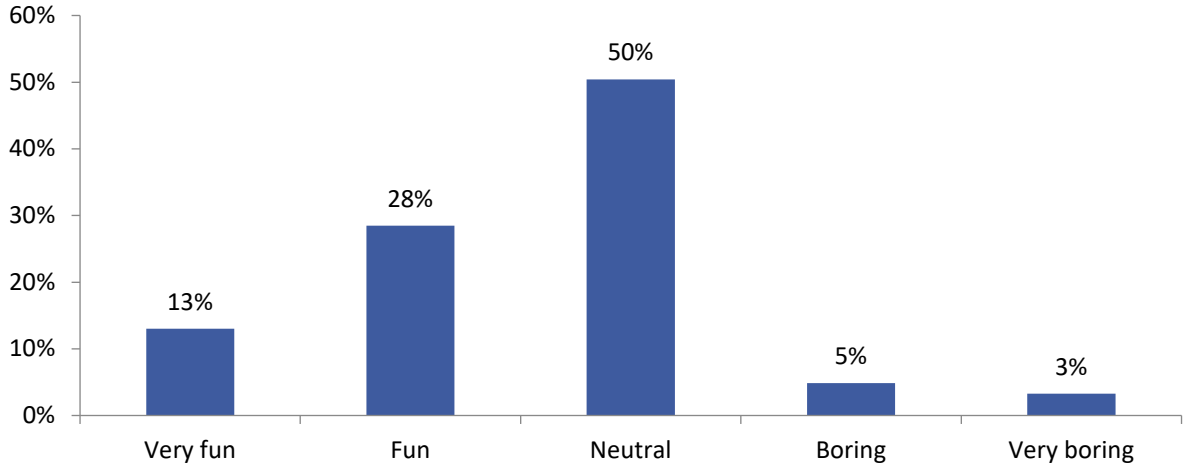
A large majority of parent and caregiver respondents felt Lincoln Middle School neither encouraged or discouraged students from walking and biking to school at the time of the survey (80%). An additional 17% felt the school encouraged or strongly encouraged active transportation, while only 3% characterized the school as discouraging walking and biking (see Figure 7).

Figure 7. Does your School Encourage Walking or Biking to/from School?, 2018 Parent/Caregiver Survey



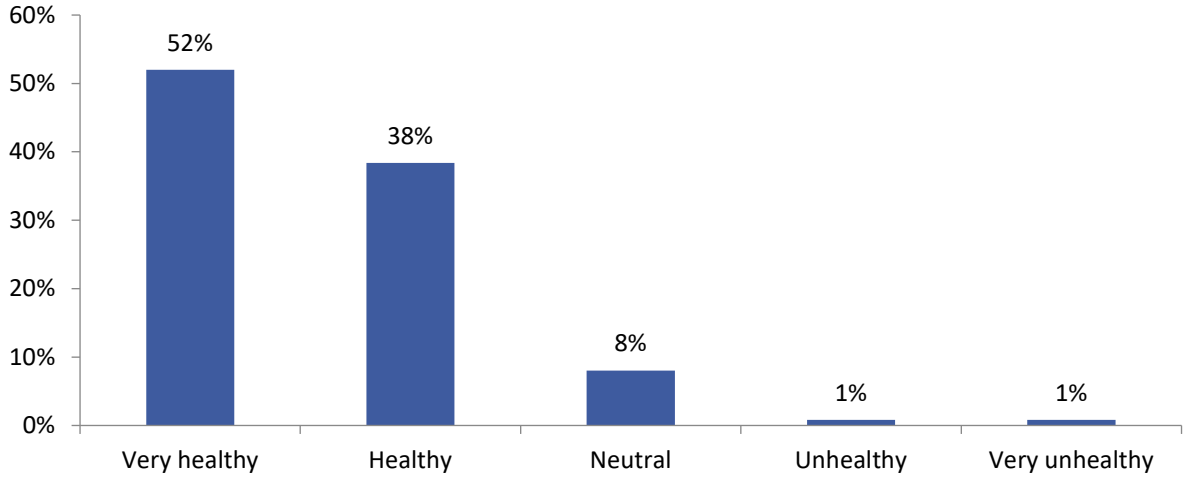
At the time of the survey, almost half (41%) of parents and caregivers reported walking or biking to school would be a fun or very fun activity for their students, while only 8% believed the activity would be boring. An additional 50% were neutral or unsure on whether their student would enjoy walking and biking to school (Figure 8).

Figure 8. How Fun is Walking and Biking to School?, 2018 Parent/Caregiver Survey



An overwhelming majority of parents and caregivers recognized the health benefits of active transportation, with 90% reporting that walking or biking to school would be healthy or very healthy for their student. An additional 8% were neutral regarding the health benefits of walking and biking, and just 2% felt the activities would be unhealthy for their student (see Figure 9).

Figure 9. How Healthy is Walking or Biking to School?, 2018 Parent/Caregiver Survey



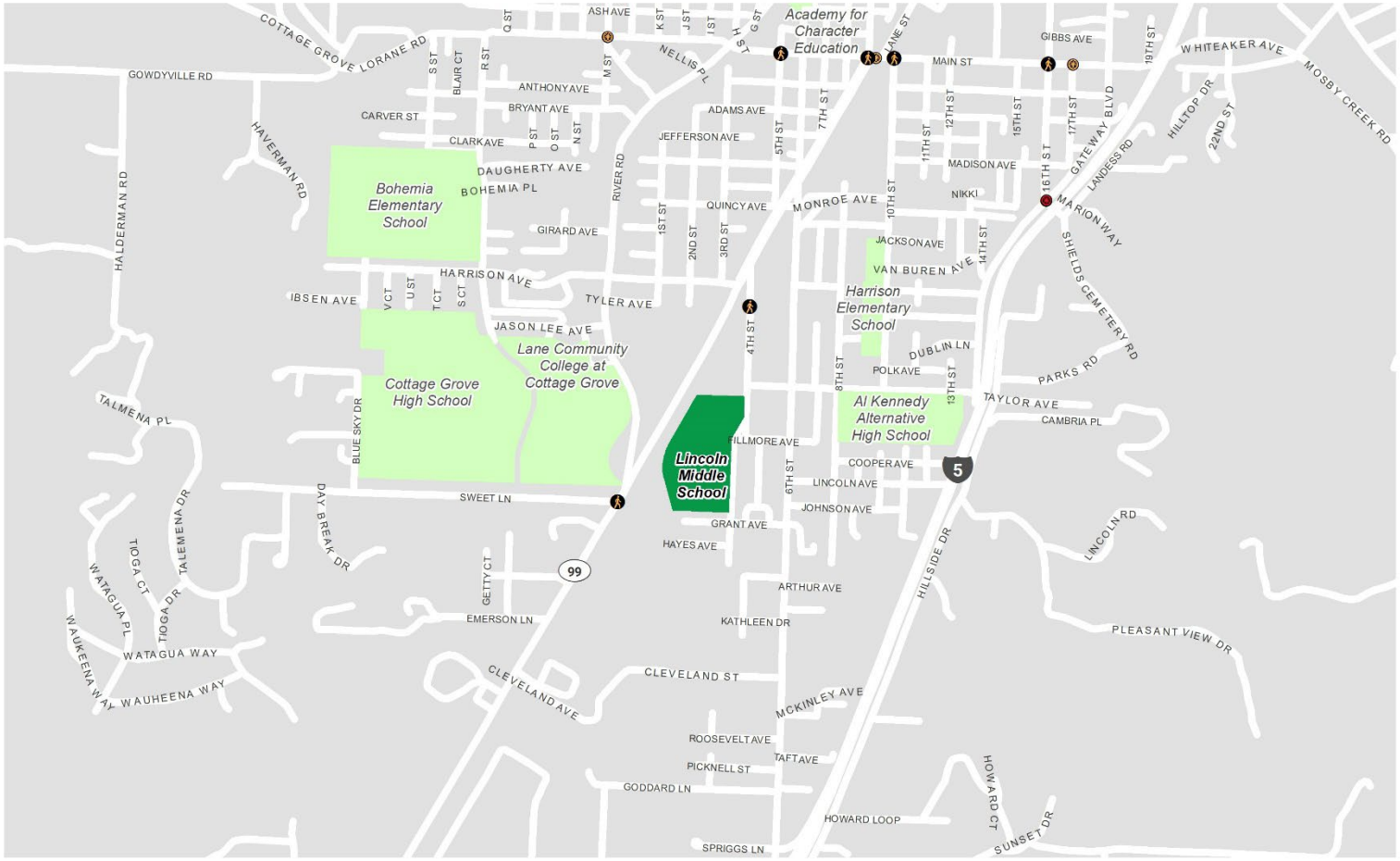
Crash Data

DATE COLLECTED:	2012-2016
DATA COLLECTION PROCESS:	Crash Data included in this report originates from relevant roadway jurisdictions, as well as the ODOT SRTS Web Map Application. 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, 12 crashes involving a bicyclist or pedestrian were reported within 1 mile of the school.
TIME OF REPORTED CRASHES INVOLVING BIKES AND PEDESTRIANS WITHIN 1 MILE OF SCHOOL*:	10 of these reported crashes occurred during school commuting hours; the majority occurred during PM commuting hours. ** For these purposes school commuting hours were defined as 6 AM to 9 PM.*
NUMBER OF REPORTED INJURIES BY SEVERITY WITHIN 1 MILE OF THE SCHOOL:	All 8 of these reported crashes involved an injury to a bicyclist or pedestrian. All 6 of the reported crashes involving a pedestrian were non-fatal. Of the 6 reported crashes involving a bicyclist, 5 were non-fatal and one was fatal. Figure 10 illustrates the location of the crashes by type and injury severity.
ADDITIONAL CRASH DATA CONSIDERATIONS:	Sidewalk and crossing improvements are planned along Harrison Ave, S. 4th Street, Taylor Avenue, Fillmore Avenue, and Grant Avenue. In 2015 a non-fatal pedestrian crash occurred at the intersection of HWY 99 and E. Harrison Ave/4th Street that involved an 11-year old boy and a 16-year old driver. In addition to the crashes between 2012-2016 illustrated on the map, in its application the City of Cottage Grove identified several school-related crash incidents that will be addressed by the planned improvements: • 2017: Fatal injury of a Middle School student on a bicycle on Hwy 99. • Late 2016: Non-fatal pedestrian crash at the intersection of 4th and Fillmore involving a child crossing the street after school and a driver failing to yield right-of-way. • 2008: Non-fatal pedestrian crash in front of Lincoln Middle School at the intersection of 4th and Fillmore that involved a 12-year old boy on a bicycle and an adult driver. Acc49@altaplanning.c

Notes on Community Context or other Relevant Information:

None.

Figure 10: Lincoln Middle School Bicycle & Pedestrian Collisions (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. City of Cottage Grove estimates the project will be completed in Spring 2021.

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)*

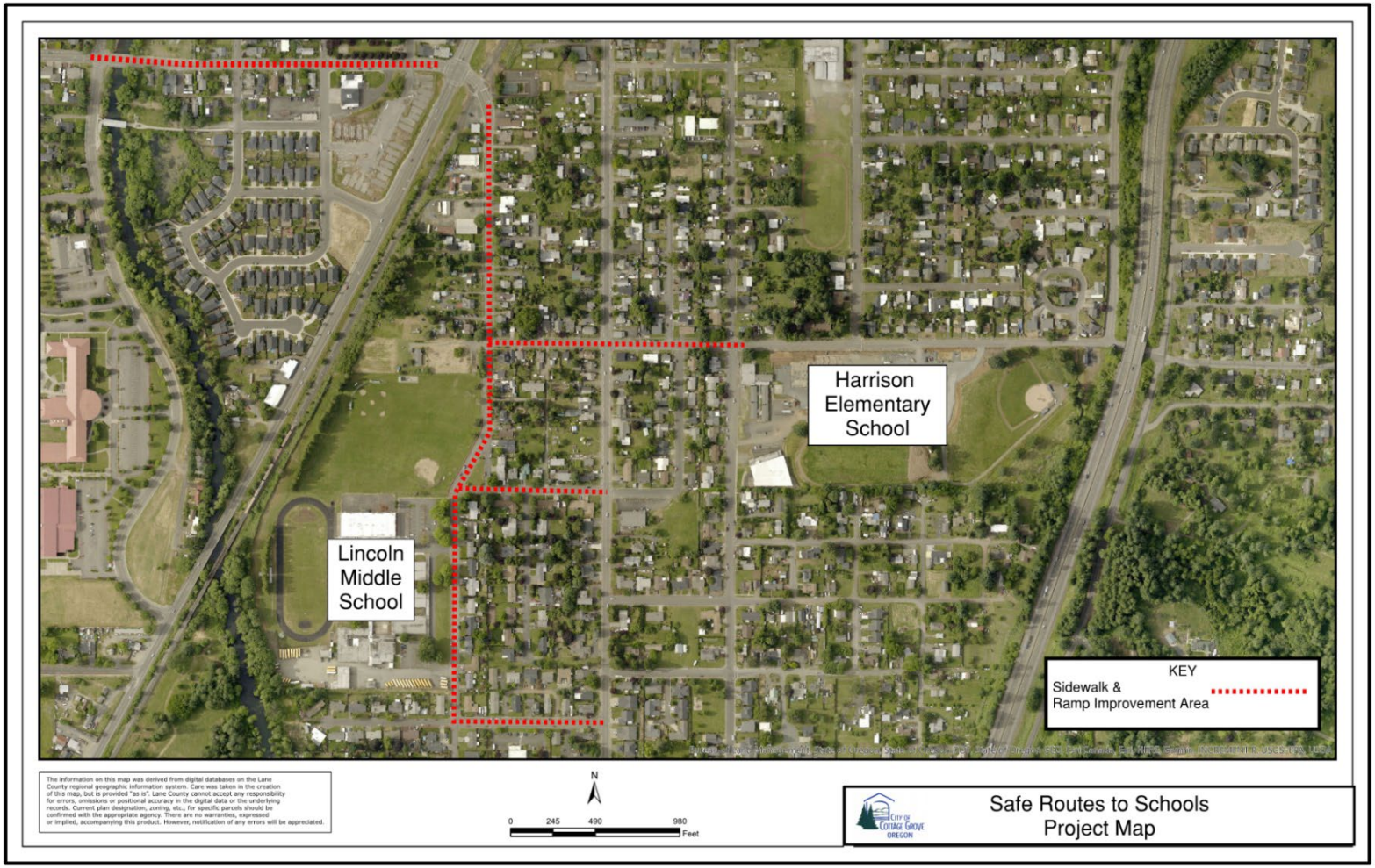
Chapter 3. Findings

- 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 11. Lincoln Middle School 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.