Eastside Transportation Corridor Improvement Study

Fresno Council of Governments

January 2021

Acknowledgments

This plan was prepared for

Fresno Council of Governments

In consultation with

The County of Fresno 1856

Caltrans

City of Selma California

The City of Fowler California 1908

Kingsburg California

The Nation's Christmas Tree City Sanger

City of Parlier Founded 1876 Incorporated 1921

Orange Cove

City of Clovis

City of Reedley California The World's Fruit Basket

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Acronyms

AADT	Annual Average Daily Traffic	**LTS**	Level of Traffic Stress
AASHTO	American Association of State Highway and Transportation Officials	**MUT**	Median U-Turn
ADA	Americans with Disabilities Act	**NAICS**	North American Industry Classification System
ADZD	Advanced Dilemma Zone Detection	**PHF**	Peak Hour Factor
ATP	Active Transportation Plan	**RAB**	Roundabout
AWSC	All-Way Stop-Controlled	**RCUT**	Restricted Crossing U-Turn
CA-MUTCD	California Manual of Uniform Traffic Control Devices	**RNDBT**	Roundabout
CM	Countermeasure	**RRFB**	Rectangular Rapid Flashing Beacon
CRZ	Clear Recovery Zone	**RT**	Right-turn
DUI	Driving Under the Influence	**RTP**	Regional Transportation Plan
EB, SB, WB, NB	Eastbound, Southbound, Westbound, Northbound	**SCS**	Sustainable Communities Strategy
EDD	Employment Development Department	**SOI**	Sphere of Influence
FCOG	Fresno Council of Governments	**SR**	State Route
FO	Fixed Object	**SWITRS**	Statewide Integrated Traffic Records System
FSI	Fatal and Severe Injury (Collisions)	**TDM**	Transportation Demand Management
HCM	Highway Capacity Manual	**TIMS**	Transportation Injury Mapping System
HFST	High Friction Surface Treatment	**TSM**	Transportation System Management
LOS	Level of Service	**TWSC**	Two-Way Stop-Controlled
LRSM	Local Roadway Safety Manual	**USDOT**	United States Department of Transportation
LT	Left-turn	**VMT**	Vehicle Miles Traveled

1. Introduction

Fresno Council of Governments (FCOG) has undertaken the Eastside Transportation Corridor Improvement Study to determine future transportation needs of the eastern portion of Fresno County. The study focuses primarily on the major north to south and east to west transportation corridors, Academy Avenue and Manning Avenue, which service the area. Figure 1-1 illustrates the Study Area limits.

The Academy Avenue corridor extends approximately 27 miles from State Route (SR) 99 in Kingsburg to SR 168 near Clovis. Along this route, Academy Avenue passes through the cities of Parlier and Sanger, operating as a collector/arterial roadway. Manning Avenue corridor extends approximately 24 miles from Golden State Boulevard in the southern city limits of Fowler to the County border at Hill Valley Road, south of the City of Orange Cove. Along this route, Manning Avenue passes through Parlier and Reedley, operating as a collector/arterial roadway.

Each of the corridors serves multiple transportation purposes by functioning as farm to market routes for large agricultural interests, while also moving people. Both corridors provide mobility and connectivity for the nine incorporated cities that are located in the study area. In addition, Academy Avenue is often used by visitors and tourists to the Fresno region as a north-south corridor that provides more direct access to the National Parks and recreational opportunities available on the eastside of Fresno County, by allowing motorists to avoid having to use the urban freeways in the Fresno-Clovis metropolitan area to get to their destination.

Based on FCOG's population forecast, the study area's current population of 236,834 residents will grow to approximately 345,180 residents by 2050, a 46 percent increase in population over the next 30 years. This forecasted population growth, combined with increasing agricultural related commerce, specifically goods movement, will result in increased traffic and safety concerns and has generated a need for FCOG, as the Regional Transportation Planning Agency, to conduct this long-range multimodal transportation study of the Eastside Study Area.

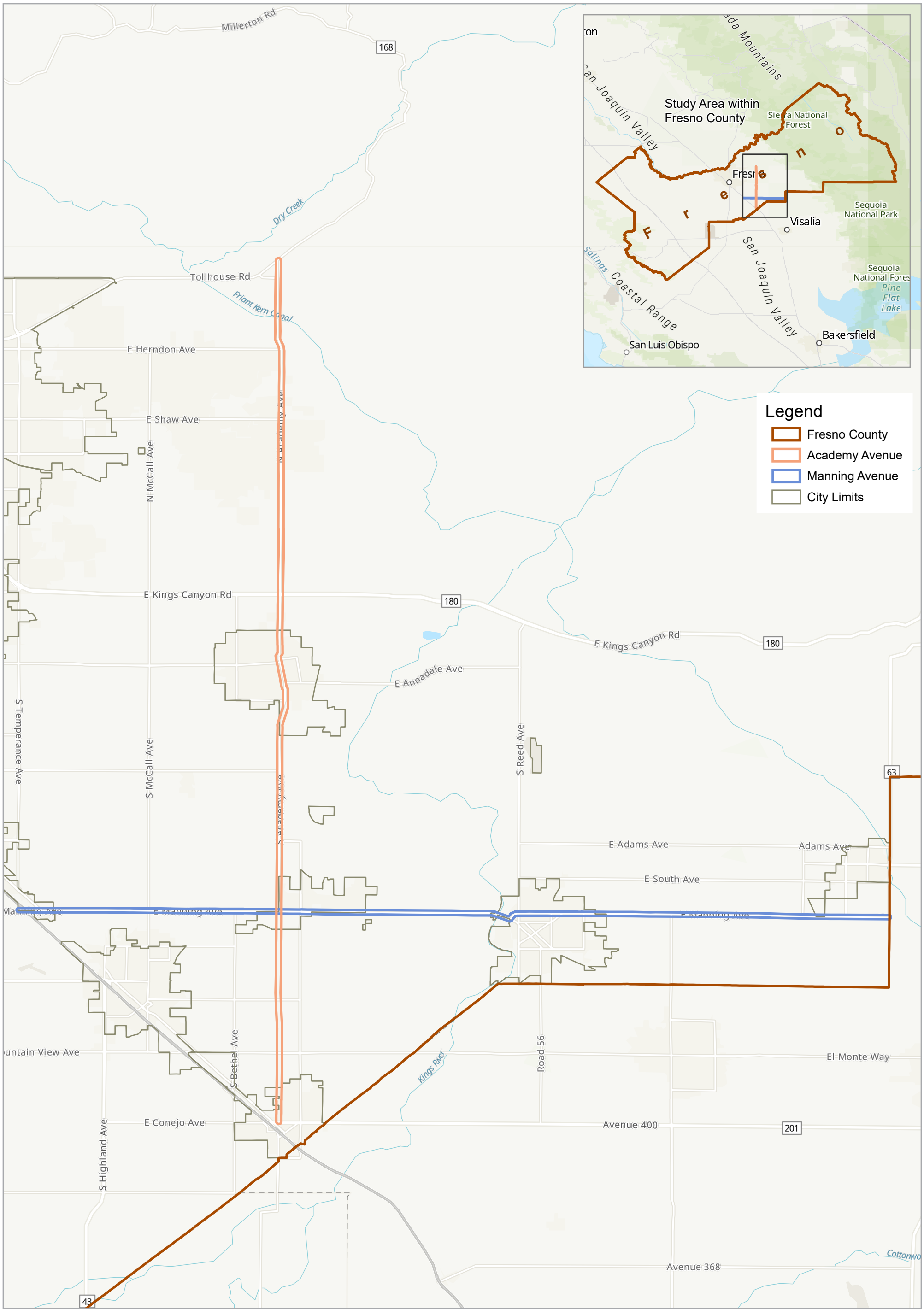
Organization of this Study

This study is organized into twelve chapters:

- **Chapter 1: Introduction** includes a brief study background, purpose, and overview
- **Chapter 2: Goals and Objectives** describes the overall study approach and guiding study objectives
- **Chapter 3: Project Area Profile** documents the current population trends, access to vehicles, and environmental justice and social equity indicators for the project area
- **Chapter 4: Existing and Projected Land Use Patterns** summarizes the goals, policies and land use and zoning designations of the eight project area cities and Fresno County

- **Chapter 5: Existing and Projected Economic Conditions** summarizes the existing and projected economic conditions in the project area
- **Chapter 6: Existing Transportation Conditions** documents findings from technical analyses, models, and previous plans and policies
- **Chapter 7: Existing and Forecasted Operations Analysis** includes a summary of current and projected future operations for the project area in the no-build scenario
- **Chapter 8: Community Outreach** summarizes the outreach process conducted to gather feedback on potential solutions and preferred concepts
- **Chapter 9: Recommendations** outlines the planning level improvements identified for the corridor based on the existing conditions analyses and community outreach
- **Chapter 10: Performance Assessment** evaluates the preferred concept under current and future conditions based on performance metrics described in Chapter 2
- **Chapter 11: Benefit Monetization Assessment** describes the monetized benefit associated with the recommendations and the overall benefit over cost assessment
- **Chapter 12: Implementation** describes the local, regional, and state programs that may be used to fund and implement projects

In addition, appendices provided under a separate cover have more detail on analysis methodology, data, findings, and community outreach.



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EASTSIDE TRANSPORTATION IMPROVEMENT CORRIDOR STUDY

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Fresno Council of Governments
Eastside Transportation Corridor Study

Study Area

Project No. **11210046**
Revision No. **-**
Date **January 2021**

FIGURE 1-1

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Print date: 25 Jan 2021

Data Source: Fresno County Dept. PWP, Esri, HERE, Garmin, SafeGraph, METI/NASA, USGS, Bureau of Land Management, EPA, NPS, USDA, Esri, HERE, Garmin, FAO, NOAA, USGS, Bureau of Land Management, EPA, NPS
Created by: pthornton

2. Goals and Objectives

Goals and Objectives

The purpose of the Eastside Transportation Corridor Improvement Study was to identify a set of fundable and implementable capital improvement projects that could improve both mobility and safety along the Academy Avenue and Manning Avenue Corridors.

The preferred package of multimodal improvements must be feasible, equitable, cost-effective, and have community support. The preferred multimodal package of improvements will serve in guiding future Eastside Transportation Corridor programming decisions over a 20-year timeframe based on available funding. Multimodal improvements, including bicycling, walking, and transit, operational and safety improvements were a key focus of the ETCIS.

The ETCIS includes the following primary objectives:

- Draw from existing data sources and apply advanced data collection technology and resources such as multiple "Big Data" data sources to establish travel characteristics, vehicle speeds, and travel time variation trends to establish an accurate baseline.
- With direct input from the public, develop a preferred corridor concept that:

    1) Maximizes efficiency and safety for multimodal users;

    2) Achieves acceptable operating conditions relative to projected future demand;

    3) Improves air quality, economic development, and social equity;

    4) Is context sensitive and in keeping with the character of the corridors;

    5) Minimizes potential impacts to the natural environment; and

    6) improves transit reliability and accessibility.

- Consistent with Caltrans' *Smart Mobility Framework 2010* and *2018 Comprehensive Multimodal Corridor Plan Guideline,* and California Transportation Commission (CTC) *SB 1 Solutions for Congested Corridors Program Guidelines*, perform a transparent and objective performance-based analysis to identify a preferred corridor concept by calculating life-cycle benefit-costs that support FCOG, Caltrans, project area cities, and Fresno County infrastructure investments in the Preferred Concept.

Overall Vision for Corridors

The study is intended to determine the future transportation needs for people using all modes within the eastern portion of Fresno County, focusing primarily on Academy Avenue and Manning Avenue. The project seeks to plan a future for the Academy and Manning Avenue corridors that is safe, connected for all modes, provides a better experience for users, and supports the local economies.

Study Approach

To determine the most cost-effective solutions for resolving the various safety and operational needs on the Manning Avenue and Academy Avenue corridors, the ETCIS evaluated projects using qualitative and quantitative data including community input, environmental sensitivity and impact, and other performance metrics for assessing benefit-cost of transportation planning investments.

To be competitive for limited discretionary transportation funding, this study documents how the recommended improvements address state and federal objectives and initiatives. Both federal and state transportation funding is currently driven by performance based return-on-investment criteria. Funding for multimodal transportation improvements is also greatly influenced by federal and state objectives related to air quality, climate change, environmental justice, social equity and return on investment.

Using the Smart Mobility Framework approach, a performance-based analysis was performed to develop and evaluate recommended improvement projects. The composite package of recommendations presented in Chapter 9 represent the preferred concept, which can be used to establish funding priorities for the corridors that will best meet local and regional goals while providing the highest return on investment of limited regional transportation funding over the next 20 years.

Smart Mobility Framework

Caltrans' *Smart Mobility Framework 2010: A Call to Action for the New Decade* provides a broad planning framework to guide multimodal and sustainable transportation planning and project development. It also provides tools to assess how plans, programs, and projects meet Smart Mobility goals throughout the state.

Smart Mobility moves people and freight while enhancing California's economic, environmental, and human resources by emphasizing convenient and safe multimodal travel, speed suitability, accessibility, management of the circulation network, and efficient use of land.

The Smart Mobility Framework is premised on six key objectives, listed in Table 2-1: Location Efficiency; Reliable Mobility; Health and Safety; Environmental Stewardship; Social Equity; and, Robust Economy. These six objectives are informed through the application of seventeen candidate performance measures. The Smart Mobility Framework process is consistent with the SB 1 Solutions for Congested Corridors Program Guidelines from the California Transportation Commission (CTC).

Table 2-1. Smart Mobility Framework Objectives

Location Efficiency	Support for Sustainable Growth
	Transit Mode Share
	Accessibility and Connectivity
Reliable Mobility	Multimodal Travel Mobility
	Multimodal Travel Reliability
	Multimodal Service Quality
Health and Safety	Multimodal Safety
	Design and Speed Suitability
	Pedestrian and Bicycle Mode Share
Environmental Stewardship	Climate and Energy Conservation
	Emissions Reduction
Social Equity	Equitable Distribution of Impacts
	Equitable Distribution of Access and Mobility
Robust Economy	Congestion Effects on Productivity
	Efficient Use of System Resources
	Network Performance Optimization
	Return on Investment

Source: Caltrans' Smart Mobility Framework 2010: A Call to Action for the New Decade

Performance Metrics

The performance metrics selected to evaluate the recommendations package are coordinated with the six objectives outlined in the Smart Mobility Framework to ensure the resulting improvement recommendations provide a balanced, sustainable, and multimodal assessment of current and future corridor conditions.

Many of these performance measures do not have established standards but were analyzed to better understand the existing and future operational characteristics of the Manning and Academy corridors and inform a comparative analysis of improvement concept alternatives. Use of additional metrics other than vehicular Level of Service (LOS) is consistent with the Smart Mobility Framework and with the recent Senate Bill (SB) 743 intended to streamline the California Environmental Quality Act (CEQA) process. Some metrics such as delay, crash reduction, mode shift, and vehicle miles of travel reduction can be monetized and were incorporated into the benefit-cost analysis, which follows this chapter in the Benefit Monetization Assessment chapter. Other quantifiable indices, such as suitability scores (i.e. level of traffic stress analysis), adaptation assessments, economic development assessments, and environmental justice impacts, etc. are not conducive to being monetized. Although some of the presented performance metrics cannot be monetized, assessment of the results of these analyses provides value to informing improvement recommendations.

The measures of effectiveness for the Manning and Academy Corridor performance metrics and analysis tools used to generate the measures of effectiveness is mapped in matrix form in Table 2-2. Also shown is whether the measure can be monetized for inclusion in a benefit-cost assessment.

Table 2-2. Performance Measures of Effectiveness

Analysis Purpose	Measure of Effectiveness	Model or Analysis Tool									Monetized Benefit?
		FCOG RTDM	Microsimulation	Level of Traffic Stress	NCHRP 552 Method	HSM Part C CMFs	SB1 Emissions Calculator	GIS Analysis	Online Mapping Tools	Literature Review	
Baseline Travel Demand	Trips, VMT	■									Y
Future Travel Demand	Trips, VMT	■								■	Y
Roadway Operations	Delay, Throughput		■								Y
Pedestrian/Bike Connectivity	Access, Comfort Level			■				■			N
Pedestrian/Bike Mode Shift	Trips, VMT Reduction				■			■			Y
Safety	Collision Reduction					■		■			Y
Air Quality	Emissions Reduction	■			■		■				Y
Social Equity	Access, Benefit, Burden			■				■	■		N
Economic Development	GRP, Jobs, Income							■		■	N
Health	VMT, Recreational Activity	■			■				■		Y
Adaptation	Network Vulnerability								■	■	N

3. Project Area Profile

Population and Housing Trends

Population and housing information has been derived from the Fresno County 2019-2050 Growth Projections, adopted by FCOG in October 2020.

Population

Fresno County is home to 1,023,360 residents, or about 316,080 households. The population is expected to increase by as much as 22 percent by 2050, to 1,240,090.

The eastern portion of Fresno County is currently home to approximately 236,834 residents. Most of the residents live in the eight cities (Kingsburg, Selma, Fowler, Parlier, Reedley, Orange Cove, Sanger and Clovis), but an additional 1,639 live in the unincorporated areas. Based on the FCOG population forecast, by 2050 the total population of the study area will grow to approximately 345,180. The combination of population growth in the cities and the unincorporated communities, along with increasing agricultural related commerce, specifically goods movement, will result in increased traffic and the need to evaluate safety concerns, both present and future. Accordingly, FCOG, as the Regional Transportation Planning Agency, is conducting this focused long-range multimodal transportation study.

Of the study area cities, Clovis, Reedley, Sanger, and Selma have the four highest populations. Reedley is the most populated city along the Manning Avenue study area and Sanger is the most populated city along the Academy Avenue study area. Clovis and Selma are significant to this study because of their size and proximity to Manning Avenue and Academy Avenue, but the study corridors do not pass directly through their jurisdictions.

Table 3-1. Populations of Study Area Cities

City	2019 Population
Kingsburg	13,410
Selma	27,000
Fowler	6,580
Parlier	14,140
Reedley	25,170
Orange Cove	9,170
Sanger	28,770
Clovis	134,780
Unincorporated	112,160
Total	1,023,360

Age

As shown in Table 3-2, there are many young people in Fresno County, with more than 27 percent of residents under 18 years of age. This 27 percent are likely to be unable to drive, which increases the need to walk, bicycle, or take transit to their destinations.

Table 3-2. Distribution of Ages in Fresno County

Age Group	Percent
Under 18	27.2%
18-24	9.0%
25-44	26.4%
45-64	26.1%
65 and over	11.4%

Household Projections

Access to Cars

Just over 25,805 households in Fresno County, or about nine percent, do not have access to a car. This means approximately 81,544 people may rely on walking, bicycling, or taking transit for their daily transportation. An additional 25,805 households in Fresno County have access to one car, making them "car light." If these households have two workers, one or both of them may rely on other modes of transportation for their commute.

Many Fresno County residents, especially those who live within the study area, are recognized as transportation disadvantaged due to factors such as low income, limited English proficiency, lack of access to a vehicle, or due to being young, elderly or disabled. In 2015, a survey of likely transportation disadvantaged individuals in Fresno County found that 22 percent of respondents ride the bus, compared to 1 percent in the general population; 27 percent carpooled or vanpooled, compared to 12 percent of the general population; and only 36 percent drove alone, compared to 80 percent of the general population.[1]

Income

Median household income in Fresno County is $51,261, which is higher than the Tulare County median of $47,518, but lower than the Kings County median of $53,865, Madera County median of $52,884, and the California median of $67,169.

[1] Statistics are reported from the 2015 Fresno County Public Transportation Gap Analysis and Service Coordination Plan

Environmental Justice and Social Equity

Health Indicators

The California Healthy Places Index (HPI) reports on several local factors that predict life expectancy and compares community conditions across the state. The overall HPI score for Fresno County is 3.6 percent, meaning the County is healthier than just 3.6 percent of other California counties (an HPI of 100 percent would indicate a county is the healthiest in the state). Fresno is the lowest ranking county in California with respect to transportation conditions. The two indicators that comprise the overall transportation health metric are automobile access and active commuting. In Fresno County, 90.76 percent of households have access to an automobile and 4.42 percent of workers commute to work by transit, walking, or bicycling. The California HPI also includes indicators for a clean environment, which include safe drinking water, ozone, fine particulate matter concentration, and particulate matter from diesel sources. Fresno County has healthier environmental conditions than just 1.8 percent of other California Counties. The HPI scores for cities located within the study area are included in Table 3-3. Data are reported as percentiles, meaning Sanger, for example, has healthier transportation conditions than 27.5 percent of all California cities.

Table 3-3. HPI Scores for Study Area Cities

City	Transportation Rank (Percentile)
Kingsburg	41.3%
Selma	11.2%
Fowler	23.6%
Parlier	3%
Reedley	19.6%
Orange Cove	2.1%
Sanger	27.5%
Clovis	52.2%

CalEnviroScreen 3.0 Assessment

CalEnviroScreen is a mapping tool that uses environmental, health, and socioeconomic information to produce comparative scores for every census tract in the state. It is important to note that CalEnviroScreen reports scores as percentiles, but the rankings for low and high performing communities is the opposite of the ranking system used by the California Healthy Places Index (HPI). A CalEnviroScreen score of 100 means that particular location has the *worst* conditions in the state (whereas an HPI score of 100 would be the best). CalEnviroScreen reports all data at the census tract level. The rankings are visualized in Figure 3-1 where green represents the healthiest environmental conditions and red is the least healthy.

Several census tracts in the study area fall in the 90-100th percentile, meaning they have less healthy environmental conditions than 90 percent of all other census tracts. Compared to other California census tracts, nearly all census tracts in the study area rank above 95 percent in terms of ozone and fine

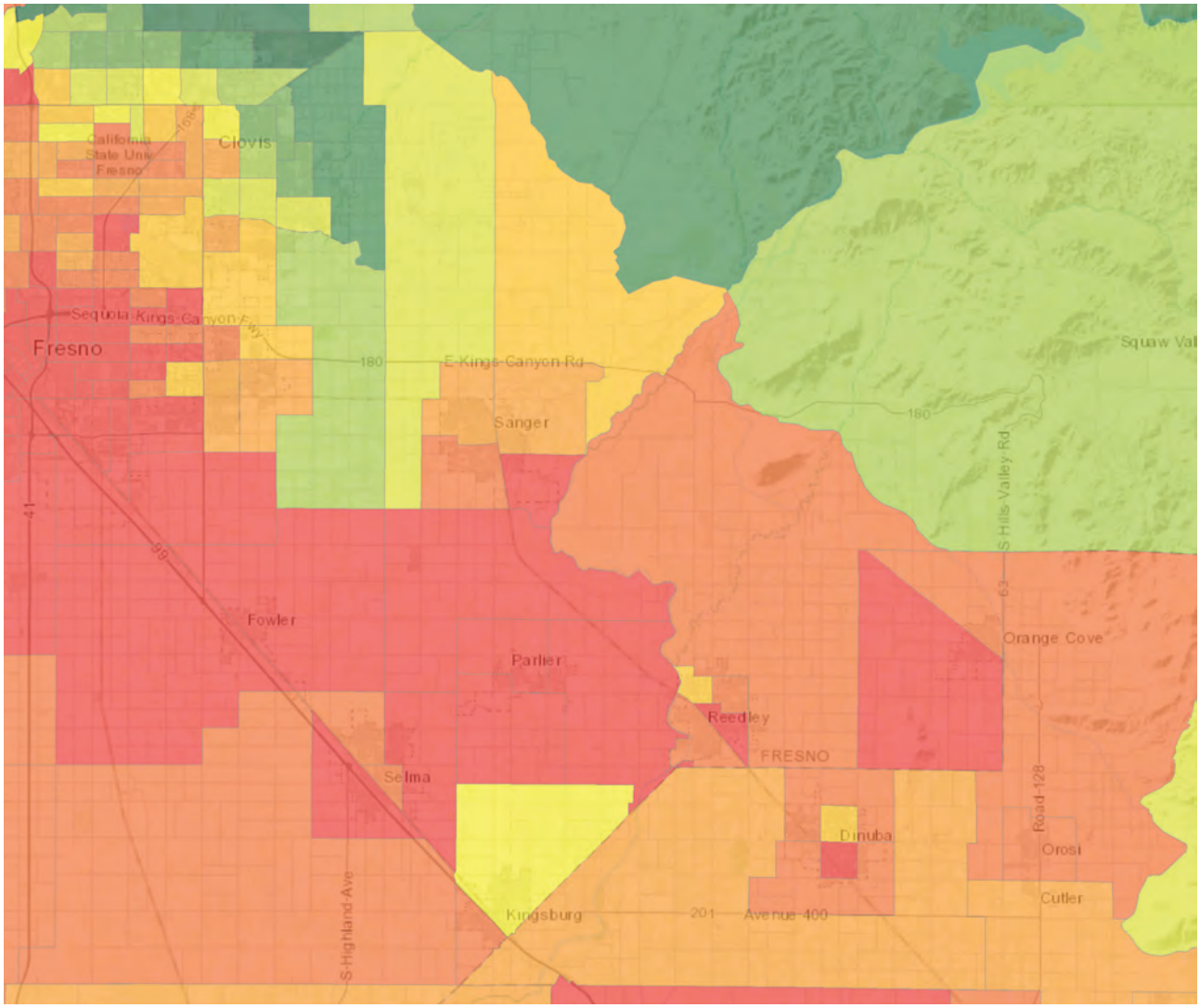
particulate. Along with low air quality conditions, most of the census tracts in the study area are in the 70th percentile or higher for rates of asthma.

One consistently strong category across the study area is the ranking for traffic conditions. Nearly all census tracts in the project area are below the 10th percentile for traffic density, meaning the study area has better traffic conditions than 90 percent of the state.

Social Equity

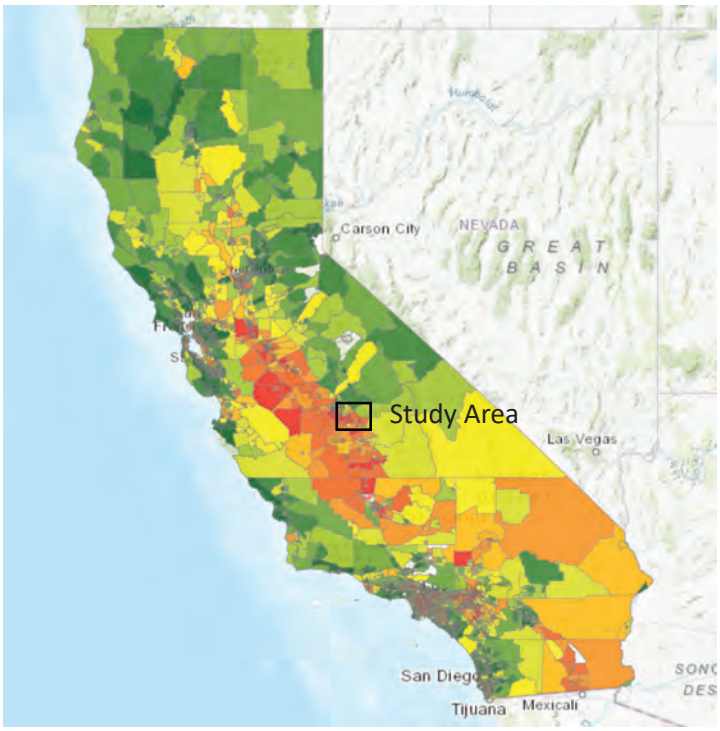
Figure 3-2 presents low-income communities (per AB 1550) and disadvantaged communities (per SB 535). As shown, many of the project area cities and parts of unincorporated Fresno County are designated as disadvantaged and low-income communities. For the entire study area, Manning Avenue traverses communities that are designated as either disadvantaged or low-income, with most of the corridor designated as both. Along Academy Avenue, unincorporated communities north of Sanger and between Parlier and Kingsburg are not designated as disadvantaged or low-income, however the rest of the north-south corridor is designated as both.

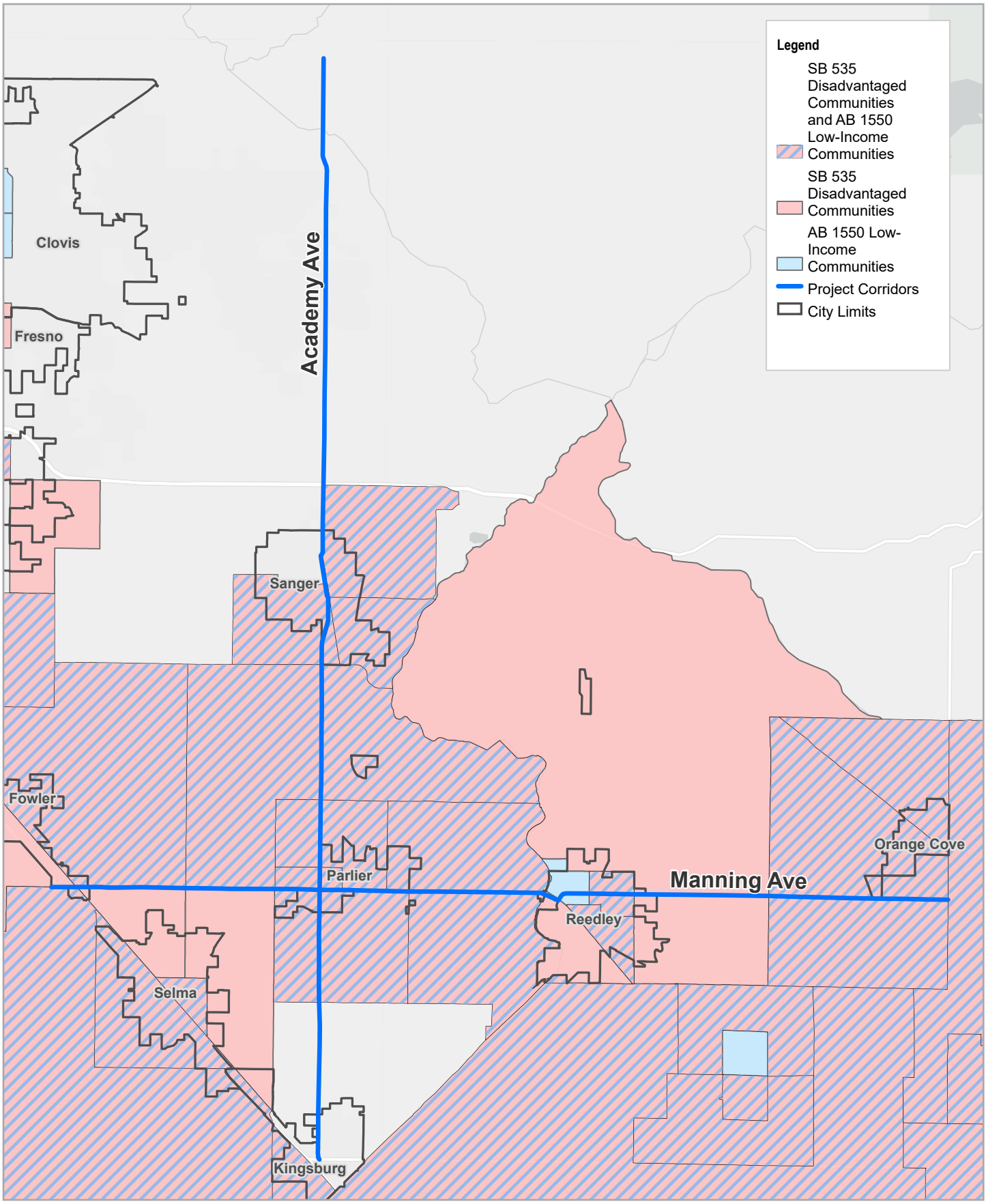
Figure 3-1. CalEnviroScreen Results for Study Area



CalEnviroScreen 3.0 Results
June 2018 Update

- 91 - 100%
- 81 - 90%
- 71 - 80%
- 61 - 70%
- 51 - 60%
- 41 - 50%
- 31 - 40%
- 21 - 30%
- 11 - 20%
- 1 - 10%





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EASTSIDE TRANSPORTATION IMPROVEMENT CORRIDOR STUDY

GHD

Fresno Council of Governments
Eastside Transportation Corridor Study

Low Income and Disadvantaged Communities

Project No. 11210046
Revision No. -
Date January 2021

FIGURE 3-2

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Data source: Light Gray Base: Fresno County Dept. PWP, Esri, HERE, Garmin, SafeGraph, METI/NASA, USGS, Bureau of Land Management, EPA, NPS, USDA.
Created by: pthornton

4. Existing & Projected Land Use Patterns

General Plan Policy and Land Use Review

Purpose

This section summarizes the goals, policies, and land use and zoning designations of the eight cities and Fresno County that are relevant to the planning for future improvements to Academy and Manning Avenues (Eastside Corridor). This section also describes planned future projects in the Corridor. The intent is to provide an overview of existing conditions to achieve an understanding of the issues and challenges that have had or will have an impact on the Corridor.

Study Area/Land Use Map

Figure 4-1 shows the full extent of the Eastside Corridor Study Area. It encompasses portions of Academy and Manning Avenues in Fresno County. The figure, along with subsequent figures showing segments of the Corridor, illustrates planned land uses along the two corridors based on the general plans of jurisdictions in the study area. The land uses were compiled by using and comparing the following three data source types:

- Fresno Council of Governments (FCOG) shape file with compiled General Plan land use data.
- Public Review Draft Fresno County General Plan.
- City General Plan land use diagrams.

There are, however, some discrepancies between sources, mainly between FCOG data and the city general plan maps. Figure 4-1 prioritizes FCOG data based on the assumption that FCOG has periodically updated the general plan land use data for the Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS). The city general plans were used to inform the few areas where there was missing data. Land uses in unincorporated Fresno County were informed by the most recent Public Review Draft Fresno County General Plan. Areas within city Spheres of Influence (SOI) are based on city planned land uses.

Methodology

Land use data for parcels adjacent to or fronting on Academy and Manning Avenues was compiled from the 2018 FCOG RTP/SCS and eight local General Plans and for Kingsburg, the North Kingsburg Specific Plan. Zoning designations were reviewed for consistency with the land use designations. The Land Use and Circulation Elements of the adopted General Plans for seven of the eight cities, as well as for Fresno County were compiled in a Policy and Program Matrix and classified using 13 criteria (see Appendix A).

Based on direction from City staff, the North Kingsburg Specific Plan (instead of the Kingsburg General Plan) policies and programs were used for the policy analysis. Policies and programs classified as auto priority or road expansion were considered potentially inconsistent with the Eastside Corridor project objectives.

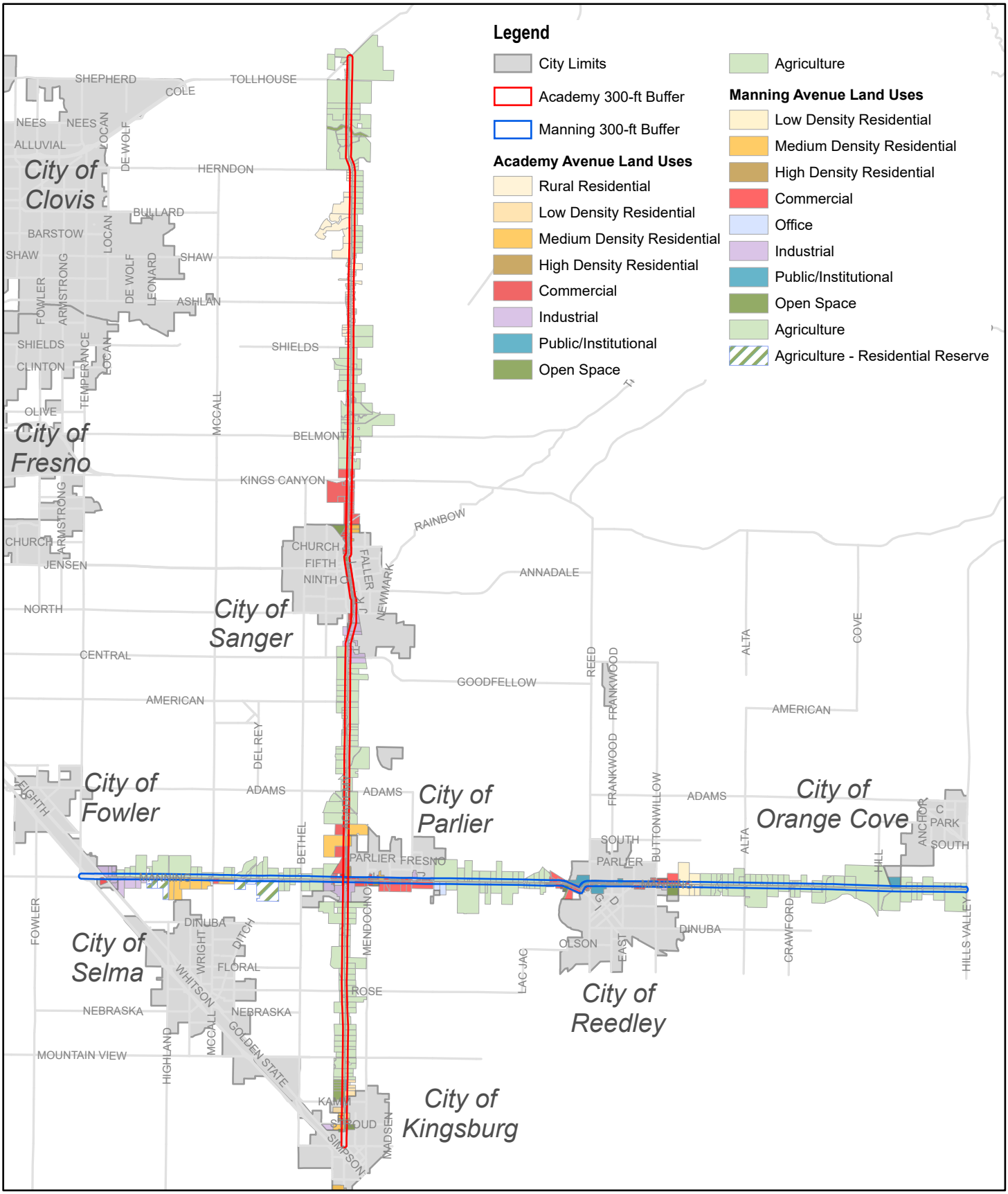
Fresno County

Key Findings

- Unincorporated areas adjacent to the Eastside Corridor are largely undeveloped and predominately agricultural or very low density rural residential.
- No major developments are planned in the Corridor outside the cities and adjacent urban areas.
- Most of the unincorporated areas designated for commercial or industrial development are in city Spheres of Influence and will likely require annexation and connection to city services to develop.
- While there is some support in County circulation policies for future roadway widening, most policy emphasis is on alternative transportation, multimodal solutions, and proactive transportation system management (TSM).

General Plan Overview

Fresno County adopted its General Plan in 2000. It has three parts: Part 1, Introduction; Part 2, Goals and Policies; and Part 3, Administration and Implementation. Part 2 includes seven elements: Economic Development, Agriculture and Land Use, Transportation and Circulation, Public Facilities and Services, Open Space and Conservation, Health and Safety, and Housing. The County adopted the 5th cycle Housing Element in 2016. The General Plan is currently undergoing a detailed policy review. A revised Plan is expected to be adopted in 2021.



EASTSIDE TRANSPORTATION IMPROVEMENT CORRIDOR STUDY

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Fresno Council of Governments
Eastside Corridor Study

Land Uses Along Eastside Corridor Study Area (Area-wide)

Project No. **11210046**
Revision No. **-**
Date **Jan 25, 2021**

FIGURE 4-1

Data source: Cities of Clovis, Fresno, Sanger, Fowler, Parlier, Selma, Kingsburg, Reedley, and Orange Cove, 2020; Fresno Council of Governments, 2020.

Land Use Designations, Zoning, Planned Development

Figure 4-1 shows the Eastside Corridor planned land uses for unincorporated Fresno County. This portion of the Corridor is largely designated as rural residential or agriculture, with some commercial uses adjacent to cities. There are limited employment-based land uses designated just east of Fowler on Manning Avenue and south of Parlier at the intersection of Manning and Academy Avenues. Most of the unincorporated areas designated for commercial or industrial development are in city SOIs and will likely require annexation and connection to city services to develop.

The areas designated for agricultural and rural residential land use have limited traffic generation potential. Outside the cities and urban fringe, no significant new travel demands in the Corridor are anticipated. There are currently no major developments planned in the unincorporated portions of the Corridor. Fresno County zoning designations in the Corridor are generally consistent with the land use designations.

Circulation Policy Summary

While Fresno County circulation policies generally support contemporary transportation system planning goals, a few policies prioritize auto use and roadway expansion. One key policy addresses the County's LOS policy as it relates to the Corridor:

> ***TR-A.2 Level of Service:*** *The County shall plan and design its roadway system in a manner that strives to meet Level of Service (LOS) D on urban roadways within the spheres of influence of the cities of Fresno and Clovis and LOS C on all other roadways in the county.*
>
> *Roadway improvements to increase capacity and maintain LOS standards should be planned and programmed based on consideration of the total overall needs of the roadway system, recognizing the priority of maintenance, rehabilitation, and operation of the existing road system.*
>
> *The County may, in programming capacity-increasing projects, allow exceptions to the level of service standards in this policy where it finds that the improvements or other measures required to achieve the LOS policy are unacceptable based on established criteria. In addition to consideration of the total overall needs of the roadway system, the County shall consider the following factors:*
>
> - *The right-of-way needs and the physical impacts on surrounding properties;*
> - *Construction and right-of-way acquisition costs;*
> - *The number of hours that the roadway would operate at conditions below the standard;*
> - *The ability of the required improvement to significantly reduce delay and improve traffic operations; and*
> - *Environmental impacts upon which the County may base findings to allow an exceedance of the standards.*
>
> *In no case should the County plan for worse than LOS D on rural County roadways, worse than LOS E on urban roadways within the spheres of influence of the cities of Fresno and Clovis, or in cooperation with*

Caltrans and the Council of Fresno County Council of Governments, plan for worse than LOS E on State highways routes in the county.

Several other policies prioritize funding for roadway rehabilitation, maintenance, and safety improvements over capacity expansion. The policies specifically prioritize TSM, such as signal synchronization and additional turn lanes over additional lanes. A great number of policies emphasize multimodal and active transportation approaches, expanded transit service, and strong regional cooperation and support between cities and FCOG. The following are examples of these policies:

> ***Policy TR-A.11*** *The County shall ensure that funds allocated directly or are otherwise available to the County for road fund uses shall be programmed and expended to maximize the use of Federal and other matching funds, and shall be based on the following sequence of priorities:*
>
> - *Maintenance, rehabilitation, reconstruction, and operation of the existing County-maintained road system;*
> - *Safety improvements where physical modifications or capital improvements would reduce the number and/or severity of accidents; and*
> - *Capital capacity improvements to expand capacity or reduce congestion on roadways at or below County LOS standards, and to expand the roadway network.*
>
> ***Policy TR-C.2*** *The County shall consider transportation system management (TSM) measures to increase the capacity of the existing roadway network prior to constructing new traffic lanes. Such measures may include traffic signal synchronization and additional turning lanes.*

Land Use Policy Summary

Fresno County land use policy as it relates to the Eastside Corridor emphasizes agricultural land preservation for those areas designated agriculture. This means a focus on minimizing new development that has the potential to generate capacity demand in the Corridor. Policy related to the limited rural residential areas assumes very low-density development, which again will minimize future Corridor capacity demand. There are no land use policies that directly address future Corridor development.

City of Clovis

Key Findings

- The Eastside Corridor (Academy Avenue in the Clovis area) is outside of the City Limits and SOI but it is the eastern boundary of the General Plan Planning Area.
- There are no City-planned land uses in or near the Corridor.
- The City of Clovis circulation policies strongly support complete streets, multimodal options, and non-auto centric traffic solutions.

General Plan Overview

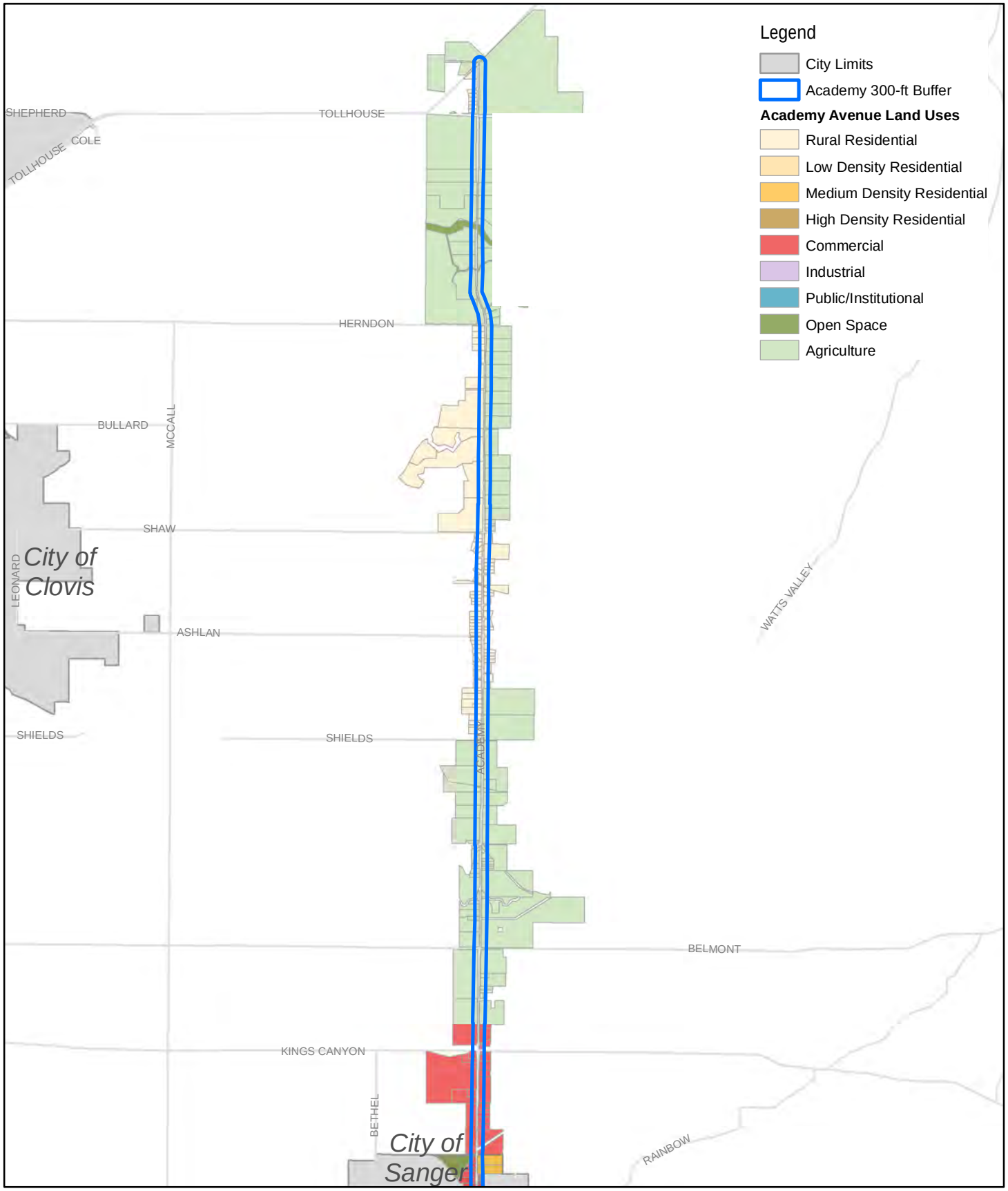
The City adopted the Clovis General Plan in 2014. It has eight elements: Land Use, Economic Development, Circulation, Housing, Public Facilities and Services, Environmental Safety, Open Space and Conservation, and Air Quality. Each element includes key issues, goals and policies. The Plan horizon

year is 2035. The primary focus of the Plan is an emphasis on preservation and enhancement of the existing community while allowing new development in three urban centers. The Plan includes a community vision and nine guiding principles:

> ***Vision Statement.*** *A City that is committed to the Clovis Community Family, their needs, their values, and a quality way of life for all; reflecting that commitment in how it develops and in the activities it undertakes.*

Guiding Principles

- ***Small Town Character.*** Preserve the authenticity of Old Town and plan new development that creates a sense of community and place.
- ***Education.*** Support access to superior lifelong education for all Clovis residents.
- ***Long-term Governance.*** Create a sustainable community through incorporating long-term thinking into short-term decision-making.
- ***Lifecycle Community.*** Create housing, employment, and lifestyle opportunities for all ages and incomes of residents.
- ***Social Capital.*** Strengthen social networks that create pride and a commitment to action within the Clovis community.
- ***Public Parks, Open Space & Trails.*** Use and design public open space resources for trails, parks, and recreation where people live, work, and play.
- ***Natural Resources.*** Foster stewardship as a primary means of conserving and enhancing natural resources and promoting connections to the Sierra.
- ***Economic Prosperity.*** Foster economic growth.
- ***Regional Engagement.*** Support regional efforts to work in an interconnected manner to improve the economy and the quality of life in the San Joaquin Valley.



EASTSIDE TRANSPORTATION IMPROVEMENT CORRIDOR STUDY

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Fresno Council of Governments
Eastside Corridor Study

Land Uses Along Eastside Corridor Study Area (East of City of Clovis)

Project No. 11210046
Revision No. -
Date Jul 14, 2020

FIGURE 4-2

Data source: Cities of Clovis, Fresno, Sanger, Fowler, Parlier, Selma, Kingsburg, Reedley, and Orange Cove, 2020; Fresno Council of Governments, 2020.

Land Use Designations, Zoning, and Planned Developments

The Eastside Corridor (Academy Avenue in the Clovis area) is outside of the City Limits and SOI but it is the eastern boundary of the General Plan Planning Area. Currently, the most eastern active development projects in Clovis are in the vicinity of Highland and Shaw Avenues in the city's southeast growth area (Loma Vista). There are no City-planned land uses in or near the Corridor.

Circulation Policy Summary

The City of Clovis circulation policies strongly support complete streets, multimodal options, and non-auto centric traffic solutions. There is major emphasis on alternative transportation and a multimodal transportation network. Examples of key policies include:

> ***Policy 1.1. Multimodal Network.*** *The City shall plan, design, operate, and maintain the transportation network to promote safe and convenient travel for all users: pedestrians, bicyclists, transit riders, freight, and motorists.*
>
> **Policy 1.3. Age and Mobility**. *The design of roadways shall consider all potential users, including children, seniors, and persons with disabilities.*
>
> ***Policy 5.1 Complete Street Amenities***. *Upgrade existing streets and design new streets to include complete street amenities, prioritizing improvements to bicycle and pedestrian connectivity or safety, consistent with the Bicycle Transportation Master Plan and other master plans.*

City Circulation policy also deemphasizes Level of Service in favor of agricultural land preservation and alternative transportation modes:

> ***Policy 2.1 Level of Service.*** *The following is the City's level of service (LOS) standards:*
>
> - *Achieve LOS D vehicle traffic operations during the a.m. and p.m. peak hours*
> - *Allow exceptions on a case-by-case basis where lower levels of service would result in other public benefits, such as*
>   - *Preserving agriculture or open space land*
>   - *Preserving the rural/historic character of a neighborhood*
>   - *Preserving or creating a pedestrian-friendly environment in Old Town or mixed-use village districts*
>   - *Avoiding adverse impacts to pedestrians, cyclists, and mass transit riders*
>   - *Where right-of-way constraints would make capacity expansion infeasible*

Land Use Policy Summary

City land use policy does not address land uses near the Corridor Study area. As noted above, the Corridor is outside the City Limits and SOI and is the Eastern boarder of the Planning Area. City land use policies generally emphasize infill development and direct development away from the undeveloped agricultural areas where the Corridor in the vicinity of the City is located.

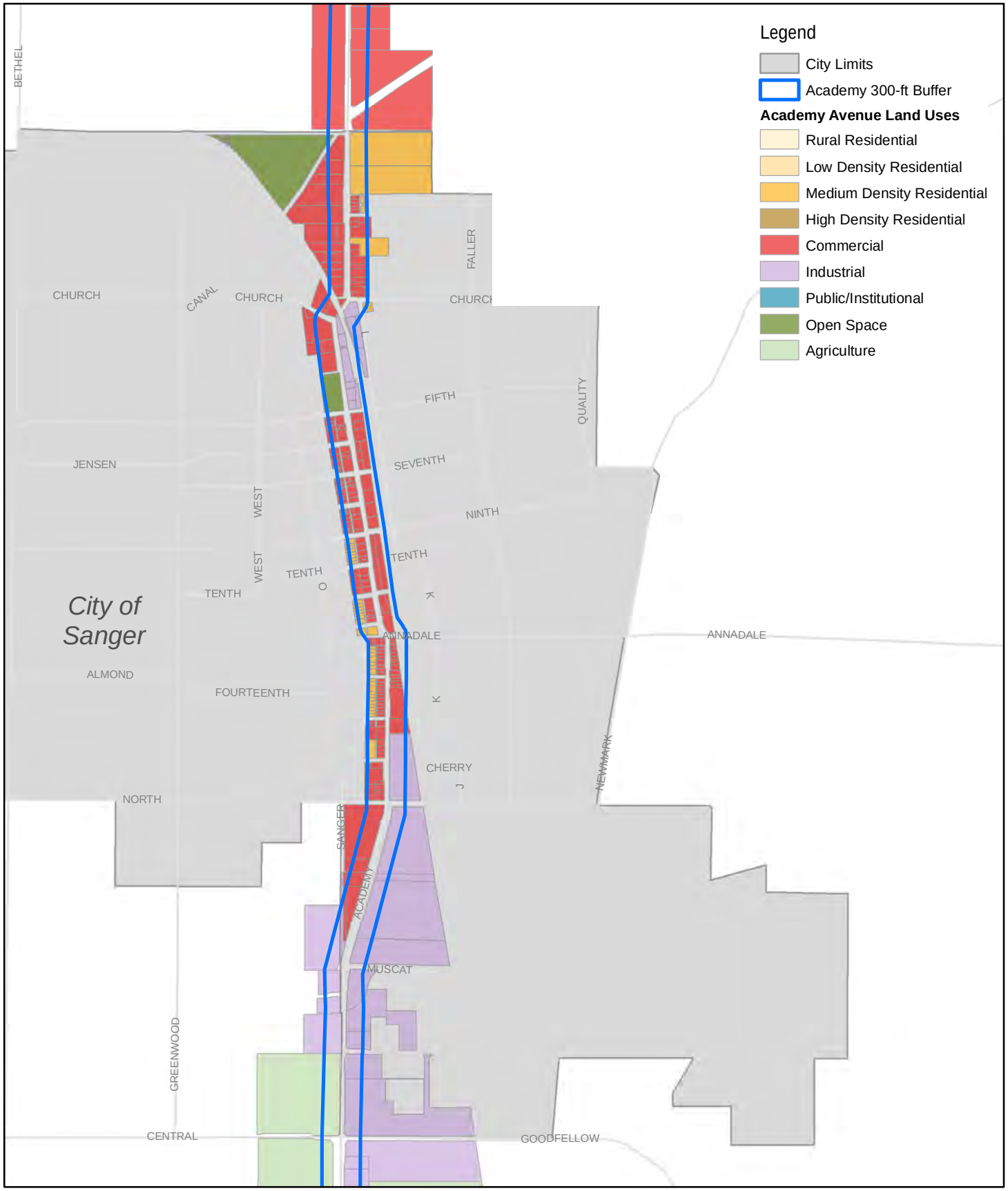
City of Sanger

Key Findings

- Academy Avenue is a major north south corridor traversing the entire city of Sanger. It is one of the busiest roadways in the city.
- There is no development currently proposed in the city that is inconsistent with the land use designations and there are no major planned development projects currently being considered by the City.
- While some Circulation Element goals and policies emphasize maintaining roadway capacity and level of services, others emphasize environmental quality and a range of transportation alternatives.
- The Land Use element includes policies and implementation programs directly related to development in the Academy Avenue Corridor. These policies and programs are primarily focused on redevelopment and improvement the city gateways and downtown.

General Plan Overview

The City of Sanger adopted the 2025 General Plan in 2003. The Plan includes and Introduction and seven elements: Land Use and Urban Form; Economic Development; Circulation and Transportation; Noise; Open Space, Recreation, and Public Facilities; Conservation; and Safety. The City adopted the 5th Cycle Housing Element in 2016. Each element includes an introduction, background information, goals, policies, and implementation programs. The Land Use Element also includes land use designations and a land use/circulation diagram.



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Fresno Council of Governments
Eastside Corridor Study

Land Uses Along Eastside Corridor Study Area (City of Sanger)

Project No. 11210046
Revision No. -
Date Jul 14, 2020

FIGURE **4-3**

Data source: Cities of Clovis, Fresno, Sanger, Fowler, Parlier, Selma, Kingsburg, Reedley, and Orange Cove, 2020; Fresno Council of Governments, 2020.

Land Use Designations, Zoning, and Planned Developments

Academy Avenue is a major north south corridor traversing the entire city of Sanger. It is one of the busiest roadways in the city. Land use within the corridor in Sanger include a broad range of commercial and industrial uses, with scattered urban residential and open space. This portion of the Corridor is largely developed, with a few vacant or underutilized parcels that could be developed for primarily commercial uses. Zoning designations are consistent with the land use designations.

Land use designations within the Corridor but outside the City Limits to the north of the city are primarily commercial; however, the land in this area is undeveloped and used for agricultural production. This area is within the City SOI and represents significant development potential. The Corridor area south of the City Limits is designated for industrial and agricultural uses; it is currently used primarily for agriculture.

There is no development currently proposed in the city that is inconsistent with the land use designations and there are no major planned development projects currently being considered by the City. The City is nearing completion of the North Academy Avenue Corridor Master Plan, but development is not expected to occur in the near future.

Circulation Policy Summary

Because the City General Plan is almost 20 years old, it does not directly address some of the more contemporary transportation topics such as complete streets, active transportation, and multimodal options. While some Circulation Element goals and policies emphasize maintaining roadway capacity and level of services, others emphasize environmental quality and a range of transportation alternatives. For example:

> ***Policy 1.2.*** *The transportation system shall be formulated in a manner that responds to concentrations of population and employment activities in areas designated for urban development by the Land Use Element.*
>
> ***Policy 3.1.*** *Priority shall be given to:*
>
> - *maintaining the existing farm-to-market rural road system within underdeveloped portions of the City limits, which supports transportation of goods and people in the City of Sanger; and*
> - *measures that improve safety and the efficient use of existing transportation facilities, particularly on heavily traveled routes. Such measures typically include low-cost improvements such as signalization, channelization and turning lanes.*
>
> ***Policy 3.2.*** *Transportation system improvements and operations shall be located and designed to promote utilization of the existing system, intermodal coordination and give priority to energy-conservation.*
>
> ***Policy 4.2.*** *The City has established a target Level of Service "C" along all major streets and highways except that LOS "D" may be allowed at intersections of any major street, highway or along street and highway segments where additional improvements are not feasible.*

***Policy 6.1**. Prepare a Community Pedestrian and Bike Trails Plan that:*

- *identifies walking and bicycle routes that are appropriate for recreational and commuter use;*
- *prepares and coordinates information systems for bicyclists and carpools;*
- *reviews and addresses the needs of pedestrians and bicyclists within the city; and*
- *encourages and supports maintenance of existing bicycles and pedestrian facilities.*

None of the goals and policies directly address Academy Avenue, although the General Plan does establish roadway standards, which do include Academy Avenue.

Land Use Policy Summary

The Land Use element includes policies and implementation programs directly related to development in the Academy Avenue Corridor. These policies and programs are primarily focused on redevelopment and improvement the city gateways and downtown.

***Policy 5.5.** Promote new development, redevelopment, and revitalization of Sanger's downtown, the Academy Avenue corridor, and the Jensen Avenue corridor.*

***Policy 6.2.** Create a sense of arrival to the City along key access routes. Design entryways to the City utilizing landscaping along major roadways entering the City as well as at key points of entry along these routes.*

***Implementation Program 6B.** Site four major gateways consisting of sequoia trees, monument signs, public art, landscaping, and other landscaping features (such as stone) at the intersections of:*

- *Central and Academy Avenues*
- *Jensen and Indianola Avenues;*
- *East Annadale Avenue and Collins Creek;*
- *Highway 180 and Academy Avenue.*

***Implementation Program 6C.** Site two minor gateways consisting of some sequoia trees and a sign announcing a traveler's approach to Sanger at the planning area boundaries at the intersections of American and Academy avenues and Jensen and Dockery avenues.*

***Implementation Program 6D.** Utilize existing rights-of-way, and where necessary purchase new rights-of-way, to create a parkway along Academy Avenue south from Kings Canyon Road. The vision for these parkways is one of the streets lined by giant sequoias and other landscaping or hard scape features.*

City of Parlier

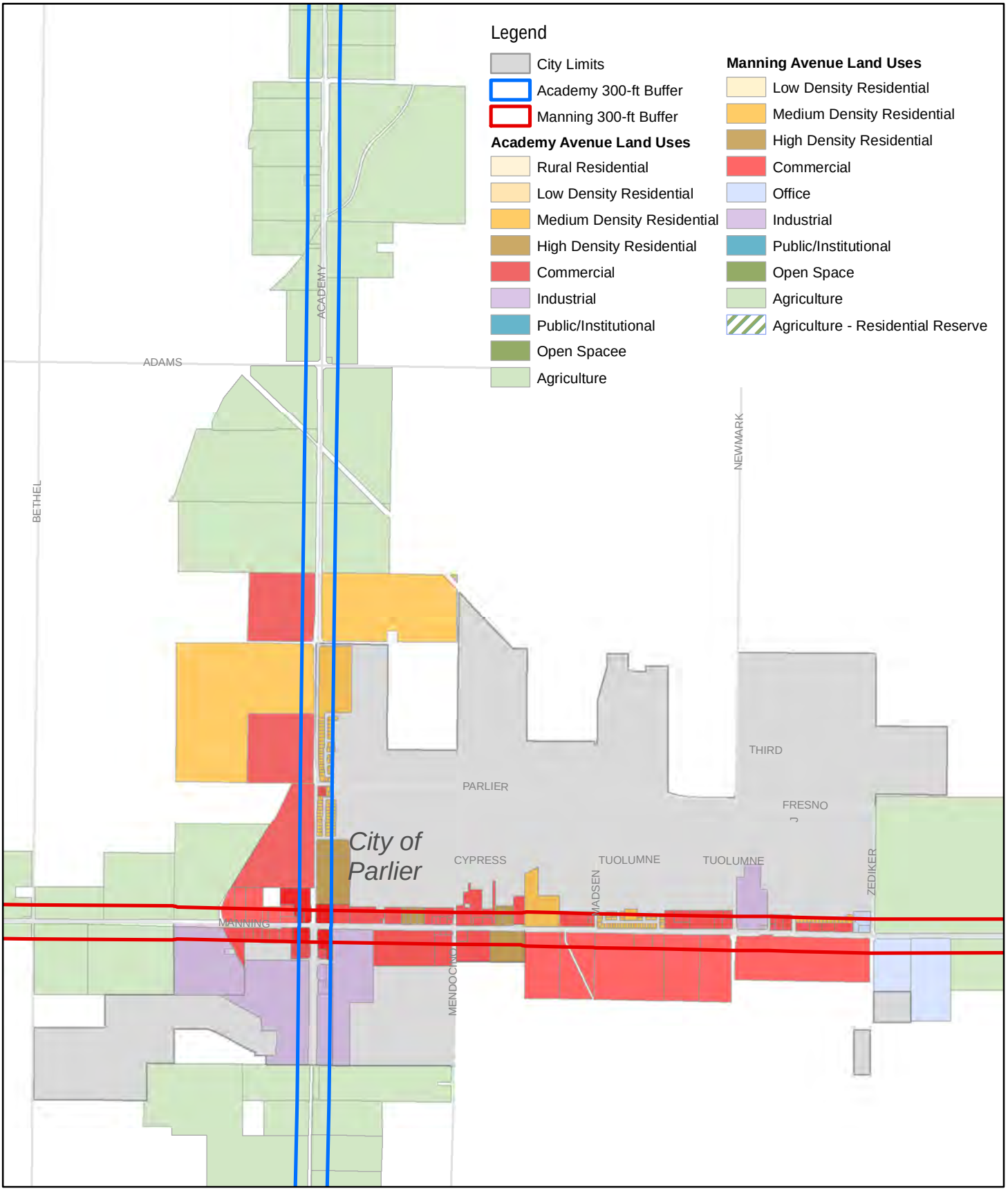
Key Findings

- The overarching goal of the General Plan is to enhance and maintain quality of life for City residents.
- Parlier is at the intersection of Academy and Manning Avenues and the Corridor Study Area.
- The Academy Avenue portion of the Corridor north of Manning Avenue is largely designated for medium and high-density residential uses on east and commercial and medium density residential to the west.
- The Manning Avenue portion of the Corridor is largely designated for commercial uses, with limited medium and high-density residential designations.
- There are no major development projects planned in the near future in the Corridors.

General Plan Overview

The City of Parlier adopted the update of the Economic Development, Land Use, Circulation, and Air Quality Elements in 2012. The City adopted the 5th cycle Housing Element in 2016. The General Plan includes an Introduction; Goals, Objectives, and Major Policies; and the four elements, each of which includes an introduction, goals, objectives, policies, and standards. A Land Use diagram is also included. The overarching goal of the General Plan is to enhance and maintain quality of life for City residents. The City anticipates a broad range of actions that:

- ***Provide for**:*
    - *Social, educational, and recreational opportunities to neighborhoods.*
    - *Emergency police, fire, and health services access.*
    - *Housing choice.*
    - *Balanced range of residential, commercial, industrial, and institutional uses,*
    - *Adequate streets, transportation facilities and public services.*
- ***Reduce** land use conflicts.*
- ***Protect** neighborhoods from traffic, noise, and crime impacts.*
- ***Prevent** environmental degradation.*
- ***Foster** economic growth, diversification, commercial services, and employment opportunities for all residents.*



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Fresno Council of Governments
Eastside Corridor Study

Land Uses Along Eastside Corridor Study Area (City of Parlier)

Project No. 11210046
Revision No. -
Date Jul 14, 2020

FIGURE 4-4

Data source: Cities of Clovis, Fresno, Sanger, Fowler, Parlier, Selma, Kingsburg, Reedley, and Orange Cove, 2020; Fresno Council of Governments, 2020.

Land Use Designations, Zoning, and Planned Developments

Parlier is at the intersection of Academy and Manning Avenues and the Corridor Study Area. The two roadways are on the western and southern edges of the urban area. The Academy Avenue portion of the Corridor north on Manning Avenue is largely designated for medium and high-density residential uses on east (within the City limits) and commercial and medium density residential to the west, which is planted with grapes and outside the City Limits. The intersection of Academy and Manning Avenues is designated for commercial and industrial uses but except for a used auto dealer, the land is vacant. The northern and southern portions of the Academy Avenue Corridor in the Parlier SOI are designated for agriculture.

The Manning Avenue portion of the Corridor is largely designated for commercial uses, with limited medium and high-density residential designations. With the exception of some high density residential, commercial, and light industrial development on the south side of Manning Avenue at South Mendocino Avenue, the area south of Manning is in agricultural use. There is potential for significant future commercial development on the south side of the Manning Avenue Corridor.

There are no major development projects planned in the near future in the Corridors. Most of the existing and near-term projects are smaller, retail developments near the intersection of Academy and Manning Avenues. Zoning is generally consistent with the land use designations within the City limits. Zoning outside the City limits is generally for agriculture uses.

Circulation Policy Summary

City circulation policies emphasize roadway design and street standards. A number of policies support development of a bikeway system in the city. A few policies prioritize LOS C and efficient automobile traffic flow. One policy emphasizes design solutions rather than roadway expansion:

> ***Policy 5.9A.6*** *Make intersection improvements to the existing major street system selectively through traffic engineering solutions rather than major structural improvements. This could include signalization, intersection channelization, use of directional signs, and diversion of traffic onto underutilized streets.*

Several policies directly address Academy and Manning Avenues:

> ***Policy 5.10.A.1*** *Continue to support Academy Avenue as the preferred route for the "Fresno County Southeast Corridor" connecting Highway 99 with Highway 180.*

> ***Policy 5.10.A.2*** *Cooperate with adjacent communities and Fresno County to improve the principal gateways to Parlier (Manning, Academy, Mendocino) to facilitate the movement of traffic into and out of the City.*

> ***Policy 5.10A.5*** *Work with Caltrans and the cities of Fowler, Selma, Reedley, and Orange Cove to address necessary improvements on Manning Avenue, general circulation issues in this corridor and impacts on and mitigation for the Manning Avenue/State Route 99 interchange.*

Land Use Policy Summary

City land use policies support well-planned, contiguous growth. They discourage premature conversion of agricultural land to urban uses. Selected objectives, policies, and standards address future development in the Corridor vicinity:

> ***Policy 2.3.A.11*** *As primary entrances to the City, Manning Avenue, Academy Avenue, and Mendocino Avenue should reflect higher standards of development. To promote these higher standards, a boulevard overlay district should be developed in the zoning ordinance to contain provisions for minimum building setbacks, landscaping, sidewalk pattern and street furniture, with distinctions made between upgrade of existing uses and new development. Proper orientation, design and architectural features shall be regulated through the site plan review process.*
>
> ***Objective 2.4.A*** *Prepare Specific Plans for the downtown area, the Mendocino Avenue corridor and the Academy/Manning Industrial Area.*
>
> ***Policy/Standards 2.4.A.3*** *A major new industrial area is to be developed south of Manning, both east and west of Academy. Initial industrial development can occur adjacent to these arterial roadways with existing zoning and site plan controls. A specific plan should be prepared for the larger industrial area which includes provisions for circulation, infrastructure, parcelization, entry treatment, and other land use controls in anticipation of industrial development.*

City of Kingsburg

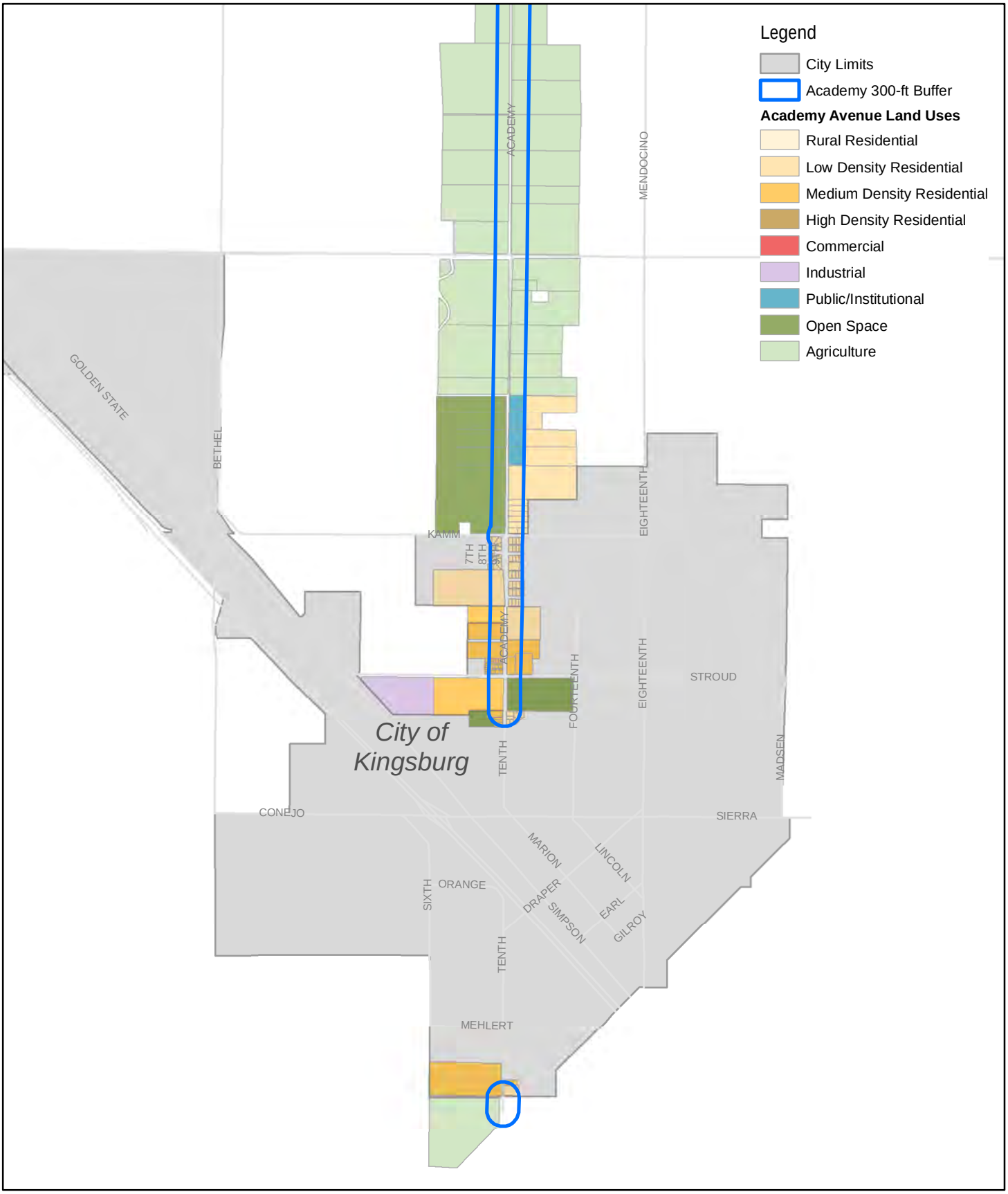
Key Findings

- The Academy Avenue Corridor bisects the North Kingsburg Specific Plan area.
- The land use designations for the Academy Avenue Corridor are residential, semi-public, and school. There are no areas in the Corridor designated for commercial or industrial uses.
- The only planned developments in the Corridor are residential. No future high traffic-generating uses are anticipated by the City.
- The Specific Plan includes a limited number of circulation objectives and policies. These are focused on providing a well-designed, efficient circulation system for future development of the area.

North Kingsburg Specific Plan Overview

The City 0f Kingsburg adopted the North Kingsburg Specific Plan in 2005 and serves as the primary instrument of the City for carrying out urban development proposals of the Comprehensive General Plan for the Swedish Village of Kingsburg (General Plan) as they apply in North Kingsburg. The Specific Plan has seven parts: Introduction and executive Summary; Plan Goals and Objectives; Land Use and Circulation Proposals; Utility Infrastructure; Community Design Standards for North Kingsburg Village; Community Design Standards for the Industrial Corridor; and Implementation; The Specific Plan has three specific functions, including:

- *Interpreting the policies and proposals of the General Plan.*
- *Describing and illustrating the ways in which private and public projects may be designed in a manner consistent with goals, policies and proposals of the General Plan.*
- *Setting forth the process of development regulation that is to be applied to private and public development actions.*



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Fresno Council of Governments
Eastside Corridor Study

Land Uses Along Eastside Corridor Study Area (City of Kingsburg)

Project No. 11210046
Revision No. -
Date Jul 16, 2020

FIGURE 4-5

Data source: Cities of Clovis, Fresno, Sanger, Fowler, Parlier, Selma, Kingsburg, Reedley, and Orange Cove, 2020; Fresno Council of Governments, 2020.

Land Use Designations, Zoning, and Planned Developments

The land use designations for the Academy Avenue Corridor are residential, semi-public, and school. There are no areas in the Corridor designated for commercial or industrial uses. The portion of the Corridor within the existing City Limits is developed as low-density residential uses or is vacant. The Corridor outside the City limits but within the SOI and Specific Plan area is generally in agricultural uses. The zoning within the City limits is consistent with the land use designations. Outside the City limits, the Specific Plan designations will presumably be implemented with consistent zoning when the area is annexed to the City. The only planned developments in the Corridor are residential. No future high traffic-generating uses are anticipated by the City.

Circulation Policy Summary

The North Kingsburg Specific Plan describes the anticipated improvements to the Academy Avenue Corridor (which is also named 10th Avenue in Kingsburg):

> *10th Avenue (Academy Avenue) would extend from Kamm Avenue north toward Mountain View Avenue as a four-lane divided facility with a landscaped median and parkway landscaping to create a shaded boulevard. With back-on residential development separated from the street by ornamental walls and landscaped corridors with a meandering walkways, on-street parking lanes would not be required, only shoulders. Between Kamm Avenue and Sierra Street, 10th Avenue (Academy Avenue) would be developed as a four-lane facility without on-street parking lanes or median islands because of the restricted area available for right-of-way widening. North of Caruthers Avenue, 10th Avenue would intersect a diagonal road running southwesterly to the Kamm-Bethel Avenue interchange with Freeway 99.*

The Specific Plan includes a limited number of circulation objectives and policies. These are focused providing a well-design, efficient circulation system for future development of the area. Key objectives are:

> ***Objective O.5.B*** *Implement a diversified multi-modal transportation system between North Kingsburg and activity centers of the community, including schools, the Central Business District, the City's principal highway commercial area centering on the Sierra Street interchange with Freeway 99, and principal employment areas along the Industrial Corridor.*
>
> ***Objective O.7.****A Provide a safe and efficient circulation system that will accommodate necessary motorized vehicular trips, but which emphasizes the ease and convenience of pedestrian and bicycle travel and public transit.*
>
> ***Objective O.7.B*** *Participate in planning for circulation and/or transportation improvements that benefit surrounding communities and the San Joaquin Valley region.*

Land Use Policy Summary

There are no land use policies in the North Kingsburg Specific Plan directly addressing the Academy Avenue Corridor. Future improvements to Academy Avenue are generally considered in terms of supporting the planned residential and related development in the Plan area.

City of Fowler

Key Findings

- The western end of the Manning Avenue portion of the Eastside Corridor begins at the southern tip of the City of Fowler.
- Land use designations in the area are highway commercial, heavy industrial, and agriculture.
- Only a small portion of the Corridor is in the Fowler City Limits, which are coterminous with the city SOI.

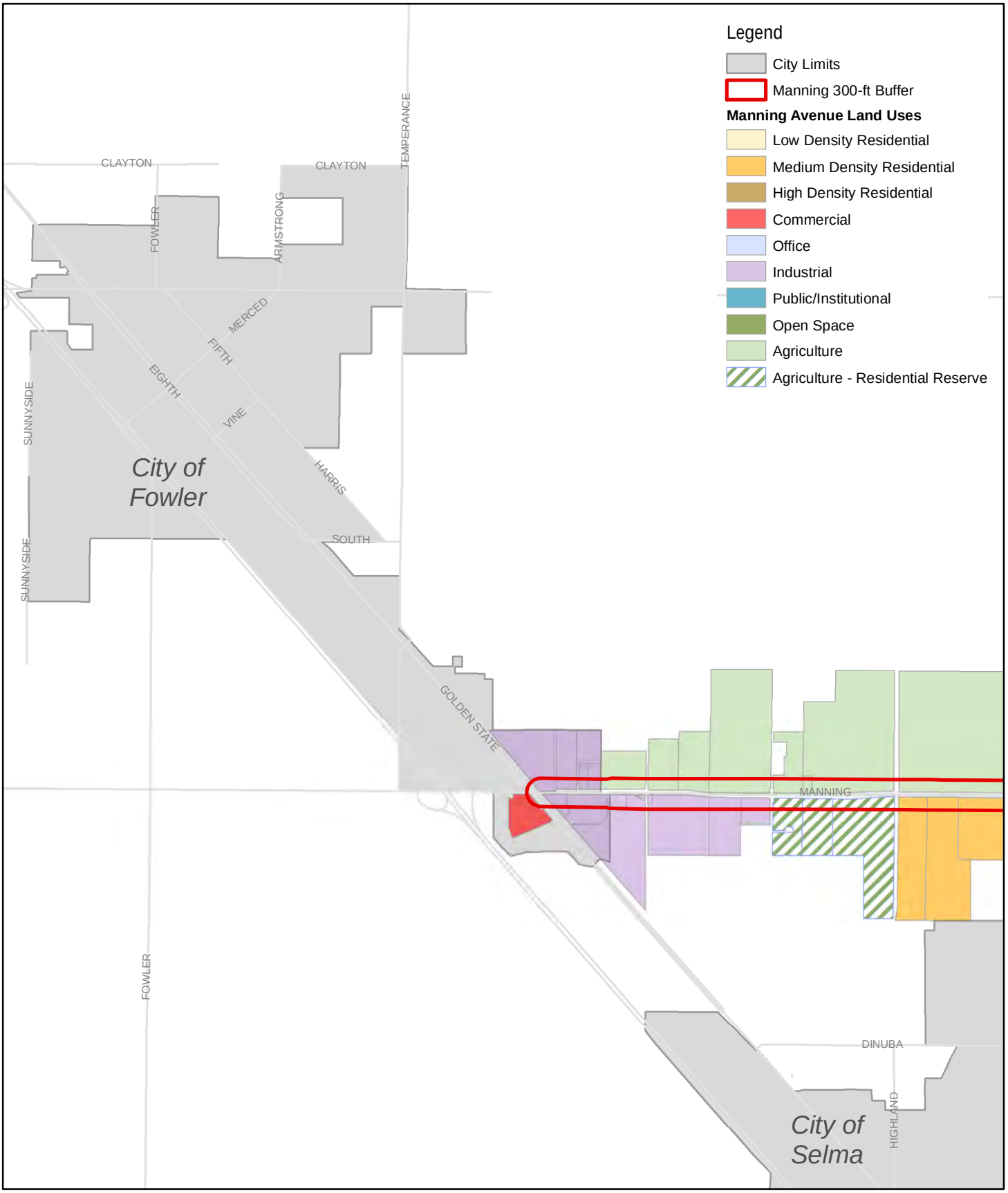
General Plan Overview

The City of Fowler 2025 General Plan Land Use, Economic Development, and Circulation Elements were adopted in 2004. The City adopted the 5th cycle Housing Element in 2016. The 2025 General Plan consists of five parts: Purpose and Scope of the General Plan; Goals of the General Plan; Economic Development; Land Use Element; and Circulation Element. The Plan preparation was guided by six concepts:

- *Establishing limits to urban growth that will maintain Fowler as a freestanding City surrounded by agricultural land.*
- *Maintaining an economically and socially diverse population by promoting a greater variety of housing types citywide.*
- *Providing commercial and industrial sites consistent with Fowler's growth.*
- *Using Growth Management to implement general plan policies and quality of life objectives.*
- *Providing for a high quality of life for existing and future residents.*
- *Downtown Fowler.*

The major goals of the Fowler General Plan are:

- *Fostering economic growth, diversification, and the provision of commercial services and employment opportunities.*
- *Providing social, educational, and recreational opportunities to neighborhoods; providing sufficient access for police, fire and health services; and protecting neighborhoods from adverse effects of traffic, noise and crime.*
- *Preventing degradation of the natural and man-made environment and offsetting degradation which may already have occurred.*
- *Providing a choice of housing location for all persons, regardless of race, sex, cultural origin, marital status, or physical ability.*
- *Reducing land use conflicts while providing a balanced range of residential, commercial, industrial, and institutional uses.*
- *Providing adequate streets, transportation facilities, and public services to accommodate existing and future populations.*



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Fresno Council of Governments
Eastside Corridor Study

Land Uses Along Eastside Corridor Study Area (City of Fowler)

Project No. 11210046
Revision No. -
Date Jul 14, 2020

FIGURE 4-6

Data source: Cities of Clovis, Fresno, Sanger, Fowler, Parlier, Selma, Kingsburg, Reedley, and Orange Cove, 2020; Fresno Council of Governments, 2020.

Land Use Designations, Zoning, and Planned Developments

The western end of the Manning Avenue portion of the Eastside Corridor begins at the southern tip of the City of Fowler. Land use designations in the area are highway commercial, heavy industrial, and agriculture. Only a small portion of the Corridor is in the Fowler City Limits, which are coterminous with the city SOI. The zoning designations within the city are consistent with the land use designations. There are no near-term planned developments in this area of the Corridor.

Circulation Policy Summary

The Circulation element includes a broad range of policies addressing every aspect of the circulation system. While a few policies support LOS C, many policies prioritize active transportation modes, implementation of transportation system management, and regional cooperation to address future traffic issues. Some key goals and policies include:

> ***Policy 5.8.3*** *Cooperate with adjacent communities and Fresno County to improve the principal gateways to Fowler (Golden State Boulevard, Manning, Adams, and Fowler) to facilitate the movement of traffic into and out of the City.*
>
> ***Policy 5.10.1*** *Encourage transit alternatives to meet the basic transportation needs of the young, the elderly, the disabled, and people without access to an automobile.*
>
> - *Maintain opportunities for a transit center within the City where alternative transit modes would connect.*
> - *Encourage and provide for ride sharing, park and ride, and other similar energy saving and air emission reduction programs.*
>
> ***Policy 5.12.2*** *Give priority to bikeways that will serve the highest concentration of cyclists and destination areas of highest demand.*
>
> ***Policy 5.12.4*** *Provide bikeways in proximity to major traffic generators such as commercial centers, schools, recreational areas, and major public facilities.*
>
> ***Goal 5.13*** *Design, construct, and operate the transportation system in a manner that maintains a high level of environmental quality.*
>
> ***Goal 5.****14 Support the use of Transportation Demand Management (TDM) strategies to reduce dependence on the single-occupant vehicle, increase the ability of the existing transportation system to carry more people, and enhance mobility along congested corridors.*
>
> ***Goal 5.15*** *Utilize Intelligent Transportation Systems (ITS) to improve the safety and performance of the surface transportation system using new technology in detection, communication, computing, and traffic control.*

Land Use Policy Summary

The land use policies in the Fowler General Plan focus largely on residential, commercial. And Downtown development, which do not address the Manning Avenue Corridor. The industrial policies focus generally on development impacts and standards. One policy is directly focused on Corridor development:

> ***Policy 4.6.****4 Major streets which pass through industrial areas and serve as entrances to the City shall receive special design treatment to reduce aesthetic impacts and traffic concerns. Measures for industrially zoned parcels shall be as follows:*
>
> - *The minimum building setback from the right-of-way line shall be 40 feet.*
> - *There shall be a minimum 10-foot landscaped area adjacent to the right-of-way.*
> - *Efforts should be made to consolidate driveways along common property boundaries, where possible.*
> - Signs shall be low profile and non-rotating.

City of Selma

Key Findings

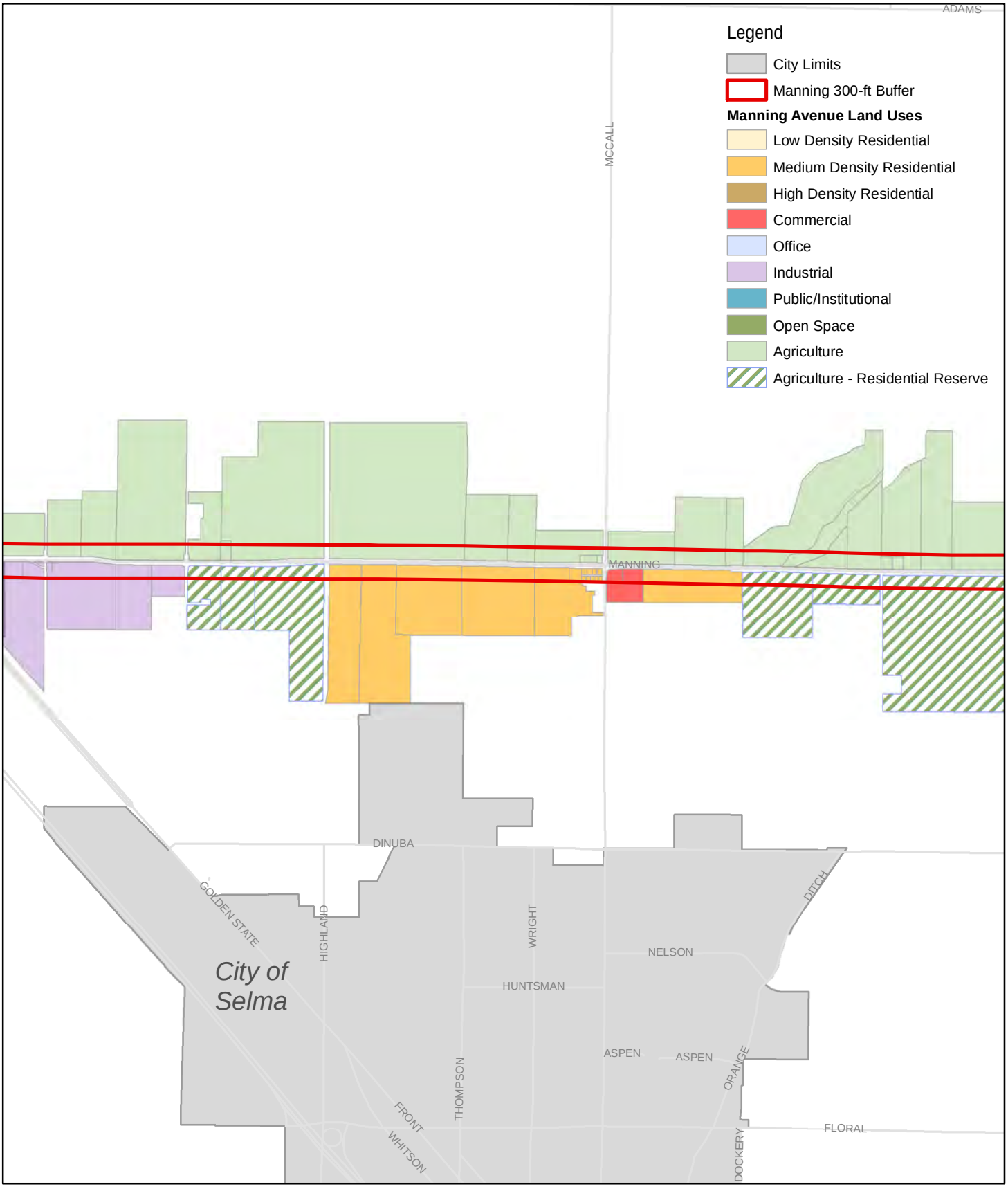
- The Manning Avenue Corridor is located north of the Selma City limits and in on the northern boundary of the city SOI.
- County land use designations for this portion of the Corridor are primarily for agriculture, but also include a range of medium density residential and commercial uses near the intersection with South McCall Avenue.
- The City has no near or long term planned developments in the Corridor.
- Most of the City Circulation Element goals, objectives, and policies focus on contemporary transportation policies that emphasize a range of transportation solutions.

General Plan Overview

The City adopted the Selma General Plan 2035 in 2010. The Plan includes six elements: Land Use; Circulation; Noise; Safety; Open Space, Conservation, and Recreation; and Public Facilities and Services. The City adopted the 5th Cycle Housing Element in 2016. The key issues that shaped the Plan include:

- *The community needed more walkable, neighborhood-oriented subdivisions.*
- *Selma needed to maintain its "small town" atmosphere.*
- *More mix of uses were needed in the downtown area.*
- *More recreational opportunities were needed in all areas of town.*
- *More senior housing was needed throughout town.*
- *Expansion was needed of the city-wide bike/pedestrian path system.*

- *More variety needed in housing (recessed/detached garages, smaller setbacks, mix of housing).*
- *New Industrial development needed to be an expansion of existing industrial areas.*
- *Selma needed to be more balanced on both sides of SR 99.*
- *Railroad tracks and SR 99 were aesthetic and noise nuisances.*
- *Only two SR 99 interchanges in the community led to traffic congestion.*



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Map Projection: Lambert Conformal Conic
Horizontal Datum: North American 1983
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Fresno Council of Governments
Eastside Corridor Study

Land Uses Along Eastside Corridor Study Area (City of Selma)

Project No. 11210046
Revision No. -
Date Jul 14, 2020

FIGURE 4-7

Data source: Cities of Clovis, Fresno, Sanger, Fowler, Parlier, Selma, Kingsburg, Reedley, and Orange Cove, 2020; Fresno Council of Governments, 2020.

Land Use Designations, Zoning, and Planned Developments

The Manning Avenue Corridor is located north of the Selma City limits on the northern boundary of the city SOI. County land use designations for this portion of the Corridor are primarily for agriculture, but also include a range of medium density residential, and commercial uses near the intersection with South McCall Avenue. A small amount of industrial land use designation is located in the western portion, near Fowler. The zoning is generally consistent with the land use designations. The City has no near or long term planned developments in the Corridor.

Circulation Policy Summary

The circulation policies, as typical on most General Plans, address abroad range of circulation and transportation issues, including level of service, roadway classifications, street design, access, safety, connectivity, active transportation modes, transit, and funding. The Plan includes an objective and policies that prioritize auto traffic flow:

> ***Objective 1A*** *Maintain a roadway level of service (LOS) of D or better for intersections and road segments for Minor Collectors, Collectors, Arterials, Major Arterials, and Highways; where other jurisdictions control and manage roadways, their respective level of service standards shall prevail on applicable segments. In order to avoid using Local streets for excessive through traffic, a LOS of B is established for Local streets.*
>
> ***Policy 1.2.13*** *Arterials shall be improved to four lanes, with appropriate variations in intersection design to alleviate special traffic problems where necessary. Major arterials shall be improved to six lanes, with appropriate variations in intersection design to alleviate special traffic problems where necessary.*
>
> ***Policy 1.2.32*** *To continue to provide a high level of service to the community, the City designates Service Level "D" as defined in the Highway Capacity Manual as the minimum desirable service level at which freeways, expressways, major arterials, arterials and collector streets should operate. All new facilities in these categories shall be designed to operate at this level or better for a period of at least 20 years following their construction.*

Most goals, objectives, and policies focus on contemporary transportation policies that emphasize a range of transportation solutions. Examples of these are:

> ***Goal 1*** *To design and maintain a fully integrated local network that provides for safe and convenient circulation using a variety of transportation modes.*
>
> ***Objective*** *1D Design streets that promote safe and pleasant conditions for residents, pedestrians, bicyclists, and motorists on neighborhood streets, while preserving access for emergency vehicles, buses, and other users.*
>
> ***Policy 1.2.30*** *Major arterial, arterial, collector, minor collector, and local street standards shall be developed to provide an increased quality of life for residential neighborhoods, a more attractive bike and pedestrian environment, conservation of natural resources and adequate capacity for their appropriate function. These new standards shall be incorporated into the City's Standard Specifications for Public Works.*

Policy 1.2.47 *The City shall promote safe, convenient, and accessible pedestrian ways within the community.*

Policy 1.2.61 *Transportation System Management and Transportation Demand Management are the applicable strategies for the mitigation of traffic and parking congestion. Public transit, traffic management, ridesharing and parking management are to be used to the greatest extent practical to implement transportation management strategies.*

Land Use Policy Summary

The land use policies focused on the existing urbanize area of Selma. There were few policies that directly related to the Manning Avenue Corridor. The following policy provides some direction for future Corridor development.

Policy 3.1.20 *Support smart growth principles that advance mixed use, higher density, walkable, bikeable and accessible neighborhoods, which coordinate land use and transportation with open space areas for recreation. Promote green/sustainable building standards for private residential, multifamily, and commercial projects.*

City of Reedley

Key Findings

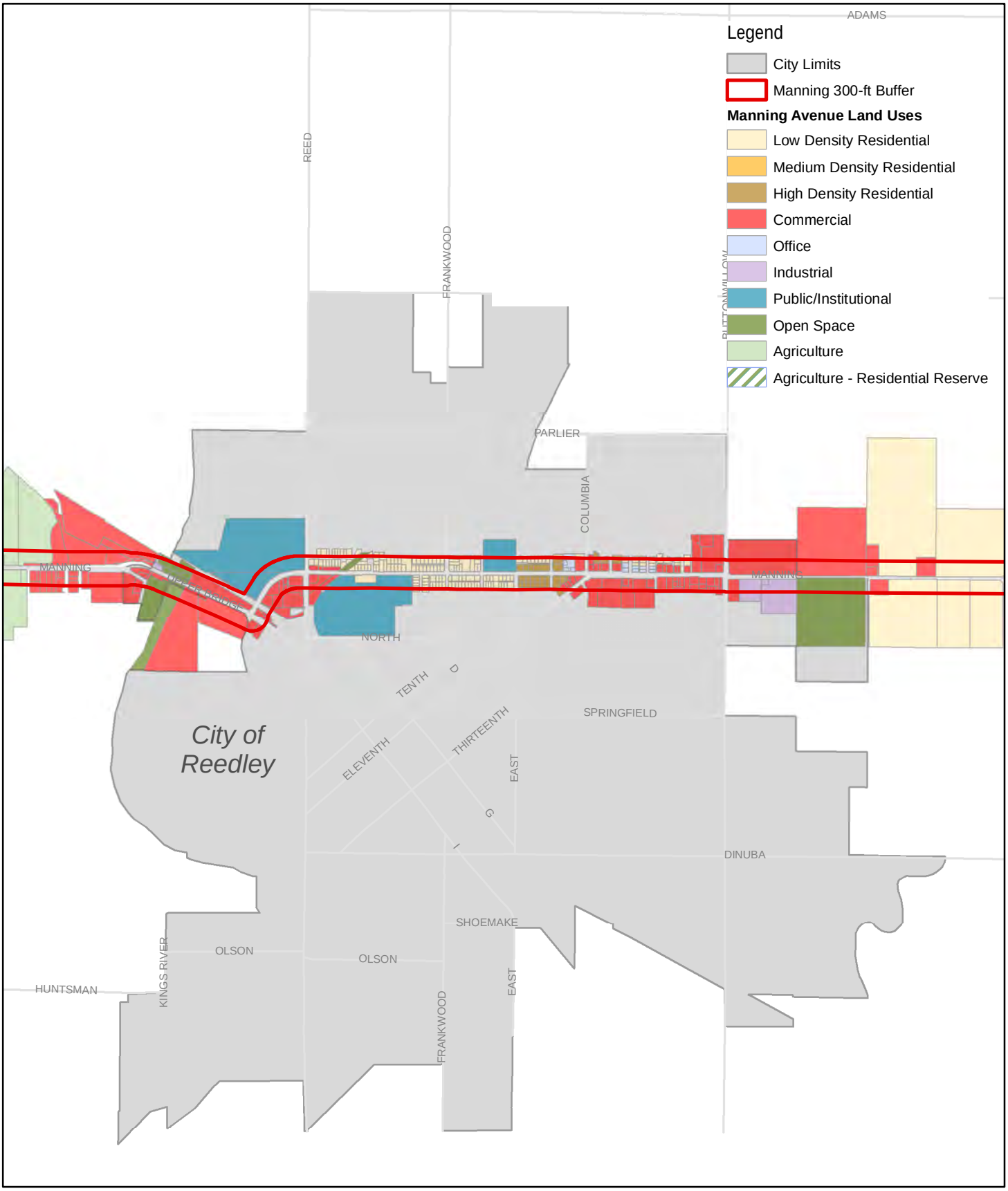
- The land use designations in the Manning Avenue Corridor in Reedley include a broad mix of residential commercial, light industrial, and public land uses typical of an urbanized area.
- The Manning Avenue Corridor is largely built-out within the City Limits.
- The Corridor east and west of the City Limits is in agriculture use.
- There are several commercial and residential development projects in the Corridor that have been recently completed, are under construction, or in the application approval process.
- While it is the City's goal to prioritize LOS C or better for automobiles, several goals and policies support active transportation modes, particularly bicycles.
- The Land Use Element includes goals and policies addressing a broad range of land uses and future development in the city and Manning Avenue Corridor.

General Plan Overview

The City of Reedley adopted the 2030 General Plan in 2014. The Plan consists of an Introduction and six elements: Land Use; Circulation; Conservation, Open Space, Parks, and Recreation; Safety; and Noise. The City adopted the 5th cycle Housing Element in 2016. The overarching goal of the City of Reedley General Plan 2030 is to accomplish the following focal points:

- *Establish a long-range vision and plan for the community that reflects the need and desire of the citizenry.*
- *Maintain Reedley's small-town atmosphere.*

- *Incorporate the Reedley Specific Plan, the Rail Corridor Master Plan, and the Southeast Reedley Industrial Area Specific Plan into a single document.*
- *Ensure neighborhood connectivity and walkability orientation through subdivision design.*
- *Provide more opportunities for mixed use projects.*
- *Preserve and expand the core of Reedley.*
- *Encourage more variety and blends of housing types.*
- *Provide adequate educational facilities.*
- *To provide economic stability, encourage a diversified job base, expand local economy while enhancing local and regional shopping opportunities.*



EASTSIDE TRANSPORTATION CORRIDOR IMPROVEMENT STUDY

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Fresno Council of Governments
Eastside Corridor Study

Land Uses Along Eastside Corridor Study Area (City of Reedley)

Project No. 11210046
Revision No. -
Date Jul 14, 2020

FIGURE **4-8**

Data source: Cities of Clovis, Fresno, Sanger, Fowler, Parlier, Selma, Kingsburg, Reedley, and Orange Cove, 2020; Fresno Council of Governments, 2020.

Land Use Designations, Zoning, and Planned Developments

The land use designations in the Manning Avenue Corridor in Reedley include a broad mix of residential commercial, light industrial, and public land uses typical of an urbanized area. Reedley College, Reedley High School, and St. La Salle School are located on the Corridor. Low density residential and commercial uses are also prevalent in the Corridor. The Corridor is largely built-out within the City limits. The Corridor east and west of the City Limits is in agriculture use. City zoning is generally consistent with the land use designations. City staff indicates there are several commercial and residential development project in the Corridor that have been recently completed, are under construction, or in the application approval process.

Circulation Policy Summary

While it is the City's goal to prioritize level of service C or better for automobiles, which is fairly common among cities on the Corridor, several goals and policies support active transportation modes, particularly bicycles. There are no policies that directly address achievement of LOS C, particularly related to increased roadway capacity.

> ***Goal 3.2B*** *Maintain a level of service (LOS) of "C" or better.*

The following goals and policies emphasize bicycle transportation and traffic calming measures. The Land Use Element (below) includes a Complete Streets goal that is supported by these policies.

> ***Goal 3.2A*** *The City will design and maintain a fully integrated local transportation network that provides for the movement of people and goods in an orderly, safe, and efficient manner.*

> ***Goal 3.2E*** *Provide a street and highway system which can accommodate alternative modes of travel.*

> ***Policy 3.2.22*** *The City should insure that planned streets and highways operate to their maximum efficiency by coordinating their multi-modal use as follows:*
>
> - *Develop bikeways in accordance with the City Bikeways Plan.*
> - *Consider the need for transit and bikeway facilities when establishing the ultimate rights-of-way of streets and highways.*
> - *The City should prepare typical roadway cross sections which define standards for transit and bikeway facility improvements.*
> - *Provide additional rights-of-way and improvements off of the travel way of arterial and collector streets where deemed necessary for public transportation.*
> - *Provide areas for pedestrian travel which will enhance the safety and efficiency of the street system.*

> ***Policy 3.2.25*** *The City shall encourage the use of traffic calming designs such as roundabouts, bulb-outs, etc., where they will improve the operation or LOS of a street.*

> ***Policy 3.4.2*** *Bikeways should be designated near major traffic generators such as commercial and employment centers, schools, recreational areas, and major public facilities.*

Land Use Policy Summary

The Land Use Element includes goals and policies addressing a broad range of land uses and future development in the city. A key goal directly related to future Corridor development is the Complete Streets goal:

> ***Goal LU 2.6F*** *Street standards shall be revised to reflect Complete Streets design which includes the following:*
>
> - *Narrow street widths, particularly on local streets, to the maximum extent practical.*
> - *Revised geometrics of street intersections, including smaller turn radii.*
> - *Tree-lined streets, including parkways between the curb and sidewalk.*
> - *Along major streets, landscaped medians shall be constructed.*
> - *Revised street standards shall ensure safe and efficient access for emergency vehicles.*
> - *Roundabouts shall be located at selected street intersections to improve traffic flow, reduce air emissions and to provide community landmarks.*
> - *Circulation plans for pedestrian, bicycle and vehicle traffic shall provide for effective connections to major community facilities, such as the Kings River, Rail Trail, Downtown, Reedley College, Reedley High School, elementary schools and parks and employment areas.*
> - *Street designs for collector and arterial roadways shall include provisions for future fixed route transit systems.*

There is one goal and policy that specific address future Corridor development:

> ***Goal LU 2.7J*** *Encourage further efforts to strengthen the downtown core, including linking it with other commercial uses along Manning Avenue and "I" Street.*
>
> ***Policy LU 2.7.40*** *Community Commercial designations shall be located primarily at the following locations:*
>
> - *Manning Avenue east of Columbia Avenue*
> - *Manning Avenue west of Reed Avenue*
> - *Dinuba Avenue east of Zumwalt Avenue*
> - *Other locations with Arterial/Arterial intersections that provide for major shopping opportunities.*

City of Orange Cove

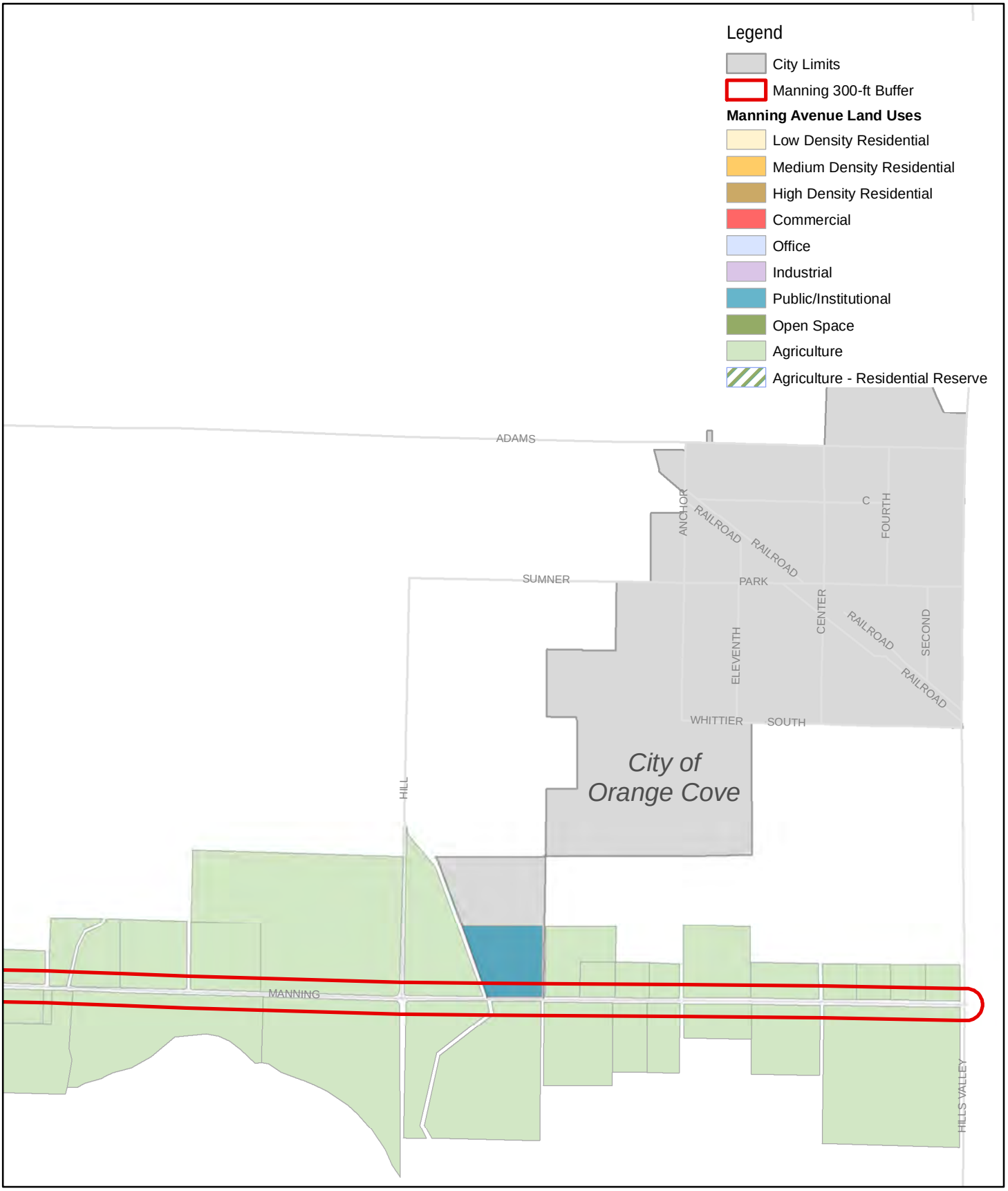
Key Findings

- Land use designations In the Manning Avenue Corridor near Orange Cove are agriculture, except for one parcel designated public/institution that includes the City wastewater treatment facilities.
- The Manning Avenue Corridor is a mile south of the City's downtown core and no commercial or high-generating land uses are planned in this area.
- Because the Manning Avenue Corridor is located outside the existing City Limits, SOI, and Planning Area, the circulation and land use policies have little bearing on Corridor development.

General Plan Overview

The City of Orange Cove Draft General Plan, dated 2003, includes seven elements (land use, circulation, open space, conservation, housing, safety, noise) organized in six chapters. The open space and conservation elements are combined into one chapter, which also addresses parks. The 5th cycle Housing Element was adopted in 2016. The objectives of the Orange Cove General Plan are to:

- *Project Orange Cove's future growth and make provisions for this growth through the General Plan.*
- *Create a unique and attractive city by investing in projects that will enhance Orange Cove's appearance and marketability.*
- *Provide a safe and pleasant environment and enhance property values throughout the community by avoiding and eliminating land use conflicts.*
- *Promote increased sales tax revenue in Orange Cove by providing sufficient land for a wide range of commercial uses.*
- *Protect and preserve natural resources, such as farmland, air and water quality and native vegetation, while facilitating growth of the community.*
- *Provide for a greater variety of housing choices and shopping opportunities.*
- *Ensure that there are adequate public facilities to serve Orange Cove in the future.*
- *Ensure that Orange Cove's infrastructure system can effectively serve the land use framework.*
- *Enhance the character of Orange Cove by creating an improved and revitalized downtown area.*
- *Promote economic development and enhanced employment.*



EASTSIDE TRANSPORTATION IMPROVEMENT CORRIDOR STUDY

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Fresno Council of Governments
Eastside Corridor Study

Land Uses Along Eastside Corridor Study Area (City of Orange Cove)

Project No. 11210046
Revision No. -
Date Jul 14, 2020

FIGURE **4-9**

Data source: Cities of Clovis, Fresno, Sanger, Fowler, Parlier, Selma, Kingsburg, Reedley, and Orange Cove, 2020; Fresno Council of Governments, 2020.

Land Use Designations, Zoning, and Planned Developments

Land use designations In the Manning Avenue Corridor near Orange Cove are agriculture, except for one parcel designated public/institution that includes the City wastewater treatment facilities. The Manning Avenue Corridor is a mile south of the City's downtown core and no commercial or high-generating land uses are planned in this area. The nearest development (which is actually re-development) is along Park Boulevard, which will have few or no impacts on the Manning Avenue Corridor, as this area is one and a half miles away.

Circulation Policy Summary

Because the Manning Avenue Corridor is located outside the existing City Limits, SOI, and Planning Area, the circulation policies have little bearing on Corridor development. None of the goals or policies address Manning Avenue. There is one policy addressing LOS that may be relevant to future Corridor Improvements:

> ***Policy 1.1*** *A level of service C will be the desirable minimum service level in Orange Cove at which arterial and collector segments will operate. A level of service of B will be the desirable minimum service level in Orange Cove at which intersections will operate.*

Land Use Policy Summary

Similar to the circulation policies, because the Manning Avenue Corridor is located outside the existing City Limits, SOI, and Planning Area, the land use policies have little bearing on Corridor development. None of the goals or policies address Manning Avenue.

5. Existing & Projected Economic Conditions

The study area is defined as those areas east of State Route 99 and outside of the city limits of Fresno. The study and analysis include all, or portions of, the communities of Kingsburg, Selma, Fowler, Parlier, Reedley, Orange Cove, Sanger, and Clovis. While we provide information on existing and projected economic conditions for the entire study area, the focus of the analysis is on the project area, defined as the areas on either side of the major north-south and east-west corridors of Academy Avenue and Manning Avenue.

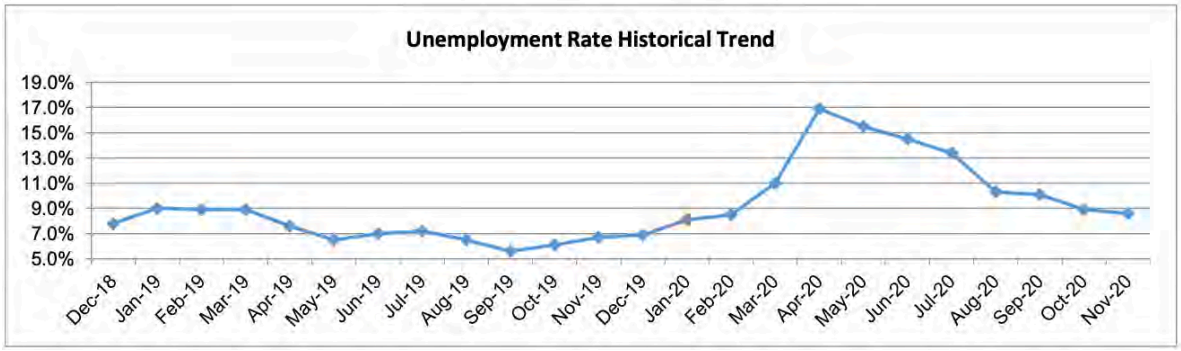
This baseline assessment set the stage for further analyses that came later in the project, including a review of economic development plans/activity, outreach to stakeholders and area employers to assess the transportation system's responsiveness to current and future expansion plans, an economic benefit analysis of potential multi-modal transportation improvements and expected land-use changes, as well as a discussion of potential longer-term economic benefit attributable to overall economic and transportation efficiencies.

County-wide Employment Projections

The last major update to employment projections for Fresno County by the Fresno Council of Governments (FCOG), was in 2020, in preparation for the 2022 Regional Transportation Plan (RTP). The projection series, prepared by Applied Development Economics, looked at population, housing, and jobs in 5-year increments from 2020 to the year 2050 (base year data is 2019 and the analysis is informed by partial year 2020 data through April). During the 30-year period, Fresno County is expected to see job growth of 69,700 jobs to a total of 475,000 jobs from 375,200 in 2020. It is notable that these projections illustrate the substantial job loss between the base year of 2019 and 2020 due to COVID-19 The rate of growth in jobs is highest from 2020 to 2025 (+2.2 percent) as the economy recovers. The overall average annual rate of growth is 0.5. Growth sectors were projected to be health services, followed by non-manufacturing industrial sectors, office, and retail.

With employment growing at the national, state, and local level, unemployment hit historical lows in the range of 5%-7% during 2018 and into 2019. Due to the current pandemic, unemployment reached near historic highs at 17% in April 2020, but had recovered to 8.6 percent as of November 2020. Unemployment rates in Fresno County are typically higher than both state and national statistics. Comparative current unemployment rates are 7.9 percent for California and 6.4 percent nationally. Near-term historical unemployment rate trends for Fresno County are shown in Figure 5.1.

Figure 5-1. Historic Unemployment Rate



Source: CA EDD Press Release, December 18, 2020

Fresno County shed some 42,000 jobs between May 2019 and May 2020. The hardest hit industry sectors in absolute job numbers are leisure and hospitality (16,000), trade, transportation and utilities (9,400), and farm (3,000). Percentagewise, the biggest losers are leisure and hospitality (-44.4 percent), other services (-25.8 percent), information (-17.1 percent), and retail trade (-16.8 percent). These are similar impacts seen in other Central Valley counties. As we will see in the next section, these are not all primary economic drivers in Fresno County, but nonetheless impacts are expected to intensify and be more widespread across sectors as the pandemic effects are projected to be long-lasting even as the health crisis eases in the next one to two years.

The Fresno County labor force currently stands at 440,000 (EDD, preliminary November 2020). This represents a 1.9 percent decrease in the labor force from November 2019, a decline in civilian employment numbers of 3.9 percent.

Study Area Job Profile

Using the Census Longitudinal Employer-Household Dynamics (LEHD) On the Map data sets for 2017, the study area contains 5,831 Census Blocks covering an area of approximately 3,099 square miles. As noted above, this includes approximately all areas east of SR 99 outside of the City of Fresno City Limits; however, a few geographies overlap the eastern Fresno City limits, particularly at its border with Clovis. Unsurprisingly, the largest concentrations of jobs are located at this border and within central Clovis. Other concentrations occur in the communities of Sanger, Parlier, and Reedley, with scattered larger employers throughout the project area.

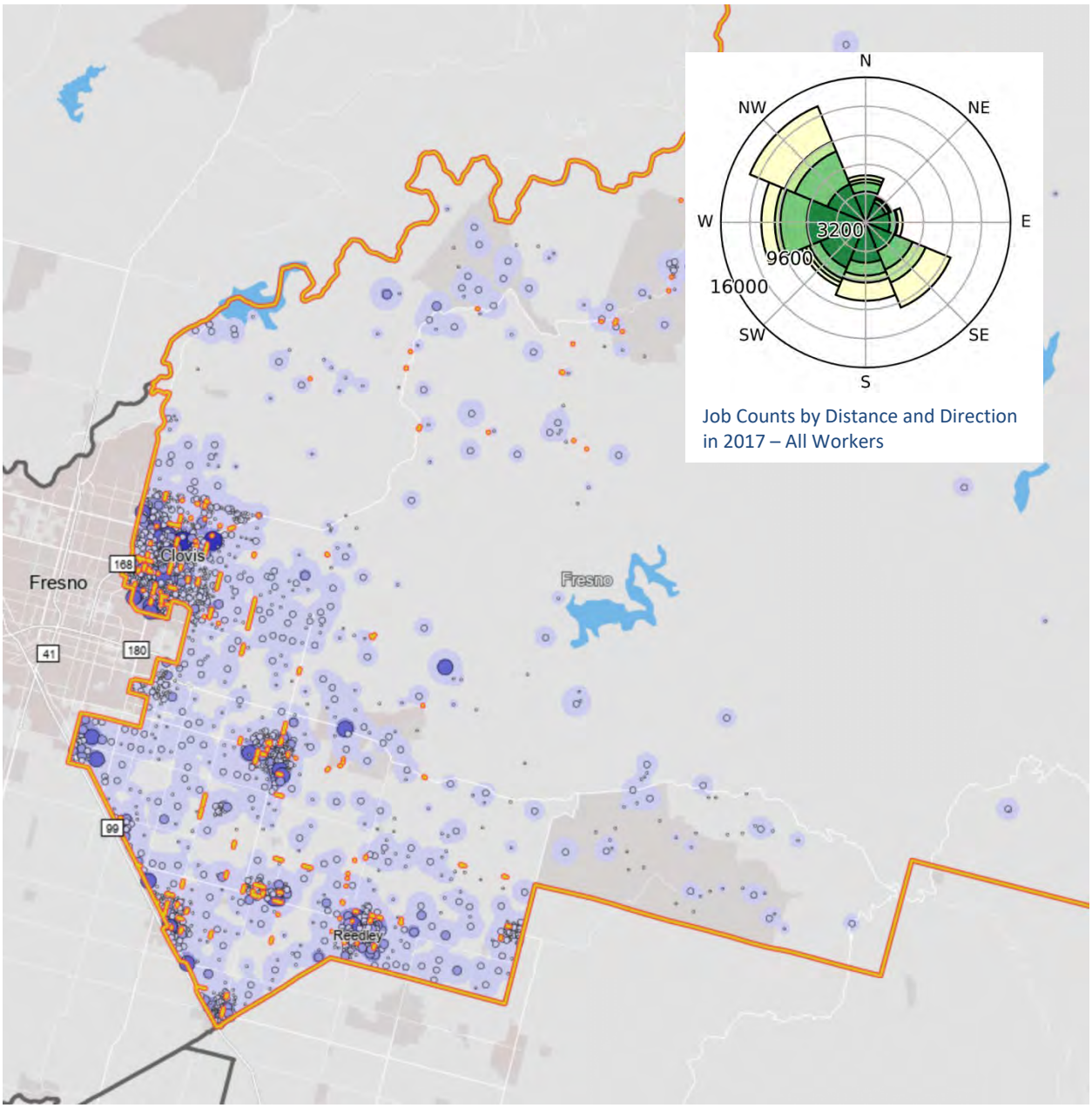
Figure 5-2 shows the location of the area's job centers.

Of the total 78,252 primary jobs located in the Eastside Corridor project area, the top five industry sectors are shown in Table 5-1.

Table 5-1. Top 5 Industry Sectors of the Project Area

Sector (NAICS)	Total Area Jobs	Percent of Total
Agriculture, Forestry, Fishing and Hunting	13,367	17.1%
Educational Services	11,289	14.4%
Health Care & Social Assistance	10,056	12.9%
Retail Trade	7,756	9.9%
Manufacturing	6,805	8.7%

Figure 5-2. Full Study Area Heat Map of Job Centers



Source: LEHD On the Map

Job centers and the location of employees is central to the purpose of our study in understanding travel patterns and transportation needs as we later move to prioritize potential solutions in the study corridors. Also central to this discussion are goods movement needs of study area and corridor specific employers. A 2013 study conducted by Cambridge Systematics (*San Joaquin Valley Goods Movement Plan*), categorized San Joaquin Valley industries as either goods movement-dependent industries or consumer goods and services industries. Agriculture, Retail Trade, and Manufacturing are considered goods movement-dependent industries – industries that "rely heavily and visibly on transportation as key parts of their operations." These industries account for 35.7 percent of area jobs and even more heavily concentrated along the study area corridors. Potential goods movement related needs were assessed along with other multimodal transportation needs as the project recommendations were developed.

Of the total jobs, 30,973 or 39.6 percent are filled by area residents; however, an additional 32.9 percent of jobs are filled by other Fresno County residents. Another 11.8 percent of jobs are filled by employees traveling from the adjacent counties of Tulare, Kings, and Madera. Thus, inter-county and close-in inter-county commuters fill 81.6 percent of study area jobs. Figure 5-2 includes a radar chart that illustrates the direction and relative length of commute trips (yellow represents commutes greater than 50 miles and dark green represents commutes of less than 10 miles).

The study area is a net exporter of employees, with 109,144 employed persons in the study area compared to 78,252 area jobs. Although overall top industry sectors are similar to Eastside area jobs, there are differences in the job shares. The top five industry sectors for workers employed in the study area are shown in Table 5-2:

Table 5-2. Top 5 Industry Sectors of the Study Area

Sector (NAICS)	Total Area Jobs	Percent of Total
Health Care & Social Assistance	17,227	15.8%
Educational Services	14,190	13.0%
Agriculture, Forestry, Fishing and Hunting	10,508	9.6%
Retail Trade	10,011	9.2%
Manufacturing	7,925	7.3%

The majority of workers traveling out of the study area for work are traveling to other parts of Fresno County. Less than 18,400 study area workers (16.8 percent) are traveling beyond Fresno or the adjacent counties of Madera, Kings, or Tulare for employment.

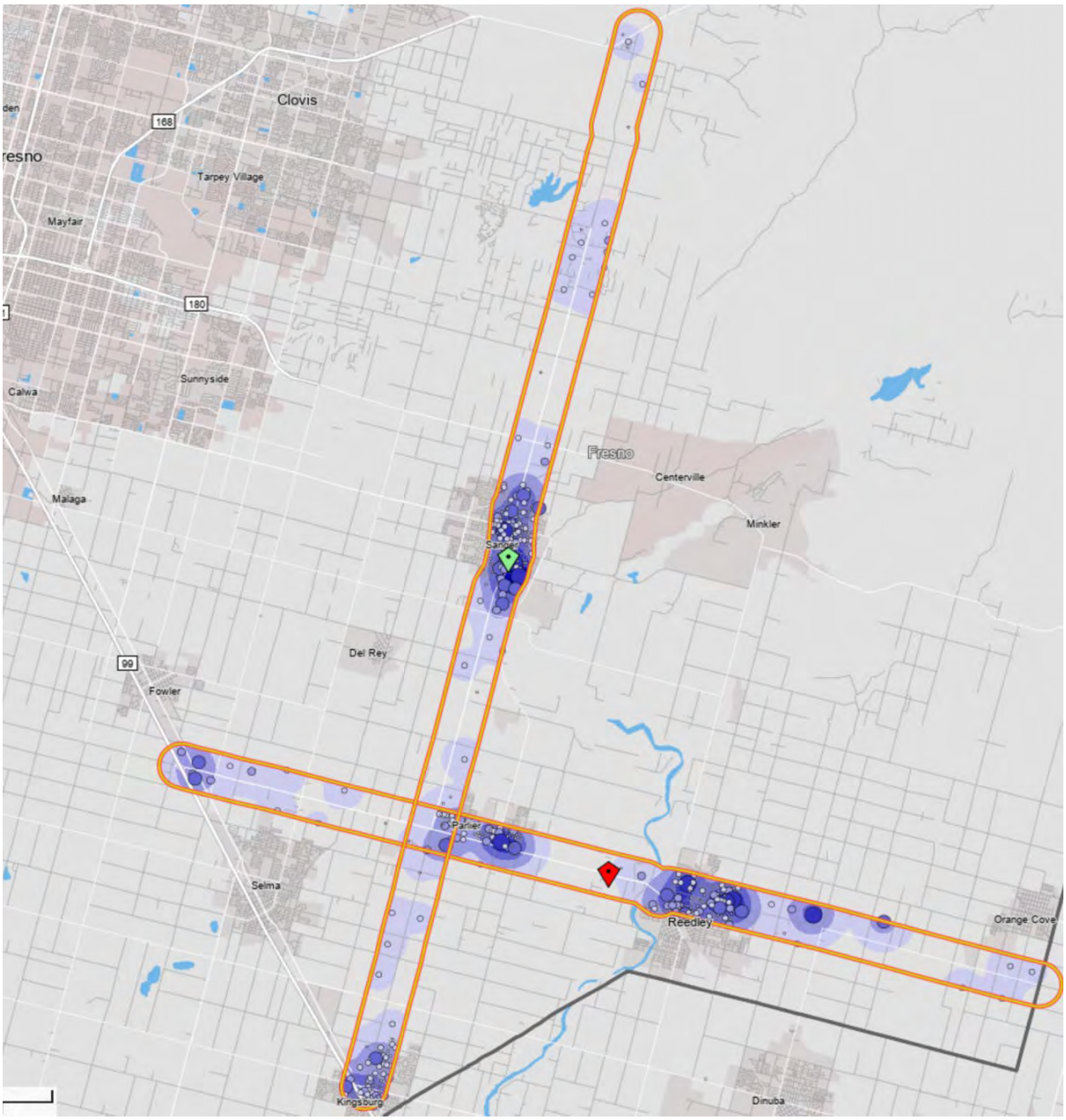
Since the focus of this study is multi-modal transportation improvements along the major east-west and north-south corridors of Manning and Academy Avenues, we also look at jobs centers within one-half mile of these corridors and their industry make-ups. Jobs within the corridor buffers represent similar industry sectors as the study area in total but are more concentrated in the top sectors. The table below lists the top five industry sectors on or within one-half mile of Academy and Manning Avenues. Total jobs in the corridor is 3,644.

Figure 5-3 is a heat map of job concentrations along the corridors.

Table 5-3. Top 5 Industry Sectors within 1/5 Mile of Manning/Academy

Sector (NAICS)	Total Area Jobs	Percent of Total
Agriculture, Forestry, Fishing and Hunting	3,644	34.4%
Manufacturing	1,889	17.8%
Health Care & Social Assistance	1,890	17.8%
Retail Trade	885	8.4%
Accommodation and Food Services	735	6.9%

Figure 5-3. Heat Map of Job Centers Along the Corridors



Source: LEHD On the Map

Again, the majority of these jobs are filled by intra-County commuters and inter-county commuters from adjacent counties. Many of these commuters are either from the City of Fresno or from one of other communities directly on or within the buffers for the two primary corridors: Sanger, Parlier, Selma, Kingsburg, Reedley, and Orange Cove.

While this would suggest corridor needs may need to be geared toward internal County needs, additional information on major employers in the County and their transportation needs will give important context to the future question of prioritizing transportation investments.

Major Fresno County employers either in or adjacent to the study area and their industry sector are listed in Table 5-4:

Table 5-4. Major Employers In/Adjacent to Study Area

Firm	Sector (NAICS)	Location	Total Employment Sector
Lion Dehydrators	Manufacturing	Selma	1,000-4,999
Pitman Family Farms	Agriculture	Sanger	1,000-4,999
Sun Maid Growers	Agriculture	Kingsburg	1,000-4,999
Wawona Frozen Foods	Manufacturing	Clovis	1000-4999
Fresno Air National Guard	Other Services	Fresno	1000-4999

Additional large employers that are in relatively close proximity to the study area are noted below as they may be both important as destinations for residents of the study area for services and employment opportunities. These additional large Fresno County employees include:

Table 5-5. Fresno County Major Employers

Firm	Sector (NAICS)	Location	Total Employment Sector
Aetna	Finance & Insurance	Fresno	500-999
California State Univ, Fresno	Educational Services	Fresno	1,000-4,999
Kaiser Permanente Fresno	Health Care & Social Assistance	Fresno	1,000-4,999
St Agnes Medical Center	Health Care & Social Assistance	Fresno	1000-4999
Taylor Communications	Manufacturing	Fresno	1000-4999

In addition to the Economic Setting for the project area and to complement the current and projected land-use analysis section presented in Chapter 4, the team reviewed existing stand-alone economic development planning documents for jurisdictions along the project corridor. These plans are companion documents to the economic development elements explored as part of the general plan review in Chapter 4. Documents that were reviewed are listed in Table 5-6.

Table 5-6. Reviewed Economic Development Plans

Name	Date	Jurisdiction	Author
Revitalization Strategy for Downtown Kingsburg	June 2017	Kingsburg	Community Planning Assistance Team (American Planning Association, California Chapter
City of Kingsburg Economic Overview	Undated	Kingsburg	City Staff
Comprehensive Economic Development Strategy	Updated June 2015	Fresno County	Fresno County Economic Development Corporation
City of Selma Retail Plan	March 2016	Selma	Kosmont Companies

While these documents are relatively current, they do not provide information directly relevant to the analysis of multimodal transportation needs on the project corridors attributable to additional traffic impacts or travel demand in the project corridor. The review supports the conclusions from the land-use analysis that no major new commercial or industrial developments are planned in near future near or on the study corridors. Also of note is that current employment projections, prepared for FCOG and referenced early in this chapter, predict the majority of growth will occur in the City of Fresno and within industry sectors that are not well represented along the study area corridors. Thus, it is not expected that land use changes or substantial employment growth in the corridor will be a factor for further analysis.

6. Existing Transportation Conditions

Plan and Policy Review

Transportation plans from the regional, county, and state levels were reviewed for their relevance to this project. The plans and policies that were determined to be related to this study are summarized in this section.

County Plans

Fresno Council of Governments Regional Transportation Plan and Sustainable Communities Strategy

FCOG RTP/SCS addresses the mobility needed to keep Fresno County region moving and connected with its communities. The RTP/SCS charts the long-range vision of regional transportation through the year 2040, addressing new requirements for reducing greenhouse gas emissions as a main goal while partnering with its communities throughout the region to provide transportation choices that encourage and cultivate thriving economies and cultural richness. The RTP/SCS identifies existing and future transportation related needs, while considering all modes of travel, analyzing alternative solutions, and identifying what can be completed.

The RTP/SCS identifies the region's transportation needs and issues, sets forth an action plan of projects and programs to address the needs consistent with the adopted policies, and documents the financial resources needed to implement the plan. Additional areas of emphasis and policy initiatives in the 2018 RTP/SCS include references to the Congestion Management Process, Environmental Justice, and Goods Movement Planning. In addition, the 2018 RTP/SCS includes updated project lists and updated performance measures.

The 2018 RTP/SCS consists of required elements referenced in the enabling legislation and is organized into various sections noted below.

- Chapter 1. Building the RTP: Putting the Pieces Together
- Chapter 2. Policies: Foundations of the Plan
- Chapter 3. Sustainable Communities Strategy: People. Choices. Community.
- Chapter 4. Actions: Assessing Our Transportation Needs
- Chapter 5. Financing Mobility: Funding Our Transportation System
- Chapter 6. Public Participation: Working Together for a Better Plan

- Chapter 7. Environmental Justice: Ensuring Meaningful Involvement for All People
- Chapter 8. Performance Measures: Investment Accountability and Efficiency

Fresno County Regional Active Transportation Plan

The Fresno County Regional Active Transportation Plan (ATP) serves as Fresno County's comprehensive guide vision for active transportation. The Fresno Regional ATP is an important document that will help each jurisdiction in the County identify needed bicycle and pedestrian projects and help the agencies qualify for new funds to implement the projects. It is important that the Plan be context sensitive to local needs and vetted with local staff and the community. The Fresno Regional ATP was adopted by the FCOG Policy Board February 22, 2018. Some goals of the Fresno Regional ATP include:

- **Goal 1:** Create a network of safe and attractive trails, sidewalks, and bikeways that connect Fresno County residents to key destinations, especially local schools and parks;
- **Goal 2:** Create a network of regional bikeways that allows bicyclists to safely ride between cities and other regional destinations;
- **Goal 3:** Increase walking and bicycling trips in the region by creating user-friendly facilities; and
- **Goal 4:** Increase safety by creating bicycle facilities and improving crosswalks and sidewalks for pedestrians.

Regional Plans

San Joaquin Valley Interregional Goods Movement Plan

The eight San Joaquin Valley Regional Planning Agencies (Fresno, Kern, Kings, Madera, Merced, San Joaquin, Stanislaus and Tulare) and Caltrans commissioned the San Joaquin Valley Interregional Goods Movement Plan (SJVMMP), completed in 2013, recognizing the importance of goods movement to the region. The Goods Movement Plan is built upon recent traffic, logistics, and long-term infrastructure improvement planning efforts throughout the study area, including the SJV Regional Goods Movement Action Plan (2007), corridor studies along SR 99 and other highways around the region (including SR 58 and SR 152), truck circulation studies to identify access points and routes for trade goods throughout the SJV region, and numerous rail studies that explore the use of the rail mode in a robust goods movement system. Building on these prior efforts and new analysis, the Goods Movement Plan developed a comprehensive list of prioritized multi-modal projects, strategic programs, and policies to guide future goods movement investments and policy. The Plan concludes with a discussion of funding and implementation strategies so the SJV Regional Planning Agencies can move forward with next steps to realize the vision embodied in the Plan.

San Joaquin Valley Goods Movement Sustainable Implementation Plan

The San Joaquin Valley Goods Movement Sustainable Implementation Plan (SJVGMSIP), adopted in June 2017, builds upon the previously completed San Joaquin Valley Interregional Goods Movement Plan, and take the next steps to address issues raised in the SJVIGMP. This was accomplished by designating

priority first and last-mile goods movement connectors and identifying any needed improvements to the connectors; identifying truck route and parking needs and strategies; identifying priority rural corridors; developing a framework for improving and maintaining the Valley-wide truck model; and coordinating all of these efforts with the Valley Regional Transportation Planning Agencies (RTPA) Sustainable Communities Strategies (SCS) and other efforts at the local, state and Federal level.

San Joaquin Valley I-5/SR 99 Goods Movement Corridor Study

Building upon goods movement planning efforts, the eight San Joaquin Valley Regional Planning Agencies studied Interstate 5 and State Route 99, major freight movement corridors identified as part of the United States Department of Transportation (USDOT) National Primary Freight Network and vital to Valley's economy. This study, adopted in June 2017, examined innovative approaches that create opportunities for public-private funding partnerships (such as tolled truck-only lanes), that create incentives to the trucking industry to manage demand (through use of larger combination vehicles or novel technology solutions), efficiency improvements that rely on Intelligent Transportation Systems (ITS) or other technology options, and greater use of alternative modes such as rail. While many of these approaches have been examined in past studies, there has never been a comprehensive examination to determine which options are the most feasible, which will draw the most positive response from industry, and which will work most effectively with other plans for these two highway corridors while minimizing negative impacts on connecting roadways and adjacent communities.

Feasibility Study Volume 1 of 2 Mountain View/SR 99 & Mendocino (18th Avenue)/SR 99 Safety and Capacity Study

The purpose of the traffic safety and capacity study determined the future transportation needs on the State Route (SR) 99 / Mendocino (18th Avenue) Interchange and SR 99 / Mountain View Avenue Interchange within the areas of Kingsburg and Selma in Fresno County. The study, completed in May 2019, identified and recommended alternatives for future traffic demands, complementing the Cities of Kingsburg and Selma General Plans. The study provides decision-makers with recommendations for design year 2045 and timeframes for when improvements are needed, as well as planning level cost estimates.

This study is a roadmap for the local agencies (FCOG, TCAG, City of Kingsburg, and City of Selma) to prioritize the improvements based on funding availability. The study provides failure years, general timeframes for improvements, alternatives with conceptual drawings and preliminary cost estimates. This information is sufficient for locals to plan the corridor and meet the transportation needs for the design year of 2045. The conceptual footprint of the improvements will also help the agencies preserve the right of way needed for future use, which will help avoid high cost for right of way in the future.

Short Range Transit Plan for the Rural Fresno County Area 2020-2024

The Short Range Transit Plan (SRTP) for the Rural Fresno County Area has been developed FCOG in cooperation with the Cities of Coalinga, Firebaugh, Fowler, Huron, Kerman, Kingsburg, Mendota, Orange Cove, Parlier, Reedley, Sanger, San Joaquin, Selma, the County of Fresno, and Fresno Economic Opportunities Commission (FEOC). Adopted in June 2019, it is intended to serve the following four (4) purposes:

- Provides a five-year, action-oriented program to implement the Public Transportation Element of the Regional Transportation Plan.
- Provides a basis for local governments to demonstrate that public transportation needs within their jurisdiction have been and may continue to be reasonably met.
- The SRTP for the Rural Fresno County Area may serve to document the “planning basis” for Federal and State assistance programs tor public transportation in rural areas of Fresno County.
- The SRTP for the Rural Fresno County Area serves as a valuable resource document of specific information for citizens and local elected officials.

The following goals and objectives are generally applicable to rural public transportation operation relating to transportation.

Goal: *The Fresno County Rural Transit Agency shall provide general public transit in accordance to the Fresno Council of Governments Regional Transportation Plan and Short Range Transit Plan for rural Fresno County.*

Objective: *Provide a transit system that meets the public transportation needs within the specialized service areas.*

Policies:

- Provide transit service within each rural incorporated city's Sphere of Influence as designated by the Fresno County Local Agency Formation Commission.
- Provide transit service through unincorporated rural communities as warranted.
- Work with common carrier operators that provide inter-city services within Fresno County.
- Provide "back-up" inter-city accessible transit services to individuals that are unable to negotiate the steps of the common carrier vehicles.

Standards

- The performance characteristics of the implemented services shall be evaluated for:
  - Passenger per Hour
  - Passengers per Mile
  - Cost per Hour
  - Cost per Mile
  - Cost per Passenger
  - Farebox Recovery
- Recorded information shall be averaged for the entire operation and analyzed on a subsystem by subsystem basis. The System mean shall be noted. Performance adherence shall be evaluated on:

- 60% of mean for Passengers per Hour and Passengers per Mile
- 140% of mean for Cost per Hour, Cost per Mile, and Cost per Passenger
- 60% of Farebox Standard
- The number of occurrence beyond “Acceptable Standards" shall be noted for resolution purposes.

- Transit fares shall be set at rates consistent with stipulated regulatory agencies, and to meet minimum farebox recovery requirements as stipulated by the Fresno Council of Governments.

Fresno County Regional Long-Range Transit Plan 2019-2050

This Fresno County Regional Long-Range Transit Plan (LRTP) is intended to guide transit and related multimodal investments and services in the Fresno region through the year 2050. The plan builds on the FCOG 2018 RTP/SC Sand prior transit planning studies. The draft was released in March 2019, and will inform the public transportation element of the next RTP/SCS that will be adopted in 2022. Specifically, the LRTP aims to:

- Integrate the efforts, projects, and future operations of the major transit providers serving Fresno County through the year 2050.
- Identify a preferred long-range vision for Fresno County’s public transit system.
- Provide guidance for future investments, projects and programs to enhance transit service
- Identify transit projects and alternatives that consider and improve sustainability, preservation, mobility, safety, innovation, economy, health and equity.
- Integrate regional bicycle and pedestrian planning with public transit plans and projects.

The LRTP expresses a set of Goals and Objectives that were developed to articulate the Vision of the LRTP. These goals and objectives build upon the Goals, Objectives, and Policies that have been developed for the FCOG 2018 RTP/SCS. The following is a comprehensive list of the goals and objectives for the LRTP:

Goal: Operate an efficient and fiscally responsible public transportation mobility system.

- **A.1 Objective:** Pursue federal, state, regional and local funding for both public and social service transportation, to provide mobility opportunities to the maximum number of people in the region.
- **A.2 Objective:** Provide a wide array of high quality public transportation mobility services that meets the diverse urban and rural mobility needs of residents, employees and visitors to the region of all ages, incomes, and mobility levels.
- **A.3 Objective:** Maximize the mobility system ridership by matching available resources to demonstrated demand for public mobility services.

- **A.4 Objective:** Encourage public/private partnerships by allocating resources that encourage provision of cost-effective services to meet the array of mobility needs in Fresno County.
- **A.5 Objective:** Incorporate lifecycle cost, risk, and performance trade-offs into capital programming, operations, and maintenance budgeting.

Goal: Create a safe, affordable, environmentally responsible, reliable and interconnected multimodal transportation system.

- **B.1 Objective:** Provide a safe public mobility system that strives for zero injuries and fatalities in the operation and maintenance of the mobility system.
- **B.2. Objective:** Emphasize convenient high frequency service where demand warrants and financial resources are sustainable.
- **B.3 Objective:** Provide mobility services that operate on time and provide local community access and reliable connections to both local and regional fixed route services.
- **B.4. Objective:** Develop a seamless public mobility network with reliable interconnected transfers and affordable fares between Fresno's rural and urban areas as well as within communities.
- **B.5 Objective:** Broaden the stakeholders' involvement in planning and funding allocation for mobility services in both rural and urban parts of the region.
- **B.6 Objective:** Create a framework that facilitates the coordinated administration of transit services throughout Fresno County.
- **B.7 Objective:** Invest capital resources in infrastructure and equipment that minimize air pollution and greenhouse gas emissions.

Goal: Collaborate on land use decisions that facilitate increased ridership, improve air quality, and reduce greenhouse gas emissions.

- **C.1 Objective:** Support compact mixed-use development near transit nodes to improve transit ridership and reduce auto vehicle miles traveled.
- **C.2 Objective:** Encourage the location of jobs, services, and amenities in both rural and urban areas that minimizes the need for long rural to urban vehicle trips.
- **C.3 Objective:** Encourage transit use and reduce driving by supporting the location of jobs near transit and in areas where transit can be viable.
- **C.4 Objective:** Limit expansion of fixed route services with frequencies of 60 minutes or less to areas and activity centers that do meet density and demand thresholds.

Goal: Generate community support for the mobility options available to Fresno County residents, employees and visitors.

- **D.1 Objective:** Provide complete and accurate information that make public transportation "user-friendly."

- **D.2 Objective:** Embrace technology advancements that improve customer information and broaden affordable mobility options.
- **D.3 Objective:** Create and produce multilingual publications and internet information that promote the use of the public transportation mobility system by all segments of the region.

Statewide Plans

California Complete Streets Act and Deputy Directive 64

The California Complete Streets Act requires regional, county, and local agencies to plan a transportation system for all modes. One purpose of this Act is to encourage agencies to reconsider policies emphasizing automobile circulation and actively make all modes of transportation more feasible for residents. Aside from providing additional transportation options, planning for multiple modes can help reduce congestion, improve travel experiences for all users, and reduce greenhouse gas emissions. Accompanying the Complete Streets Act, Caltrans adopted Deputy Directive 64 (DD64), applying the same guidance to Caltrans roadways.

High Speed Rail Draft 2020 Business Plan

The goal of high-speed rail is reducing congestion and pollution, and improving mobility, job creation and affordable housing. As California's population continues to increase and the economy continues to grow, high-speed rail is an essential mode of transportation to help facilitate the transportation system. In early 2019, the Governor scaled back this project to focus on completion of the 171-mile segment between Bakersfield and Merced, which includes the Fresno area. The Draft 2020 High Speed Rail Business Plan, released for comment on February 12, 2020, includes the following goals relevant to the Fresno area:

- Complete the 119-mile Central Valley construction segment and lay track pursuant to our federal funding grant agreements with the Federal Railroad Administration.
- Expand the 119-mile Central Valley segment to 171 miles of operable electrified high-speed rail connecting Merced-Fresno-Bakersfield, three of the fastest growing areas in California.
- Commence testing of electrified high-speed trains by 2025 and put those trains in service by 2028-29.

Existing Transportation System

Existing Major Roadways

The following provides a description of the primary highway and roadways within the study area based on the Fresno County General Plan update. Figure 6-1 illustrates the roadway classification of the study corridors, Academy Avenue and Manning Avenue.

State Route 99 (SR 99) is a major north-south freeway from the City of Bakersfield, to the City of Sacramento. Within the study area, SR 99 provides access to the western limit of Manning Avenue. At the Manning Avenue access point, SR 99 is a six-lane divided freeway with a 65 mph posted speed limit.

State Route 168 (SR 168) is a major east-west freeway seceding off of SR 180 near Cedar Ave, in the City of Fresno and terminating at Huntington Lake Road at Huntington Lake. Within the study area, SR 168 provides access to the northern limit of Academy Avenue. At the Academy Avenue access point, SR 168 is a two-lane minor arterial with a 55 mph posted speed limit.

State Route 180 (SR 180) is a major east-west freeway that begins in the City of Mendota traversing eastward through Fresno County ending at the Copper Creek Trailhead, approximately five miles east of Cedar Grove. Within the study area, SR 180 intersects with Academy Avenue, just north of the City of Sanger. At the intersection, SR 180 is a four-lane divided principal arterial with a 65 mph posted speed limit.

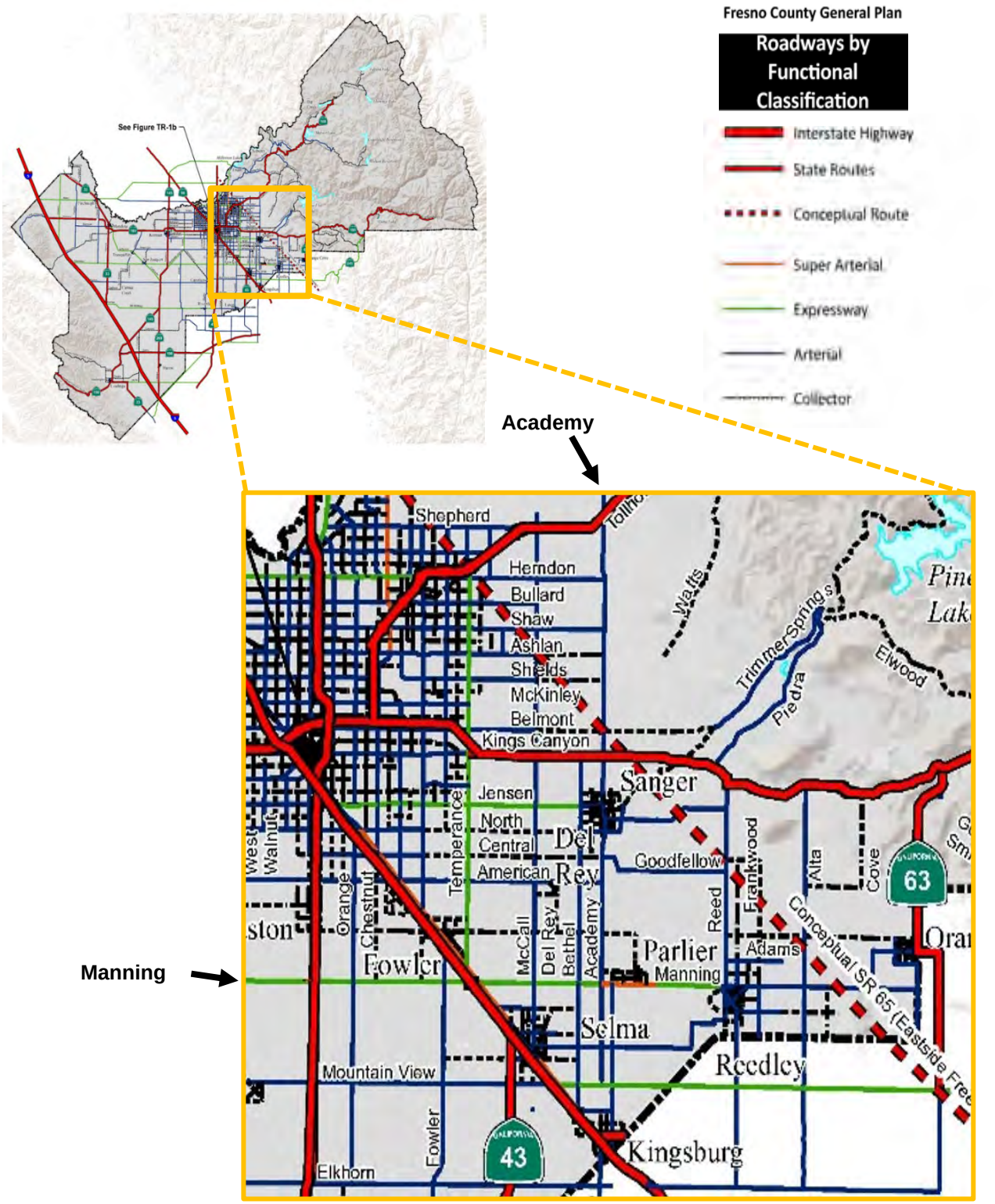
Academy Avenue corridor extends approximately 27 miles from Sierra St in the City of Kingsburg to SR 168 near the City of Clovis within the study area. Along this route, Academy Avenue passes through the cities of Parlier and Sanger. The study corridor operates as an arterial roadway.

Manning Avenue corridor extends approximately 21 miles from Golden State Boulevard in the southern city limits of the City of Fowler to SR 63, south of the City of Orange Cove. Along this route, Manning Avenue passes through Parlier and Reedley. The study corridor operates as an arterial, super arterial and expressway; see the table below for classification (from west to east).

Table 6-1 Roadway Classification for Manning Avenue Segments

Functional Classification	Location
Expressway	Golden State Blvd to Academy Ave (Beginning of study corridor)
Super Arterial	Academy Ave to Zediker Ave
Expressway	Zediker Ave to Reed Ave
Arterial	Reed Ave to SR 63 (end of study corridor)

Figure 6-1. Roadway Functional Classification



Existing Access Points

Existing access points for Manning Avenue and Academy Avenue were reviewed for this study and are listed in Appendix D. The large number of driveways and intersections that occur along the study corridors were taken into account as recommendations were developed.

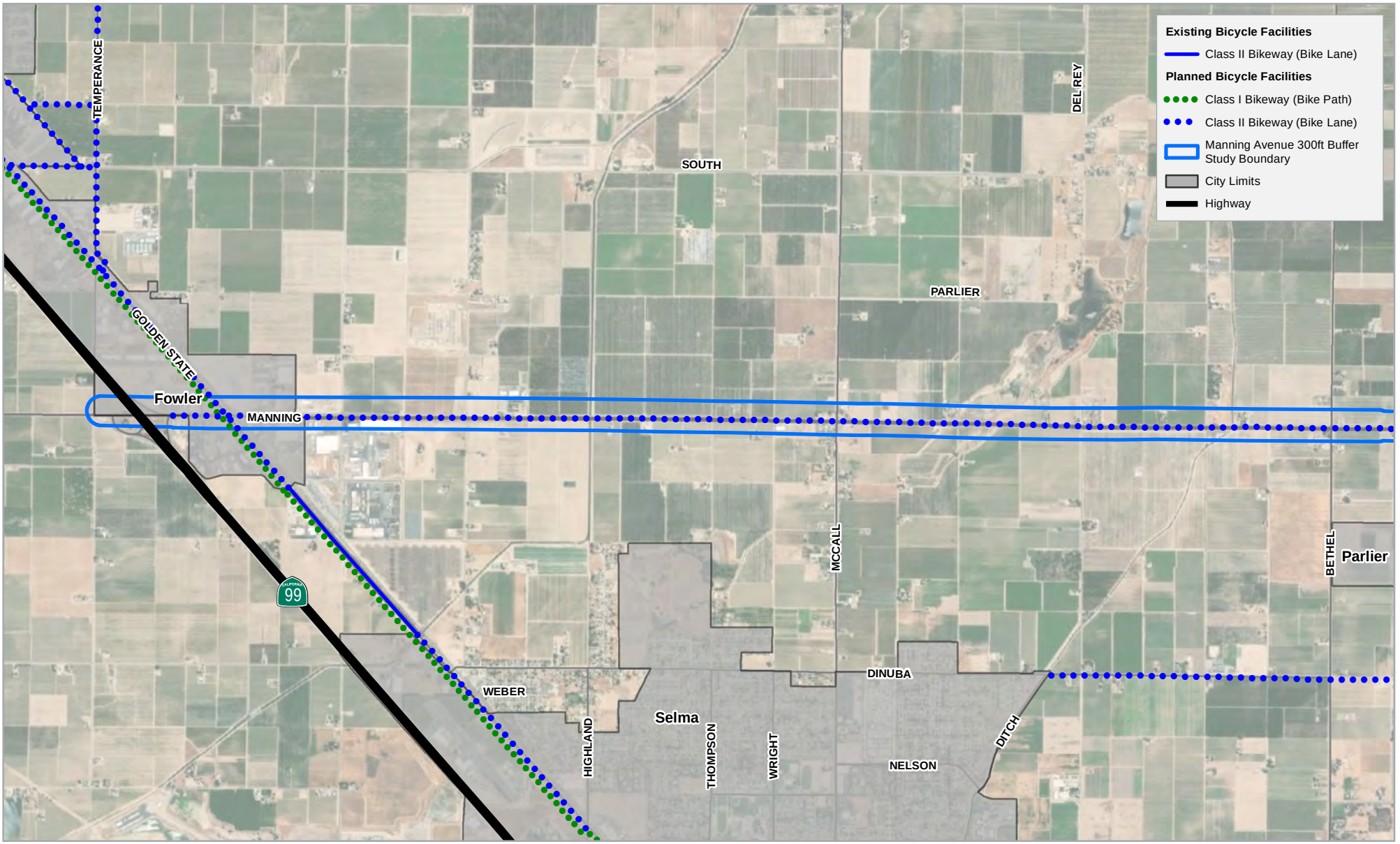
Existing Bicycle Facilities

Bicycle facilities within the study area were identified based on the Fresno County Active Transportation Plan (ATP). The inventory of existing bicycle facilities along Manning Avenue and Academy Avenue is illustrated in the following figures, from Figure 6-2 to Figure 6-11. Proposed facilities from the Fresno County ATP are also illustrated in the figures. Implementing these upgrades is crucial for the County to achieve its goal to create a network of safe and attractive bikeways that connect Fresno County residents to key destinations and allow bicyclists to ride safely between cities and other regional destinations.

Academy Avenue: Class II bikeways exist along most of the unincorporated portions of Academy Avenue and along the western city limits of Parlier. Where the corridor passes through Sanger and Kingsburg, the existing bikeways are Class III bike routes. The following segments do not have any bikeways:

- East Shaw Avenue – SR 168 (north end of the study corridor)
- North Avenue – 11th Avenue (through Sanger)
- Mountainview Avenue – Kamm Avenue (north of Kingsburg)

Manning Avenue: Except for a small segment of Class II bikeways located in Reedley, there are no existing bicycle facilities along Manning Avenue within the study area. The Fresno County ATP proposes several future Class I, II, and IV facilities, which are illustrated in Figure 6-2 - Figure 6-11.



EASTSIDE TRANSPORTATION IMPROVEMENT CORRIDOR STUDY

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Map Projection: Lambert Conformal Conic
Horizontal Datum: North American 1983
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FIGURE 6-2

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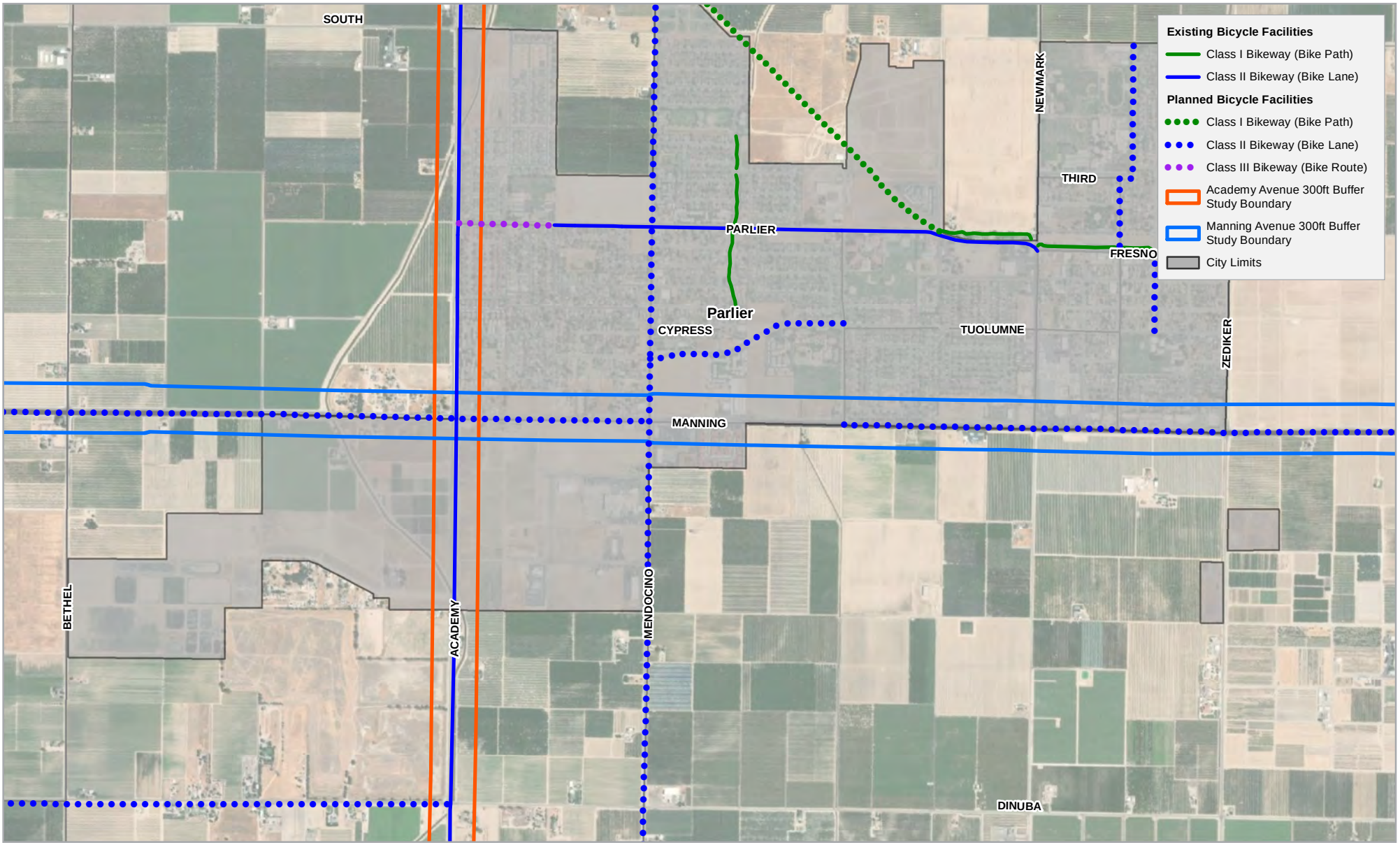
Data source: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community.



EASTSIDE TRANSPORTATION IMPROVEMENT CORRIDOR STUDY

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FIGURE 6-3

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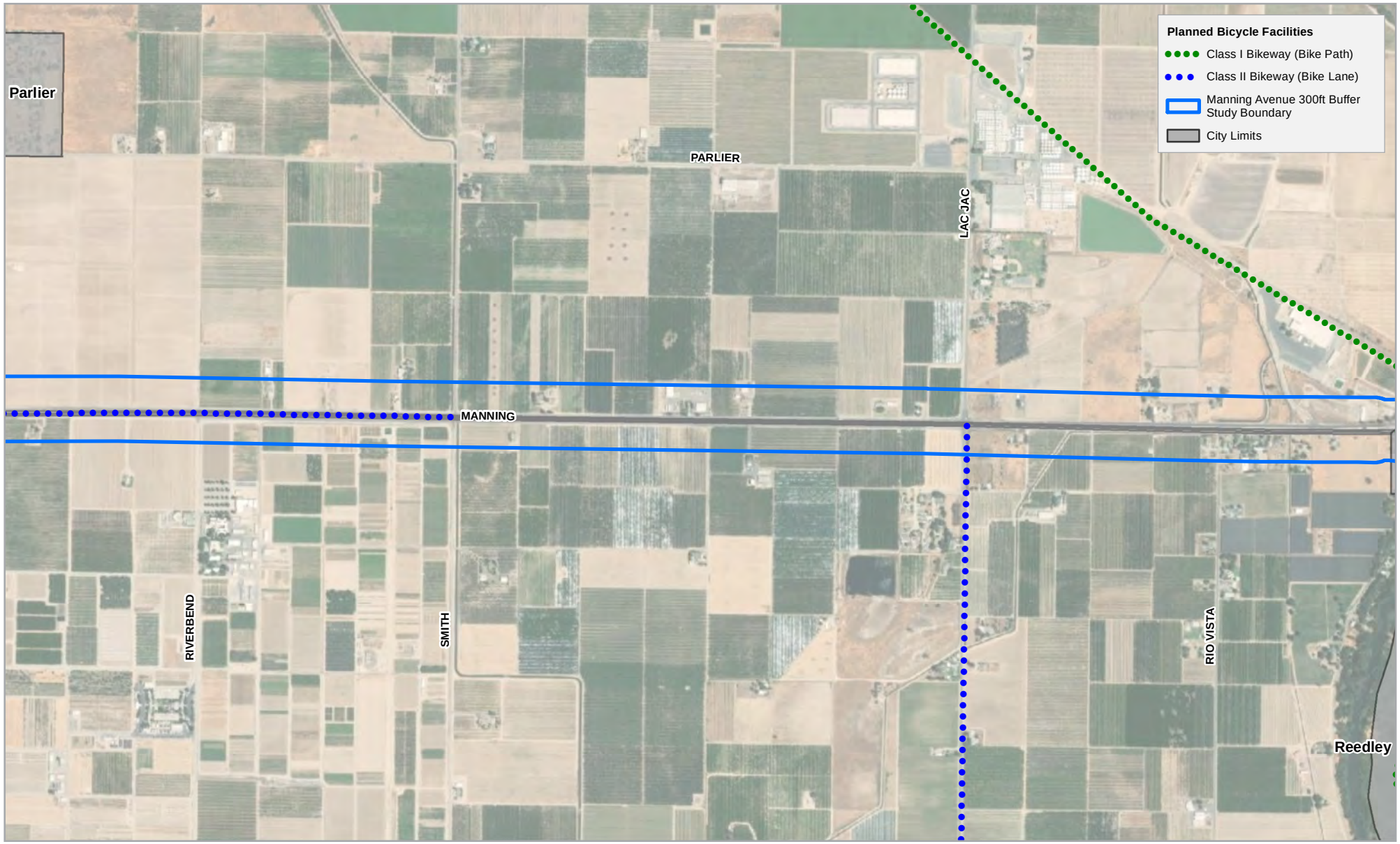
Data source: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community.



EASTSIDE TRANSPORTATION IMPROVEMENT CORRIDOR STUDY

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FIGURE 6-4

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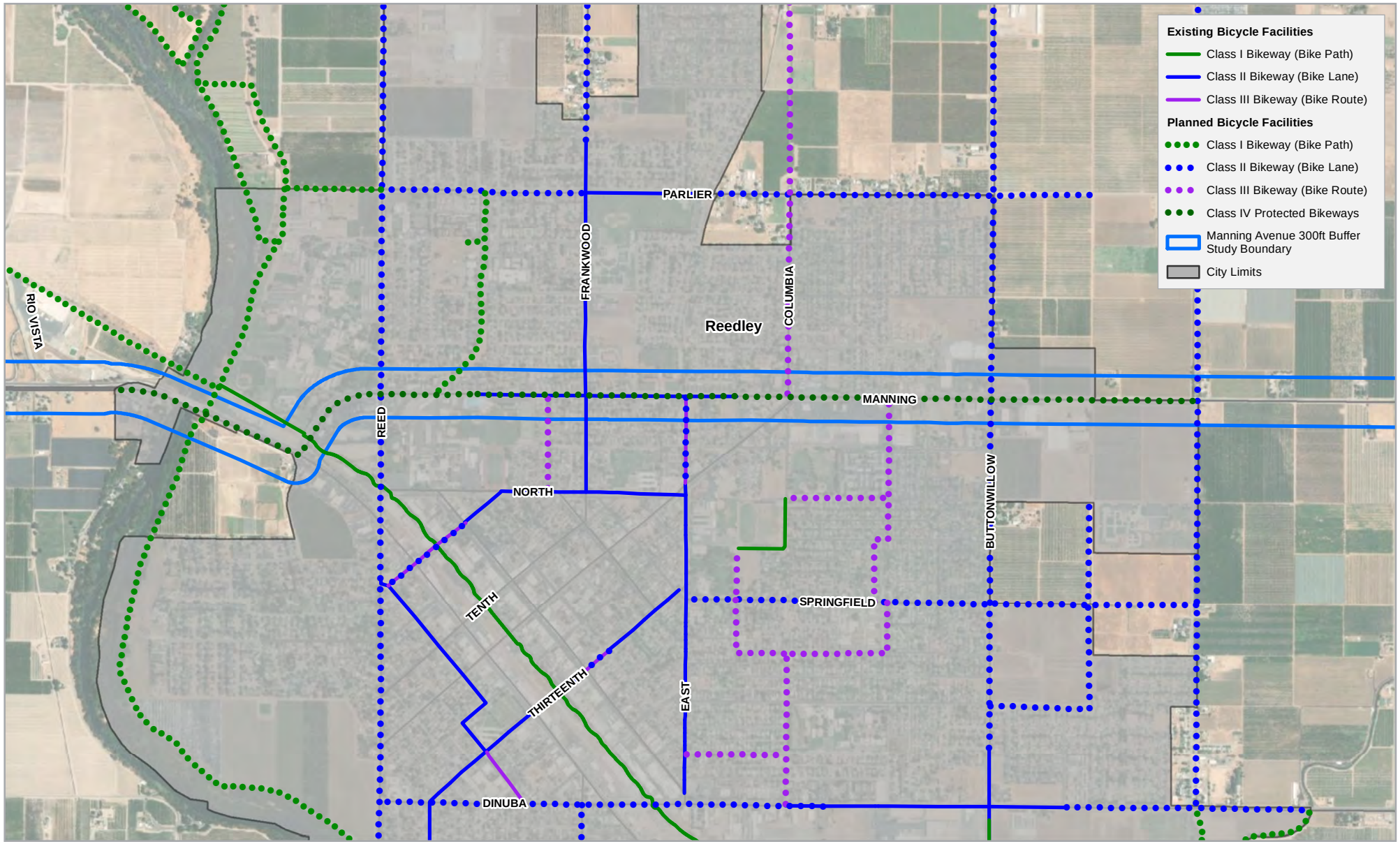
Data source: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community.



EASTSIDE TRANSPORTATION IMPROVEMENT CORRIDOR STUDY

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Manning and Academy Avenues Bikeway Facility Types

FIGURE 6-5

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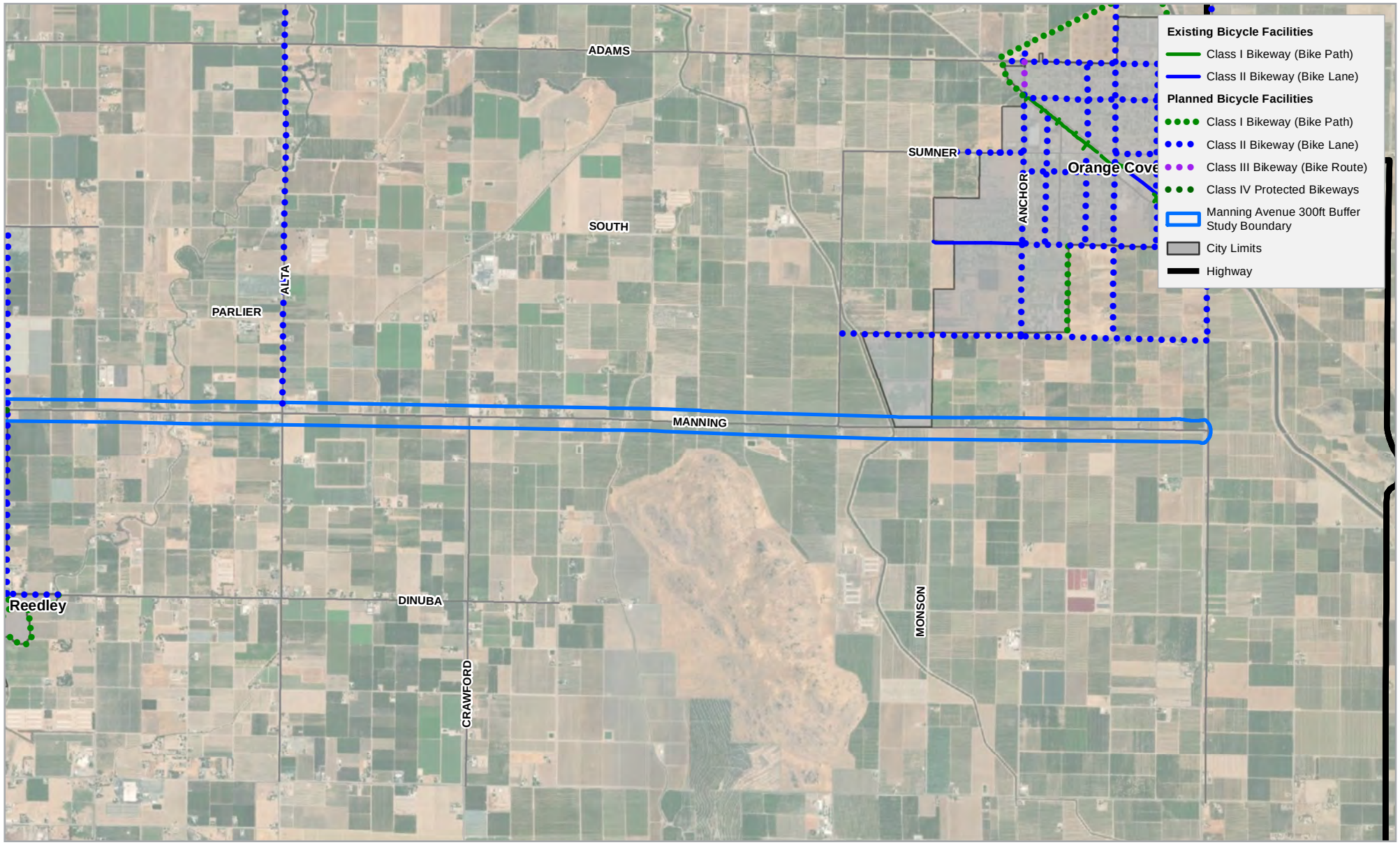

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Manning and Academy Avenues Bikeway Facility Types

FIGURE 6-6

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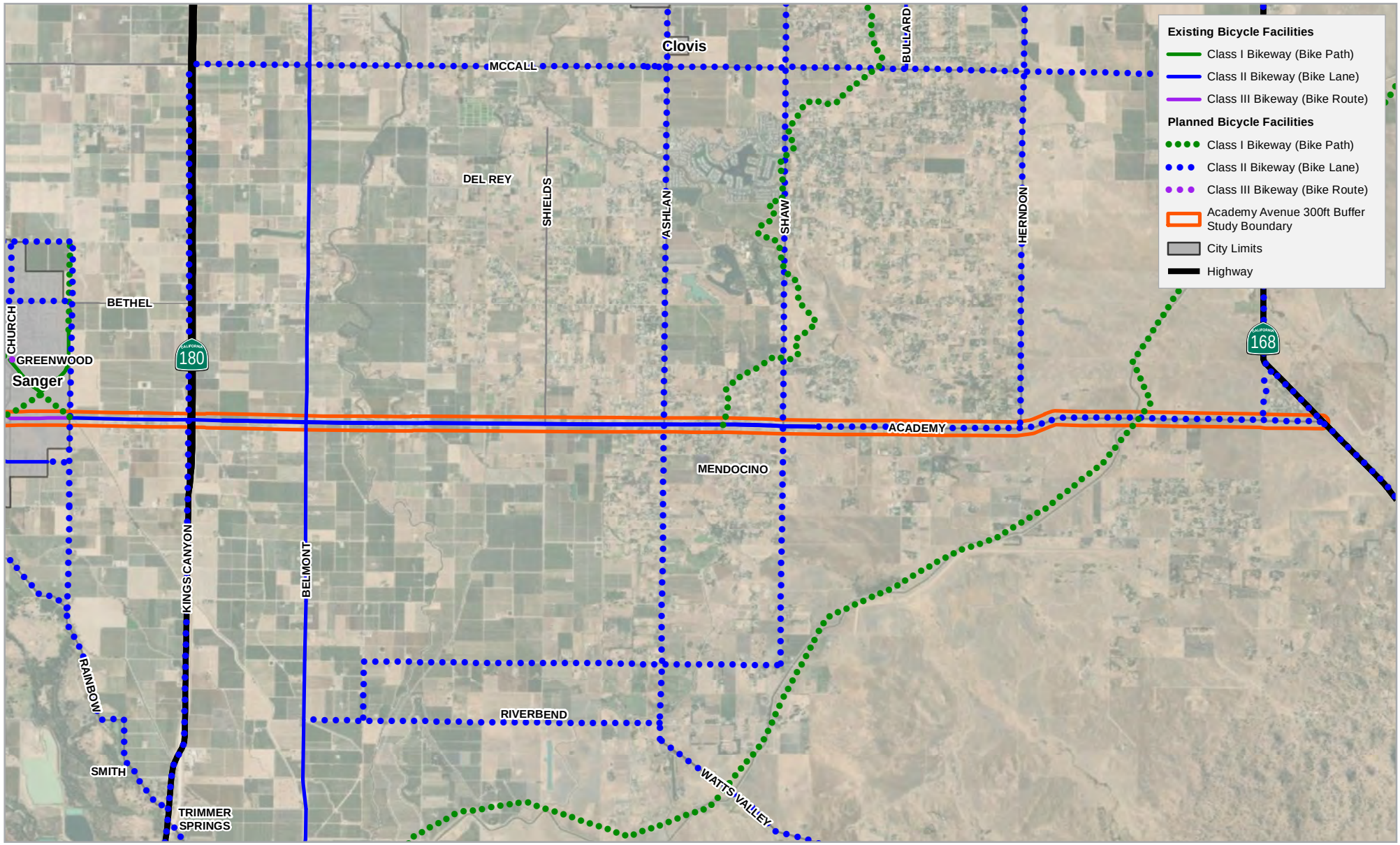

EASTSIDE TRANSPORTATION IMPROVEMENT CORRIDOR STUDY

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FIGURE 6-7

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Data source: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community.

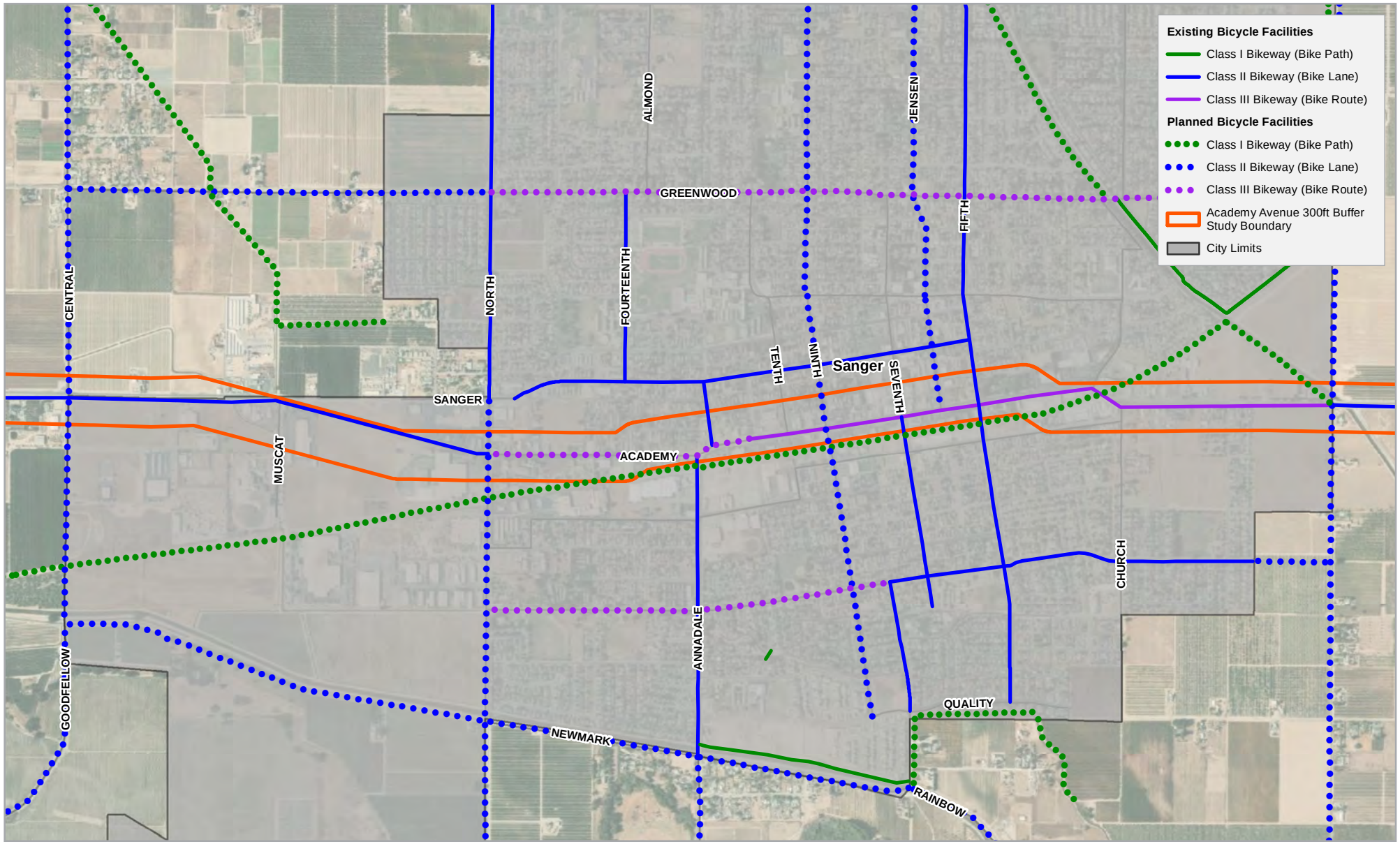

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FIGURE 6-8

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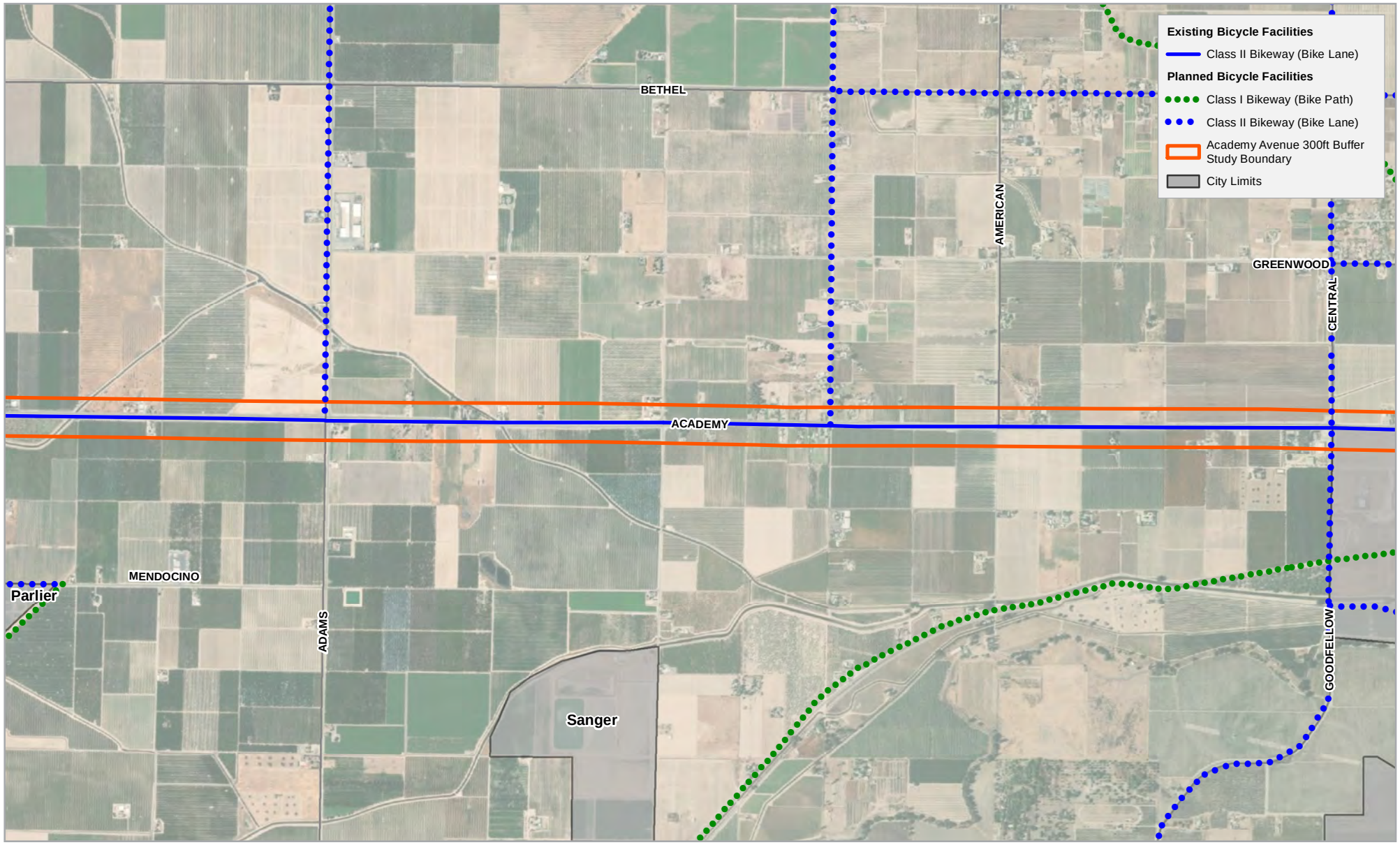

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FIGURE 6-9

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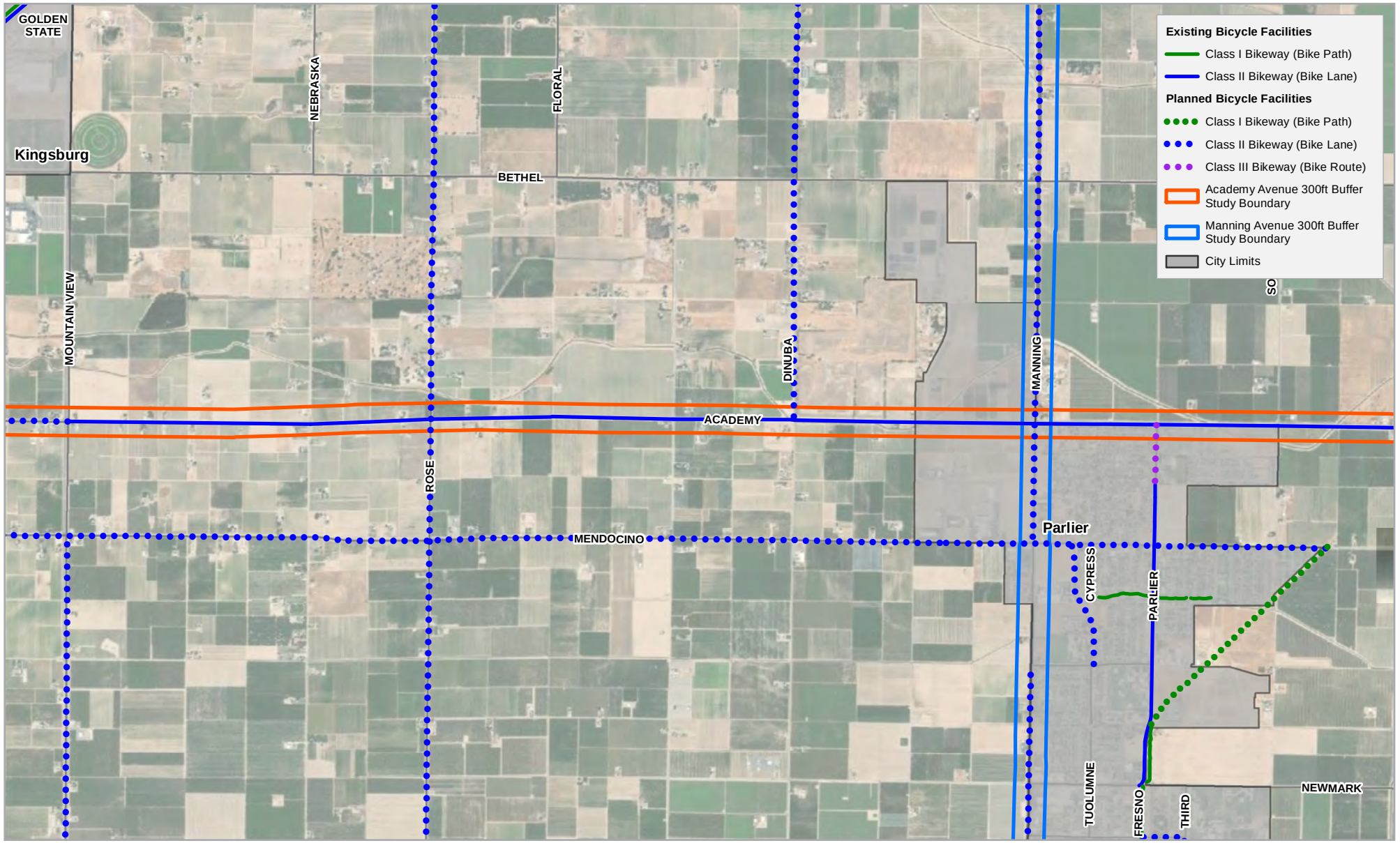

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FIGURE 6-10

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Data source: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community.

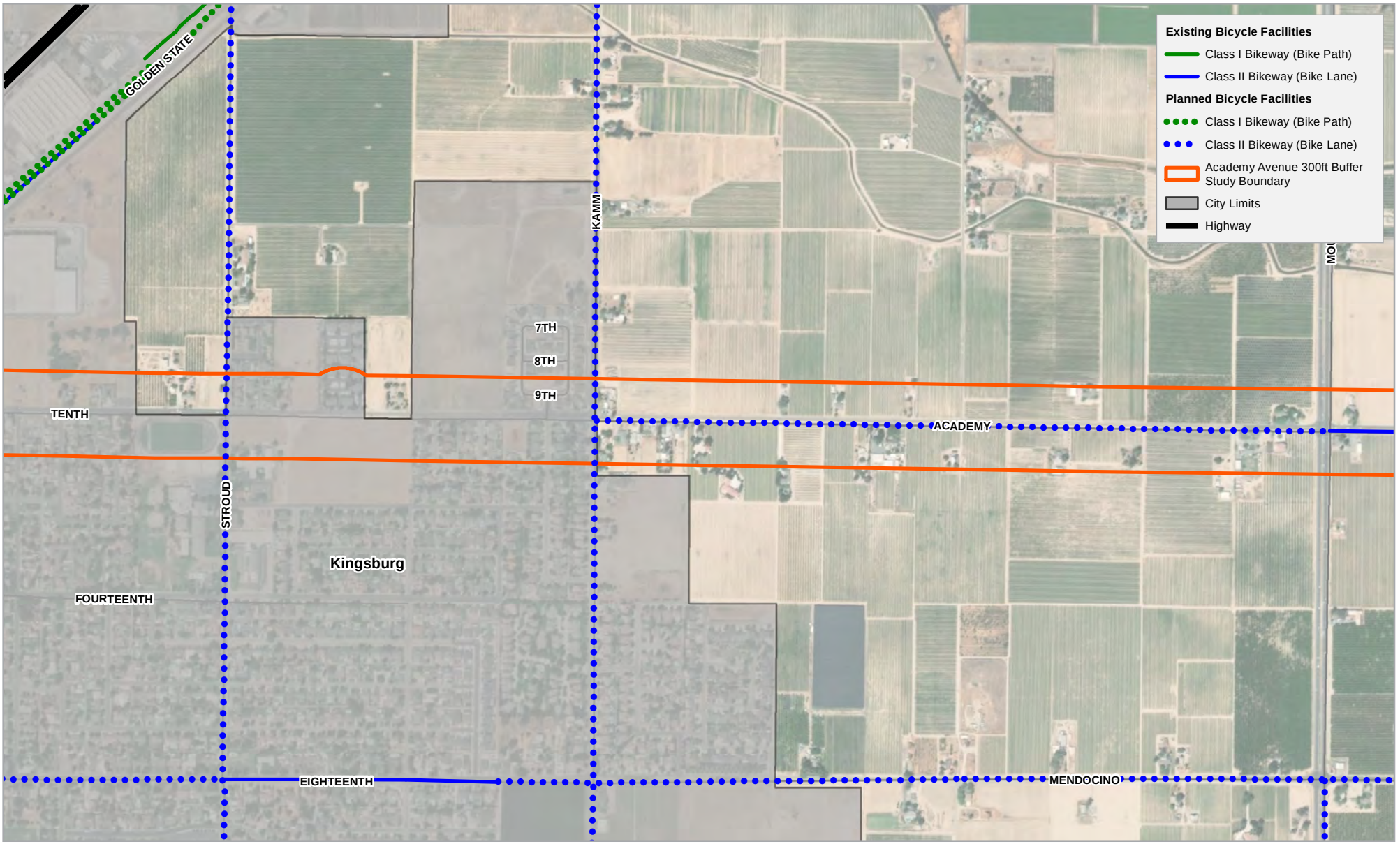

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FIGURE 6-11

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Data source: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community.

Existing Transit Services

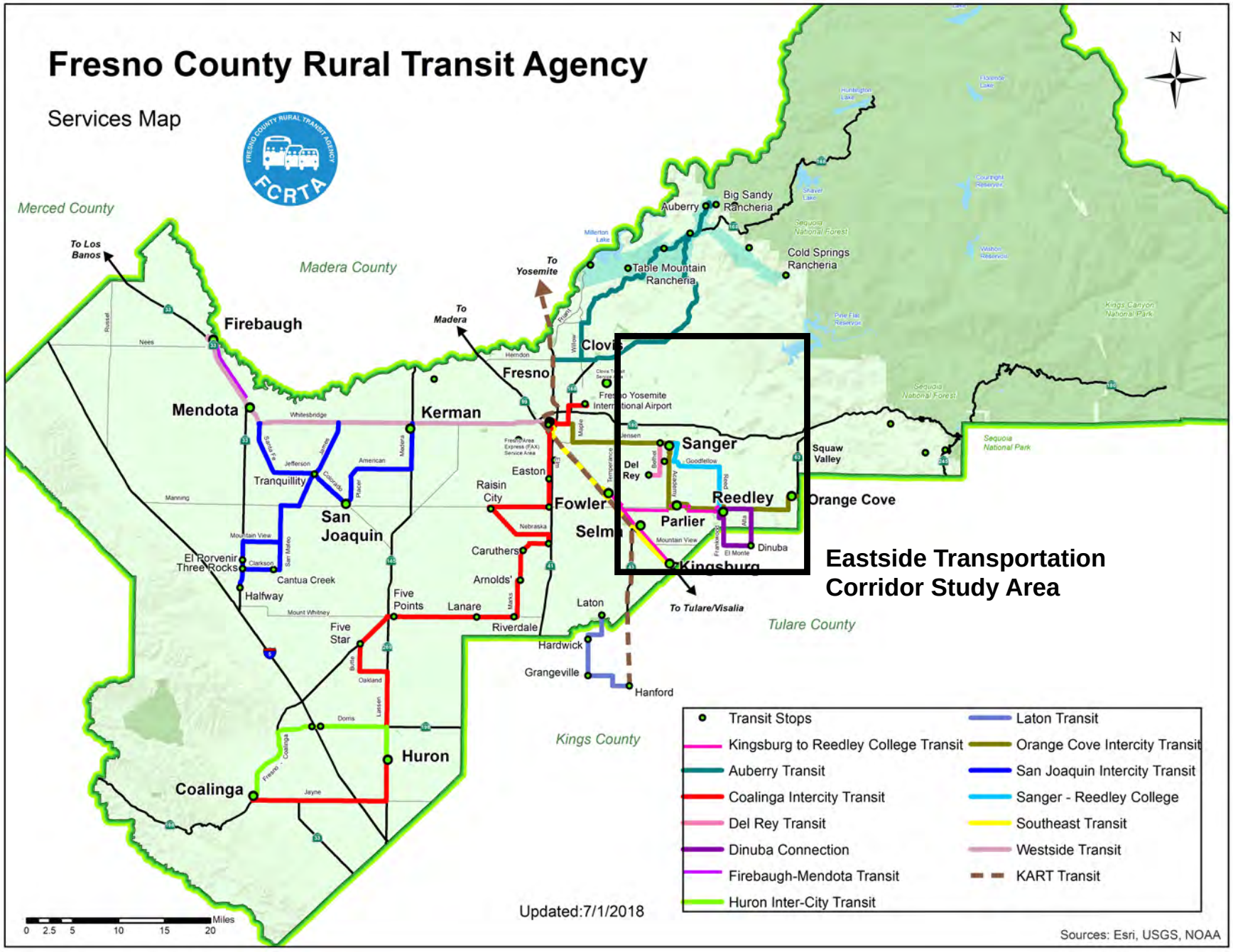
Fresno County Rural Transit Agency (FCRTA) provides rural transit service in Fresno County. FCRTA operates several sub-systems that serve 13 incorporated cities and 29 unincorporated rural areas. The individual city systems typically have a fixed route component and a Dial-A-Ride component that provides demand-responsive service. Fixed routes typically offer one round trip per weekday, with service once in the morning and once in the evening.

Figure 6-12 illustrates FCRTA Services and indicates the location of services available in the project area, which include:

- **Kingsburg to Reedley College Transit** connects Kingsburg, Selma, Fowler, Parlier and Reedley.
- **Southeast Transit** connects Kingsburg, Selma, Fowler, and the City of Fresno, which is located to the northwest of the study area.
- **KART Transit** connects Selma and Fowler to the City of Fresno, Kings County to the south and Yosemite to the north.
- **Dinuba Connection** is a small loop that connects Reedley and Dinuba, which is located southeast of the project area in Tulare County.
- **Orange Cove Intercity Transit** connects Orange Cove, Reedley, Parlier, Sanger, and the City of Fresno.
- **Coalinga Intercity Transit** provides an end-of-route connection to Fresno Yosemite International Airport by way of connecting to Fresno City through other available transit.
- **Auberry Transit** connects Clovis to KART Transit and destinations to the northeast of the project area, including Auberry, Table Mountain Rancheria, Cold Springs Rancheria, and Big Sandy Rancheria.

Vanpooling in Fresno County

Accompanying transit services in rural Fresno County are robust car and vanpooling options, which make up between 20% and 29% of County commuters. The vanpool program is managed and operated by CalVans. According to the 2015 Gap Analysis and Service Coordination Study, in 2014 CalVans operated a network of 48 farmworker vanpools and 127 commuter vanpools with an origin or destination in Fresno County. The vanpool program is open to anyone, accommodating individual and employer-based use.


Fresno County Rural Transit Agency
Services Map
FCRTA
N
Merced County
Madera County
Tulare County
Kings County
To Los Banos
To Madera
To Yosemite
To Tulare/Visalia
Firebaugh
Mendota
Kerman
Fresno
Clovis
Auberry
Big Sandy Rancheria
Table Mountain Rancheria
Cold Springs Rancheria
Fresno Yosemite International Airport
Sanger
Del Rey
Reedley
Parlier
Orange Cove
Squaw Valley
Dinuba
Kingsburg
Selma
Fowler
Easton
Raisin City
Caruthers
Arnolds'
Laton
Riverdale
Lanare
Five Points
Five Star
Hardwick
Grangeville
Hanford
Tranquillity
San Joaquin
El Porvenir
Three Rocks
Cantua Creek
Halfway
Huron
Coalinga
Sequoia National Forest
Sequoia National Park
Kings Canyon National Park
Eastside Transportation Corridor Study Area
Transit Stops
Kingsburg to Reedley College Transit
Auberry Transit
Coalinga Intercity Transit
Del Rey Transit
Dinuba Connection
Firebaugh-Mendota Transit
Huron Inter-City Transit
Laton Transit
Orange Cove Intercity Transit
San Joaquin Intercity Transit
Sanger - Reedley College
Southeast Transit
Westside Transit
KART Transit
Miles
0 2.5 5 10 15 20
Updated:7/1/2018
Sources: Esri, USGS, NOAA

Collisions Analysis

Safety Overview

A safety analysis was conducted along the Eastside Corridors, Academy Avenue and Manning Avenue, using the Statewide Integrated Traffic Records System (SWITRS) and Transportation Injury Mapping System (TIMS), for the five-year period between 2015 and 2019. Figure 6-13 and Figure 6-14 illustrate collisions along the study corridors with a 300-foot buffer from the centerline of the road. Figure 6-13 illustrates the location and severity types of collisions, with more concentrated areas of collisions occurring on Manning Avenue than Academy Avenue. Figure 6-14 illustrates the location and severity of collisions involving bicyclists and pedestrians.

Table 6-2 displays collisions by severity, motor vehicle involved with, and type. Between 2015 and 2019, 899 collisions were reported in the study area. The most common collision types were broadside and rear end collisions, combined they make up 62.7% of the total. Hit Object was the third highest collision type, at 17.1%. There were 17 fatalities reported and 46 reports of collisions resulting in severe injury, together fatal and severe collisions account for 7% of the total collisions. Nearly all of the reported fatalities were located outside the city limits of the incorporated cities, except one fatality on the outer city limits of Parlier. A majority of collisions involved another motor vehicle (72%), with fixed object making up the second highest category, at 15.8%.

Table 6-2. Study Area Collisions 2015-2019

Collision Category		Collision Count	
Collisions By Severity	Fatal	17	1.9%
	Injury - Severe	46	5.1%
	Injury - Other Visible	129	14.3%
	Injury - Complaint of Pain	302	33.6%
	Property Damage Only	405	45.1%
Total		899	100.0%
Motor Vehicle Involved With	Animal	16	1.8%
	Bicycle	11	1.2%
	Fixed Object	142	15.8%
	Motor Vehicle on Other Roadway	8	0.9%
	Non-Collision	34	3.8%
	Other Motor Vehicle	647	72.0%
	Other Object	19	2.1%
	Parked Motor Vehicle	5	0.6%
	Pedestrian	17	1.9%
Total		899	100.0%

Collision Category		Collision Count	
Collisions By Type	Broadside	286	31.8%
	Head-On	44	4.9%
	Hit Object	154	17.1%
	Other	30	3.3%
	Overturned	36	4.0%
	Rear End	278	30.9%
	Sideswipe	54	6.0%
	Vehicle/Pedestrian	17	1.9%
Total		899	100.0%

Study Intersection Collisions

Study intersections were selected by the project team in coordination with FCOG, County of Fresno and Caltrans to analyze current and forecasted LOS (Chapter 7) and were also isolated to identify intersections with the highest number of reported collisions for the 2015 to 2019 study period. The top ten intersections are displayed in Table 6-3, with two intersections tied for 9th place, both with 13 collisions.

Table 6-3. Top Ten Study Intersections for Total Collisions

Rank	#	Intersection	Control	Total Collisions	FSI Collisions	%FSI
1	18	Manning Ave / Lac Jac Ave	Signal	47	1	2%
2	16	Manning Ave / McCall Ave	Signal	40		0%
3	5	SR 180 / Academy Ave	Signal	35	1	3%
4	12	Mountainview Ave / Academy Ave	Signal	30	3	10%
5	22	Manning Ave / Alta Ave	Signal	24	2	8%
6	11	Rose Ave / Academy Ave	AWSC	18	2	11%
7	9	Adams Ave / Academy Ave	AWSC	16	4	25%
8	8	North Ave / Academy Ave	Signal	15		0%
9	10	Manning Ave / Academy Ave	Signal	13		0%
9	15	Manning Ave / Golden State Blvd	Signal	13		0%

Note: # indicates the study intersection numbers which align with the study intersection numbers presented in the Operations Analysis in Chapter 7.

Segment Collisions

Academy Avenue Segment Collisions

Collisions reported as not occurring at an intersection, or occurring at a distance greater than 300 feet from an intersection were isolated for further examination to identify collision trends. 88.9% of these collisions reported were due to Vehicle Code Violation. The most commonly reported primary collision factor for collisions occurring along Academy Ave were improper turning (40.7%) and DUI (20.4%). The most commonly reported collision type was hit object collisions (40.7%). Of collisions that were reported as improper turning for the primary collision factor, 59% were reported as hit object for the collision

type. Of collisions reported as improper turning for the primary collision factor and hit object for the collision type, 84.6% were between and vehicle and fixed object, and 15.4% were between a vehicle and "other object." Of collisions reported as improper turning for the primary collision factor, 27.3% were reported as overturned for the collision type.

Manning Avenue Segment Collisions

Collisions reported as not occurring at an intersection, or occurring at a distance greater than 300 feet from an intersection were isolated for further examination to identify collision trends. 89.7% of these collisions reported were due to Vehicle Code Violation. The most common primary collision factors on segments along the Manning Corridor were reported as improper turning (38.8%) and unsafe speed (32.1%). The most common collision types were hit object (36.36%) and rear end collisions (30.9%). Of the collisions reported as improper turning for the primary collision factor, the predominant collision type was hit object (70.3%), followed by overturned (14.1%). Of the collisions with the primary collision factor reported as overturned collisions with hit object collisions reported as the collision type, 97.8% of collisions were between a vehicle and fixed object. Of the collisions reported as unsafe speed, 83% of these collisions were reported as rear-end collisions. 90.6% of unsafe speed/rear-end collisions were reported as a collision between two vehicles.

Multimodal Safety

The same five-year period was used to assess the the study area collisions for bicyclists and pedestrians. Figure 6-14 illustrates pedestrian and bicycle collisions by severity. A total of 28 bicycle and pedestrian related collisions were reported for the period between 2015 and 2019. Pedestrian and bicycle collisions were primarily concentrated within city limits of the incorporated cities. All reported fatalities involving pedestrians and bicyclists occurred in rural areas, outside the incorporated cities.

Table 6-4. Bicycle and Pedestrian Collisions by Severity 2015-2019

Collision Category		Collision Count	
Bicycle Collision By Severity	Fatal	1	9.1%
	Injury - Severe	0	0.0%
	Injury - Other Visible	6	54.5%
	Injury - Complaint of Pain	4	36.4%
Total		11	100.0%
Pedestrian Collision By Severity	Fatal	3	17.7%
	Injury - Severe	1	5.9%
	Injury - Other Visible	9	52.9%
	Injury - Complaint of Pain	4	23.5%
Total		17	100.0%

Table 6-4 displays the distribution of bicycle and pedestrian collisions by severity. Among the total collisions, 17 involved pedestrians and 11 involved bicycles. Combined, they account for 3.1% of the total collisions. Although bicycle and pedestrian collisions make up a small portion of the total amount, 24% or roughly a quarter of all reported fatalities involved a bicyclist or pedestrian. Of the total pedestrian collisions reported, 17.7% were fatal. Among the pedestrian collisions resulting in non-fatal

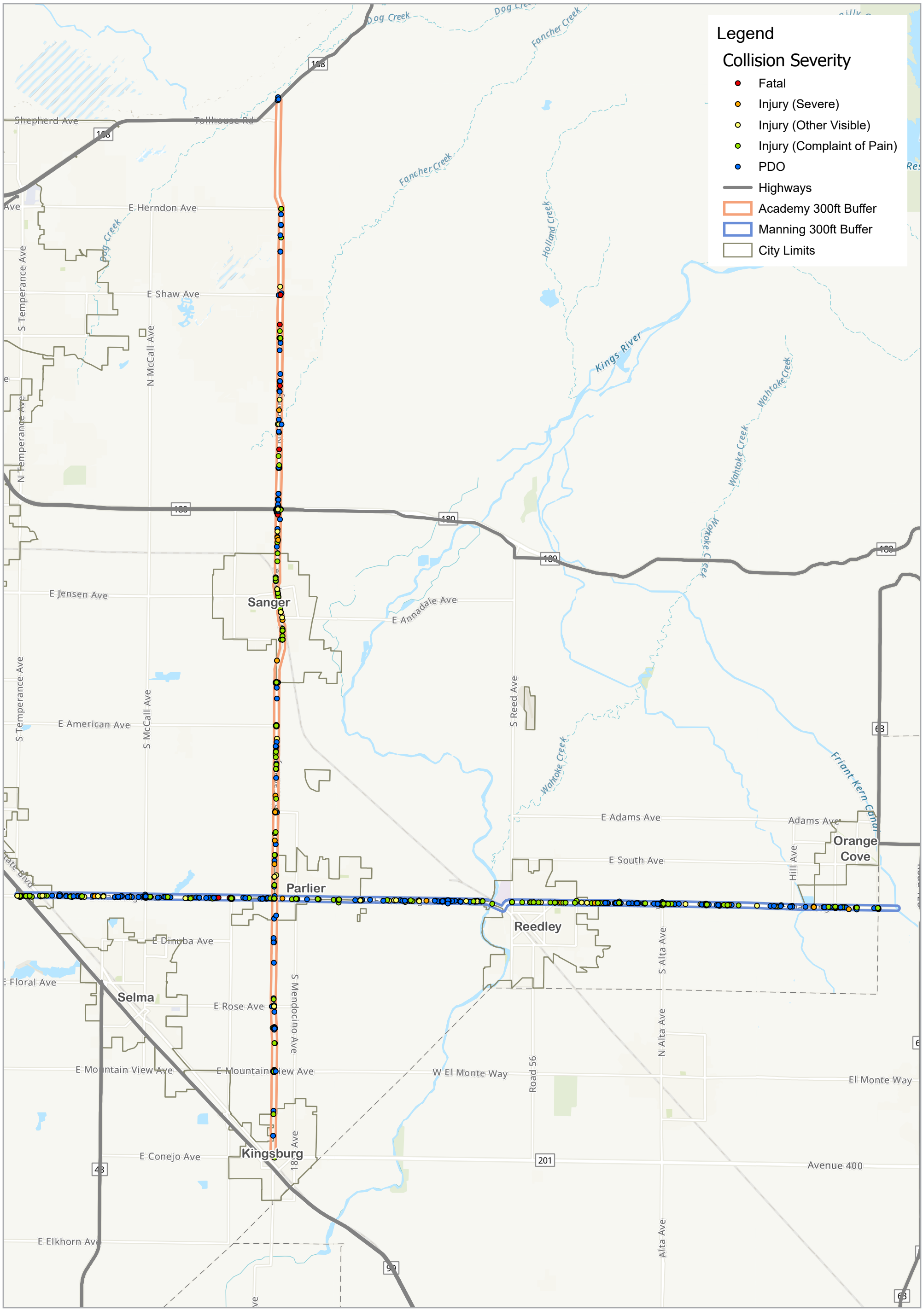
injury, the majority of collisions resulted in minor or visible injury, with one collision resulting in severe injury. Of the total bicyclist collisions, 54.5% resulted in visible injury and 36.4% resulted in a complaint of pain injury. During this period, 9.1% of bicycle collisions resulted in fatality.

Manning Avenue and the City of Reedley

Manning Avenue bisects the City of Reedley, running east-west just north of downtown. Compared to other study area cities along Manning, Reedley is the most populated and has more mileage of bicycle facilities than any other study area city that is traversed by Manning Avenue. Of the 31 bicyclist and pedestrian collisions reported for the study area, nine were reported in Reedley, with five involving bicyclists and four involving pedestrians. These collisions were not clustered to any particular location and do not demonstrate any one particular problem area. The higher proportion of collisions in Reedley do not necessarily indicate that conditions for bicyclists and pedestrians are significantly more challenging than conditions in other cities along Manning, rather bicyclists and pedestrians may be more likely to walk and bike there. This indicates a need for a safer bicycle and pedestrian network that is balanced with the motorized movement through the corridor.

Academy Avenue and the City of Sanger

Along Academy Avenue, similar conditions and findings are evident for the City of Sanger. Academy bisects Sanger, running north-south through the center of the City and its downtown. Eleven active transportation collisions were reported for the City of Sanger, with six involving pedestrians and five involving bicyclists. Of all the study area cities Academy Avenue traverses, Sanger is the most populated and has the highest mileage of bicycle facilities. As noted for Reedley, the higher proportion of collisions in Sanger does not necessarily indicate that conditions for bicyclists and pedestrians are significantly more challenging than conditions in other cities along Academy, but that pedestrians and bicyclists may be more likely to walk and bike there. This indicates a need for a safer bicycle and pedestrian network that is balanced with the motorized movement through the corridor.



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EASTSIDE TRANSPORTATION IMPROVEMENT CORRIDOR STUDY

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Fresno Council of Governments
Eastside Transportation Corridor Study

Study Area Collisions By Severity

Project No. **11210046**
Revision No. **-**
Date **January 2021**

FIGURE 6-13

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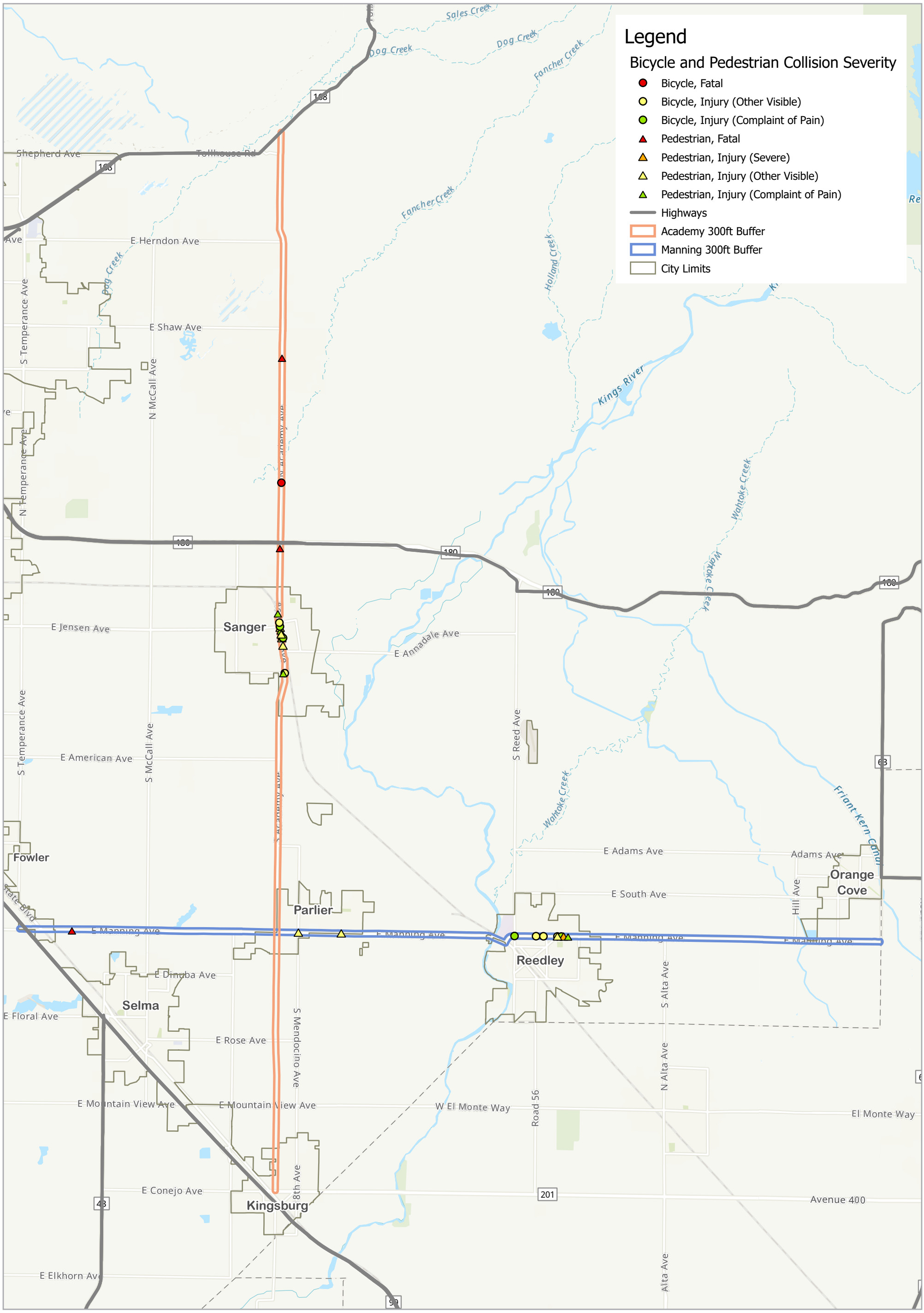
Created by: pthornton



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EASTSIDE TRANSPORTATION IMPROVEMENT CORRIDOR STUDY

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Fresno Council of Governments
Eastside Transportation Corridor Study

Bicycle and Pedestrian Collisions By Severity

Project No. **11210046**
Revision No. **-**
Date **January 2021**

FIGURE 6-14

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Created by: pthornton

Bicycle Level of Traffic Stress

Bicycle Level of Traffic Stress (LTS) analyzes the perceived level of comfort associated with infrastructure characteristics of a given roadway for active transportation users. Bicycle LTS within the study area was analyzed based on Mineta Transportation Institute (MTI) methodology presented in MTI Report 11-19, *Low Stress Bicycling and Network Connectivity (2012)*.

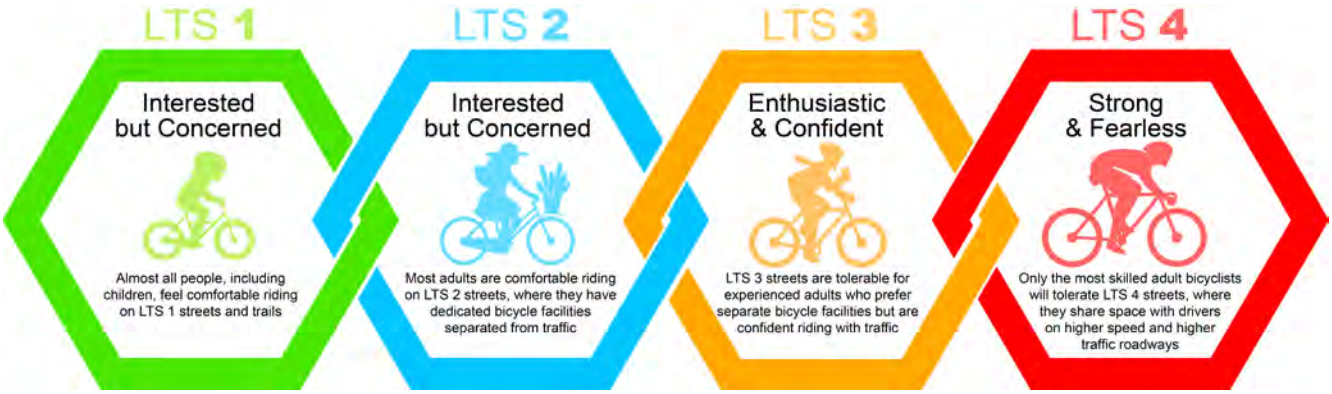
Bicycle LTS analyzes roadway segments, intersection approaches with right turn lanes, and unsignalized intersections using infrastructure characteristics such as:

- Type of bikeway, and separation between bicycle and vehicle traffic, if applicable;
- Number of vehicle lanes, or daily traffic volumes;
- Presence of median;
- Posted speed limit;
- Intersection control type (i.e., stop signs, traffic signals or roundabouts); and
- Configuration of right-turn lanes at intersections.

Bicycle LTS is a suitability rating system that assesses comfort and convenience of transportation facilities from the perspective of the user. The methodology also allows planning practitioners to assess connectivity within a roadway network and identify gaps that may discourage users from traversing roadways by bicycle.

Based on the infrastructure characteristics of the roadway, a score of one through four is assigned to roadway segments, intersection approaches, and intersection crossings. An LTS score of one indicates the lowest stress or most comfortable experience, while an LTS score of four suggests the highest stress or least comfortable experience. Each LTS score and the types of users typically associated with each facility type are described in Figure 6-15.

Figure 6-15. Level of Traffic Stress Score Descriptions



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Due to the mixture of land use contexts between incorporated and unincorporated areas within the study area, the methodology for analyzing Bicycle LTS in this study uses one set of criteria within incorporated areas, and another in unincorporated areas. Facilities within incorporated areas were analyzed using the methodology described in the MTI Report 11-19, while facilities in unincorporated areas were analyzed using LTS methodology specific to rural facilities, as adopted by Oregon Department of Transportation (ODOT).[2] The criteria used to analyze level of traffic stress across the Eastside Corridor are provided in Appendix C.

The LTS analysis presented herein assesses the traffic stress of roadway infrastructure along the Academy and Manning Ave study corridors. The incorporated area local streets adjacent to the study area were not considered as part of this analysis. While many of these local streets can be assumed low stress based on daily traffic volume and speed, high stress locations within incorporated areas should be identified by local jurisdictions to identify connectivity gaps and potential improvement locations in the roadway infrastructure connecting to Manning and Academy Avenues.

The majority of roadways analyzed in the study area do not feature dedicated bicycle facilities, and where facilities do exist, stress levels are high due to the conflict presented by the configuration of roadways with minimal separation from vehicular traffic along multi-lane, high-speed roadways. Bicycle LTS results for study area segments is presented in Figure 6-16, and study area intersection approaches and crossings are presented in Figure 6-17.

Segment LTS

As seen in Figure 6-16, the study area features high-stress segments with most roadway segments scored at LTS 4. This is because the majority of segments along both the Academy and Manning Avenues corridors feature multi-lane traffic of 35 mph or greater. There are some lower stress roadway segments in the unincorporated areas in the northern portion of the study area along Academy Avenue resulting from lower daily traffic volumes and provision of adequate shoulder width. As discussed previously, the unincorporated areas were analyzed using the LTS methodology for assessing rural facilities, which takes into account daily traffic volumes and paved shoulder width. The availability of shoulder width and traffic volumes lower than 7,000 vehicles per day (vpd) along this stretch of Academy Avenue results in a lower stress experience scored at LTS two. There are a few Class I shared-use facilities within the incorporated areas near the study corridors; however, there are no Class I Paths directly adjacent or along the study corridors. As separated facilities, the Class I shared-use path segments receive a low stress LTS scores of one.

Approach LTS

Intersection Approach LTS scores, displayed in Figure 6-17, show the varied stress level of intersection approaches throughout the study area. Intersection approaches within incorporated and unincorporated areas were analyzed using the same set of criteria, which takes into account the following infrastructure characteristics at the at the intersection approach: presence and length of right turn lanes; presence and configuration of a bicycle lane at the approach; and the speed of turning vehicles, estimated using curb radius at the turn of the intersection.

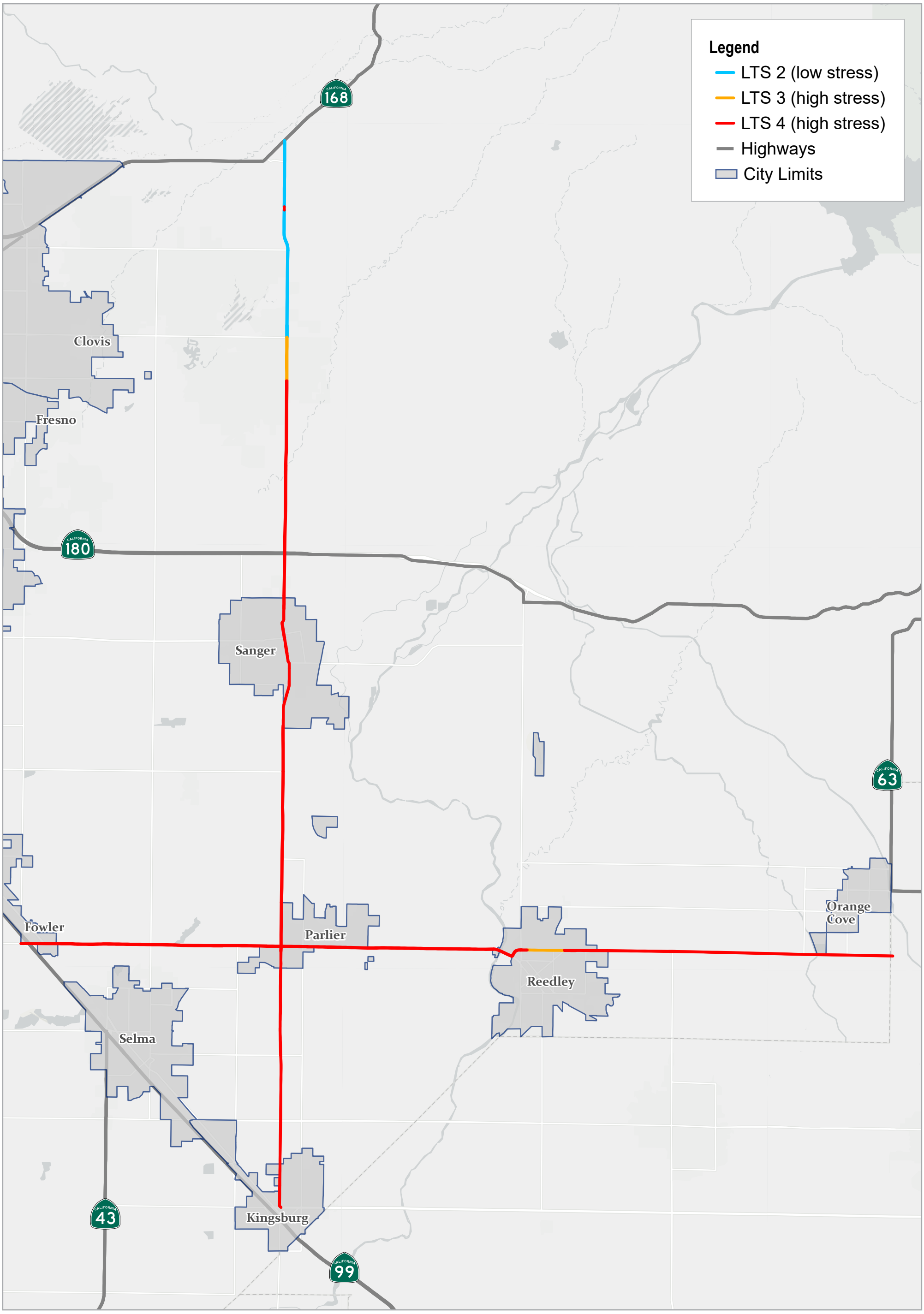
[2] Oregon Department of Transportation (ODOT), Analysis Procedure Manual Version 2, 14.4.7 Rural Applications, 2017.

Approaches were assigned LTS scores of two, three and four. Where bike lanes exist, most approaches were given LTS scores of two and three. Intersection approaches within mixed traffic were given LTS scores of three and four. Turn pocket length was the predominant criteria determinant of the differentiation in LTS score for approaches within both mixed traffic and adjacent to bicycle lanes. Longer turn pockets result in greater lengths of the bicyclist being exposed to right-turning traffic at the intersection approach, which causes a higher stress bicycling experience.

Crossing LTS

Intersection Crossing LTS scores are also displayed in Figure 6-17. Signalized intersection crossings are not scored using the MTI Bicycle LTS methodology, because signalized intersections generally provide adequate crossing time for most bicyclists. Unless data is available to suggest that signalized crossings do not provide adequate crossing time, signalized crossings are not considered and assumed to be low stress. Crossing scores reflect the worst score in cases where two segment links are crossed at an intersection. The majority of the study area's unsignalized intersections reflect the crossing effect of high-speed major link on the minor, lower-speed link.

Crossing scores were analyzed using different criteria for intersections in incorporated versus unincorporated areas. The LTS score assigned to unsignalized crossings within incorporated areas accounts for presence of a median refuge, the total number of lanes, and the speed limit of the street being crossed. Higher speeds and greater widths of the street being crossed results in higher stress intersection LTS scores. The LTS score assigned to unsignalized crossings within unincorporated areas account for daily traffic volumes and the total number of lanes of the street being crossed. Crossing scores across the study area are varied, however, most intersection crossings were assigned LTS scores of three or four.



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EASTSIDE TRANSPORTATION IMPROVEMENT CORRIDOR STUDY

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Eastside Transportation Corridor Study

Bicycle LTS - Segments

Project No. **11210046**
Revision No. **-**
Date **JANUARY 2021**

FIGURE 6-16

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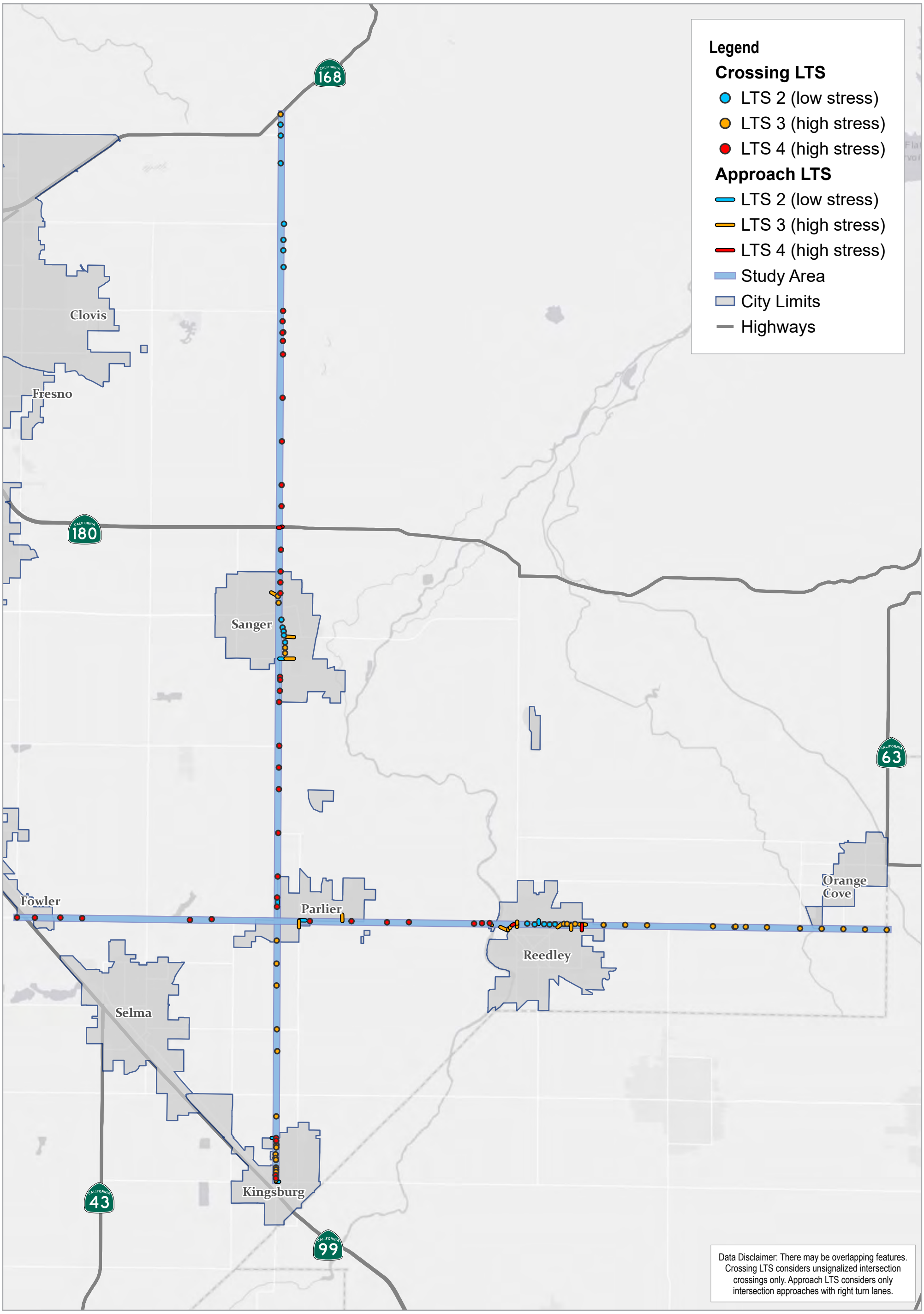
Data Source: Light Gray Base: Fresno County Dept. PWP, Esri, HERE, Garmin, SafeGraph, METI/NASA, USGS, Bureau of Land Management, EPA, NPS, USDA. Created by: pthornton



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EASTSIDE TRANSPORTATION IMPROVEMENT CORRIDOR STUDY

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Eastside Transportation Corridor Study

Bicycle LTS - Intersection Approaches and Crossings

Project No. **11210046**
Revision No. **-**
Date **JANUARY 2021**

FIGURE 6-17

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Connectivity

The level of traffic stress analyses presented above highlight the barriers to low stress connectivity within the study area. Connectivity to study area destinations was qualitatively assessed by comparing the level of traffic stress results presented in Figure 6-16 and Figure 6-17 and the location of destinations, or Points of Interest (POIs) identified in Figure 6-18. POIs seen in Figure 6-18 include destinations such as:

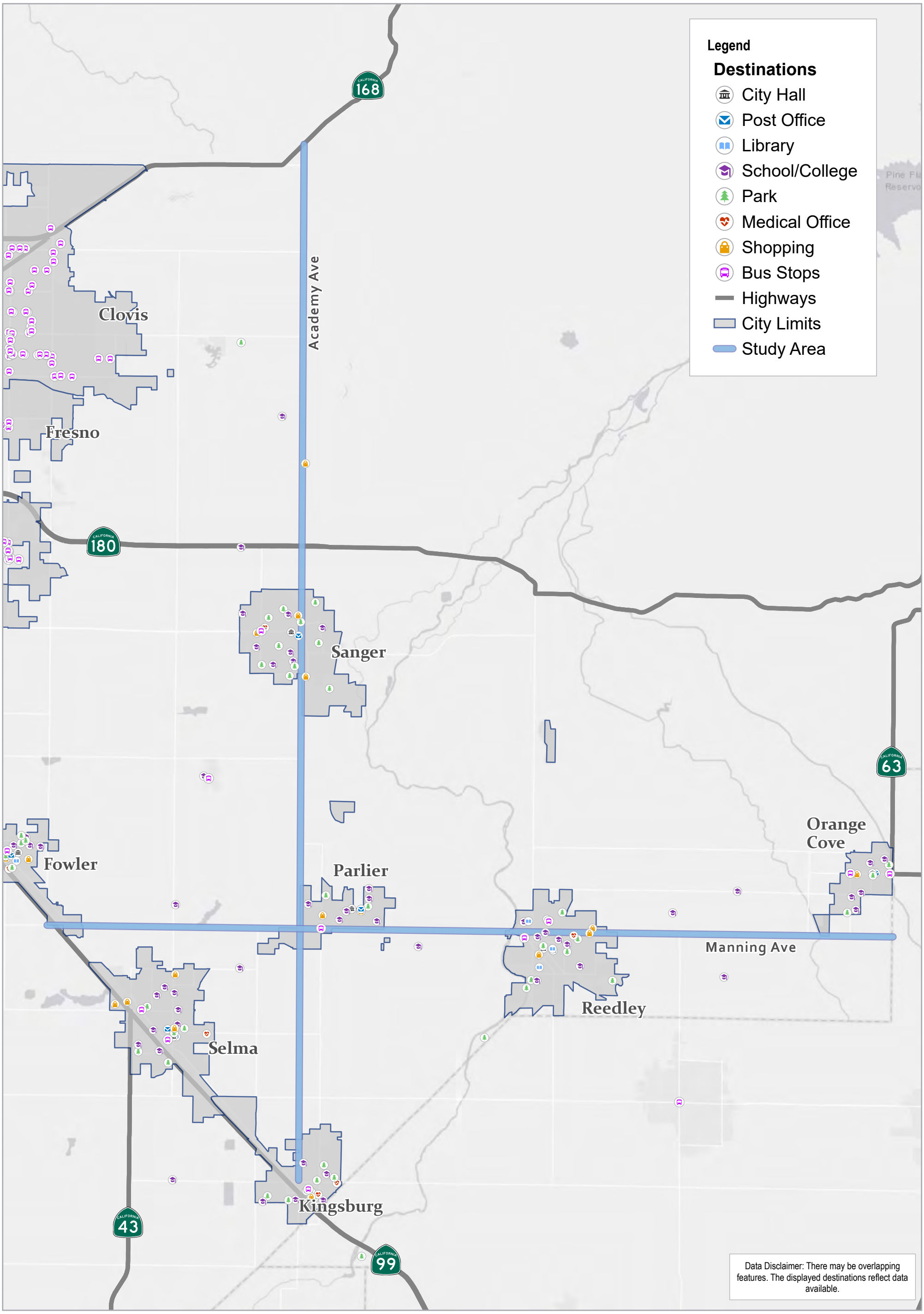
- City Hall Buildings, Post Offices, and Libraries
- Schools and Colleges
- Parks
- Medical Facilities
- Shopping Centers
- Transit Facilities, including: Bus Stops and Bus Routes

High stress segments, intersection crossings and intersection approaches present a barrier to low stress connectivity throughout the study area. With the exception of Reedley, which features a segment of Manning Avenue assigned an LTS score of three; all segments within incorporated and unincorporated areas are assigned LTS scores of four.

With points of interest and residential land use located mostly in incorporated areas, segments of Manning and Academy Avenues within the incorporated areas present the greatest barriers to multimodal connectivity within the study area. The majorities of destinations are condensed in these areas, and demand for low stress active transportation facilities are the highest in these locations.

While the more rural segments of Academy and Manning Avenues are also assigned high stress scores, there is less demand for low stress connectivity to concentrated points of interest along these segments. Along the corridor segments within unincorporated areas, land use is mostly low-density rural residential and agricultural with low demand for active transportation for commute travel purposes. Users who frequent the roadway facilities along unincorporated segments would likely fall within the “strong and fearless” or “enthusiastic and confident” categories described above, such as long distance, recreational riders who can tolerate higher stress facilities.

While we do recommend improvements that aim to improve safety and comfort along high stress segments in unincorporated areas, (discussed in detail in Chapter 9. Recommendations), multimodal connectivity recommendations are more focused on segments of Academy and Manning Avenues within incorporated areas where land use density and connectivity need is higher. This study strives to improve level of traffic stress to scores of one or two within incorporated areas, and LTS 3 within unincorporated areas, where feasible, to support multimodal connectivity that is realistic in terms of geographic context and funding opportunity.



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EASTSIDE TRANSPORTATION IMPROVEMENT CORRIDOR STUDY

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Fresno Council of Governments
Eastside Transportation Corridor Study

Points of Interest

Project No. 11210046
Revision No. -
Date JANUARY 2021

FIGURE 6-18

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Data Source: World Light Gray Canvas Base: Esri, HERE, NPS; Points of Interest: Open Street Map. Created by: pthornton

Climate Change Preparedness

This section documents an analysis of the Eastside Transportation Corridor's exposure to the risks of climate change impacts and preparedness of the Eastside Transportation Corridors to respond to risks of increasing temperatures, precipitation, and wildfires. This analysis includes the following:

- **Exposure & Potential Impacts** – historical impacts and identifying the corridors' susceptibility to potential damage or reduced service life from projected future conditions
- **Adaptive Capacity** – determining the corridors' current adaptive capacity based on adaptation-related policies and programs described in current planning documents
- **Vulnerability Scoring** – based on the combination of potential impacts from climate hazards and adaptive capacity

Adaptation measures are presented in Chapter 9 Recommendations and outline adaptive measures to improve climate change resilience.

Climate change is a global phenomenon that has the potential to impact local health, natural resources, infrastructure, emergency response, and other facets of society. Projected changes to climate are dependent on location and observable changes have already occurred in California. Fresno County spans across the Central Valley with the Coast Range to the west and the Sierra Nevada to the east. The County experiences extreme heat, flooding, wildfire, drought, dense fog, strong winds and winter storms.[3] In the coming decades, the county is projected to experience higher average temperatures and increases in extreme heat events, wildfires, storms, and droughts. In addition to decreased air quality and threatened water supply, these changes are anticipated to impact infrastructure such as roadways. This analysis focuses on the climate change impacts to the corridors, which could experience deterioration due to extreme heat, storm events and flooding, and wildfire.

Exposure & Potential Impacts

As mentioned above, the county has historically experienced extreme heat, flooding, wildfire, drought, dense fog, strong winds and winter storms. Historical exposure to weather-related events and risks are summarized in the 2018 Fresno County Multi-Hazard Mitigation Plan (MHMP) and the 2019 Fresno Council of Governments Fresno County Regional Transportation Network Vulnerability Assessment (TNVA).

Projected exposure to climate change impacts in the region have been thoroughly studied in the 2019 TNVA and the 2018 District 6 Caltrans Climate Change Vulnerability Assessment. All the climate change

[3] Fresno Council of Governments (FCOG). 2019. Fresno County Regional Transportation Network Vulnerability Assessment – Vulnerability Assessment Summary Memorandum. Accessed at: https://www.fresnocog.org/wp-content/uploads/2017/06/Vulnerability-Assessment-Summary.pdf

projections in this analysis are gathered from the 2018 Caltrans VA Map.[4] The projections used to create the 2018 Caltrans VA Map were taken from Cal-Adapt – an interactive, online platform developed by the University of California and Berkeley to synthesize climate change projections and climate impact research for California's scientists and planners. This analysis considers a greenhouse gas emissions scenario developed by the Intergovernmental Panel on Climate Change (IPCC), called Representative Concentration Pathway (RCP) 8.5. In this scenario, emissions continue to rise throughout the 21st century before leveling off. RCP 8.5 is considered a conservative emissions scenario to use in planning and is both used in the 2018 Caltrans VA as well as recommended by the State for climate change planning. This section describes exposure and potential impacts to the corridors from temperature, precipitation, and wildfire.

Temperature

Since 1901, average temperatures across the country have increased with eight of the top ten warmest years on record having occurred over the past 30 years, according to the United States Environmental Protection Agency. Temperatures in California are expected to continue rising with heat waves potentially increasing as well. Extreme temperatures can impact the corridor's design and operations and maintenance.

According to the 2018 Caltrans VA, increasing temperatures may impact the following:

- Design
  - Pavement design
- Operations and Maintenance
  - Extended periods of high temperatures affect safety conditions for maintenance employees working long hours outdoors
  - Extreme temperatures may cause pavement discontinuities and deformation, which could lead to more frequent maintenance

Projected changes in minimum temperature (mean of the absolute minimum air temperatures expected) and maximum temperature (mean of the average maximum temperatures over seven consecutive days) are critical to determining the extreme temperatures a roadway may experience, according to the 2018 Caltrans VA. Specifically, the selection of pavement binder grade, which acts as the glue holding together the aggregate materials in asphalt, is partially reliant on minimum and maximum temperature. To maintain pavement integrity under extreme cold conditions (which can lead to contraction) and extreme heat (which can lead to expansion), the appropriate binder must be selected. Figure 6-19 and Figure 6-20 were created using data from the 2018 Caltrans VA Map, which assesses three future 30-year periods centered on 2025, 2055, and 2085. These periods illustrate how adaptive measures, such as pavement design, may need to shift over time. The following figures can be used to develop adaptation measures related to both design and operations and maintenance over time.

[4] 2018 Caltrans District 6 Climate Change Vulnerability Assessment Map:
https://caltrans.maps.arcgis.com/apps/webappviewer/index.html?id=5519c87f661d4f5e9c3f4146cd7aadfd

Figure 6-19. Change in Absolute Minimum Temperature

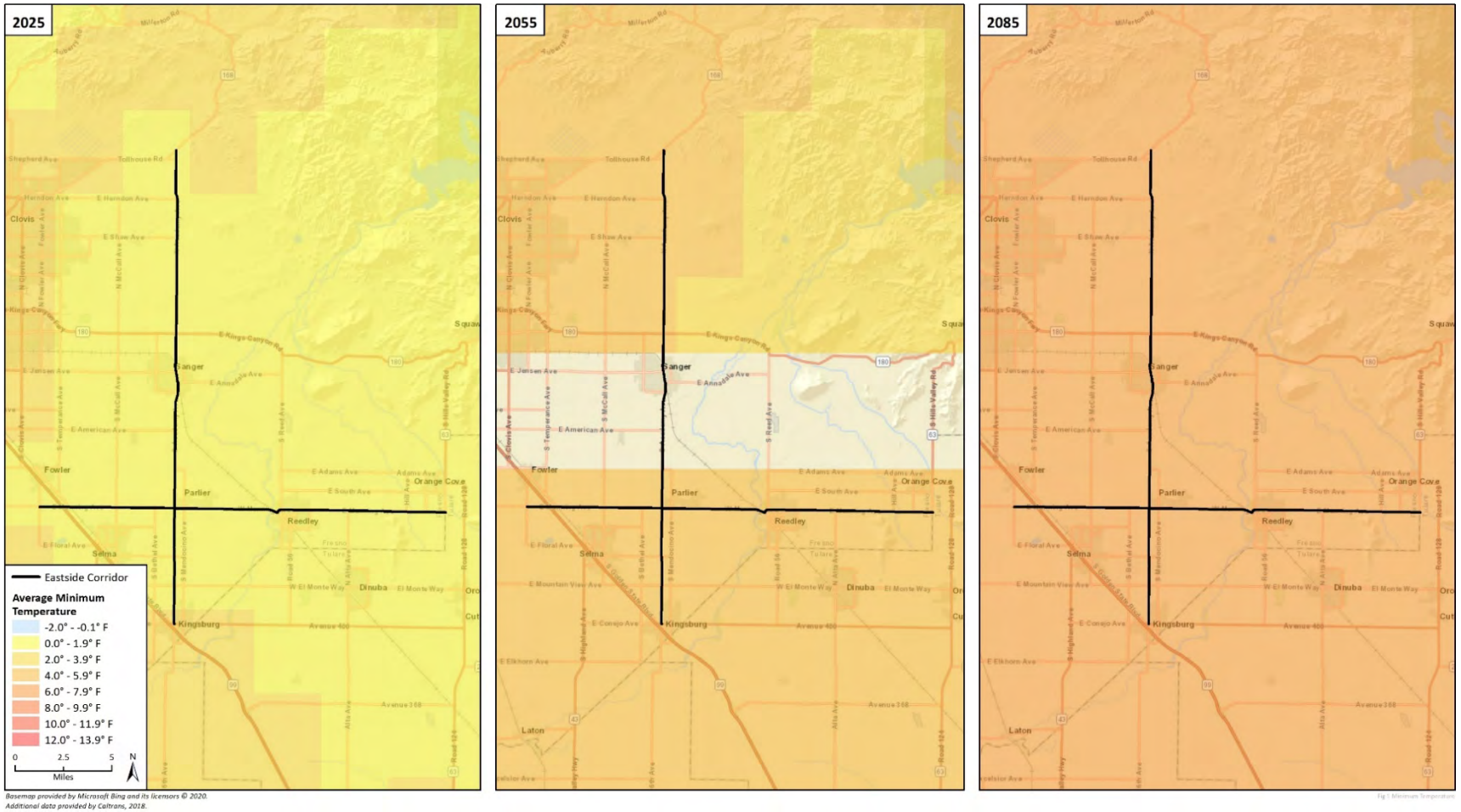


Figure 6-20. Change in Average Maximum Temperature Over 7 Consecutive Days

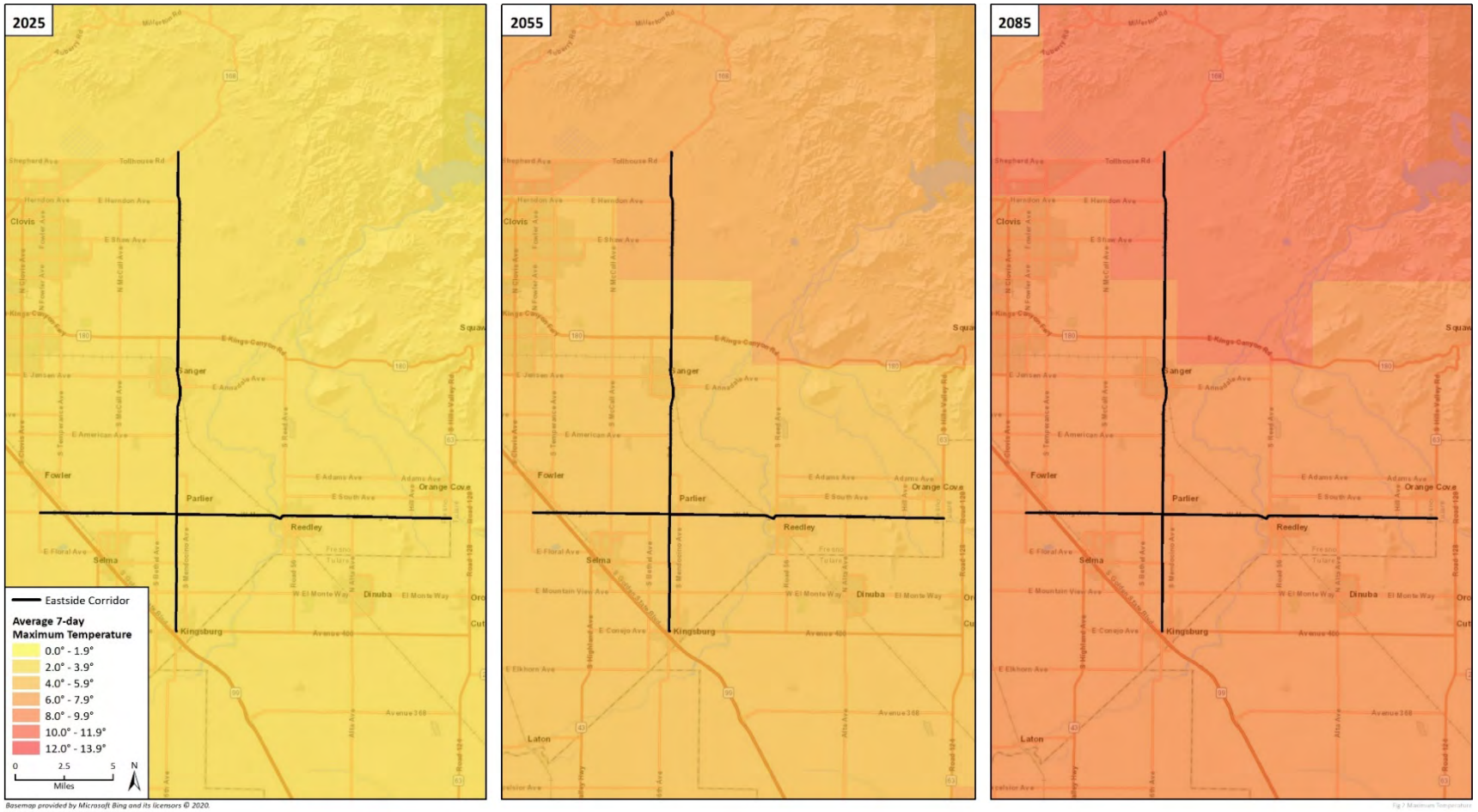


Figure 6-19 and Figure 6-20 show both minimum and maximum temperatures increasing over time. As previously mentioned, this will affect design as well as operations and maintenance of the corridors. With average maximum temperature over seven consecutive days rising over 10 degrees Fahrenheit by the end of the century, roadway design will need to be reevaluated. These high temperatures will also affect safety conditions for maintenance.

Precipitation

A warming climate is likely to influence the frequency and intensity of precipitation events. Heavy precipitation events have been on the rise in the United States since the 1980s. Across the country, nine of the top ten years for extreme one-day precipitation events have occurred since 1990 with the occurrence of abnormally high annual precipitation totals also increasing.[5] As described in the Health and Safety Element of the 2000 Fresno County General Plan, flooding is a natural occurrence in the Central Valley because it is a drainage basin for thousands of watershed acres of Sierra Nevada and Coast Range foothills and mountains. Flooding in Fresno County occurs primarily along the Kings River in the central-eastern portion of the county, some sections of the San Joaquin River, and many of the foothill streams along the east and west sides of the valley. Figure 6-21 shows the current 100- and 500-year floodplains surrounding the corridors.[6]

As described in the 2018 Caltrans VA, abnormally heavy precipitation events occurred in the Fresno area during the 2016-2017 winter, causing $85 million in damages to Caltrans District 6 assets in 2017. Heavy precipitation can cause flooding and inundation, landslides, and washouts. According to the 2018 MHMP, there is no risk of large landslides in the valley portion of the County, where the corridors are located, because of the relatively flat topography. The main potential risk for the corridors is flooding and inundation.

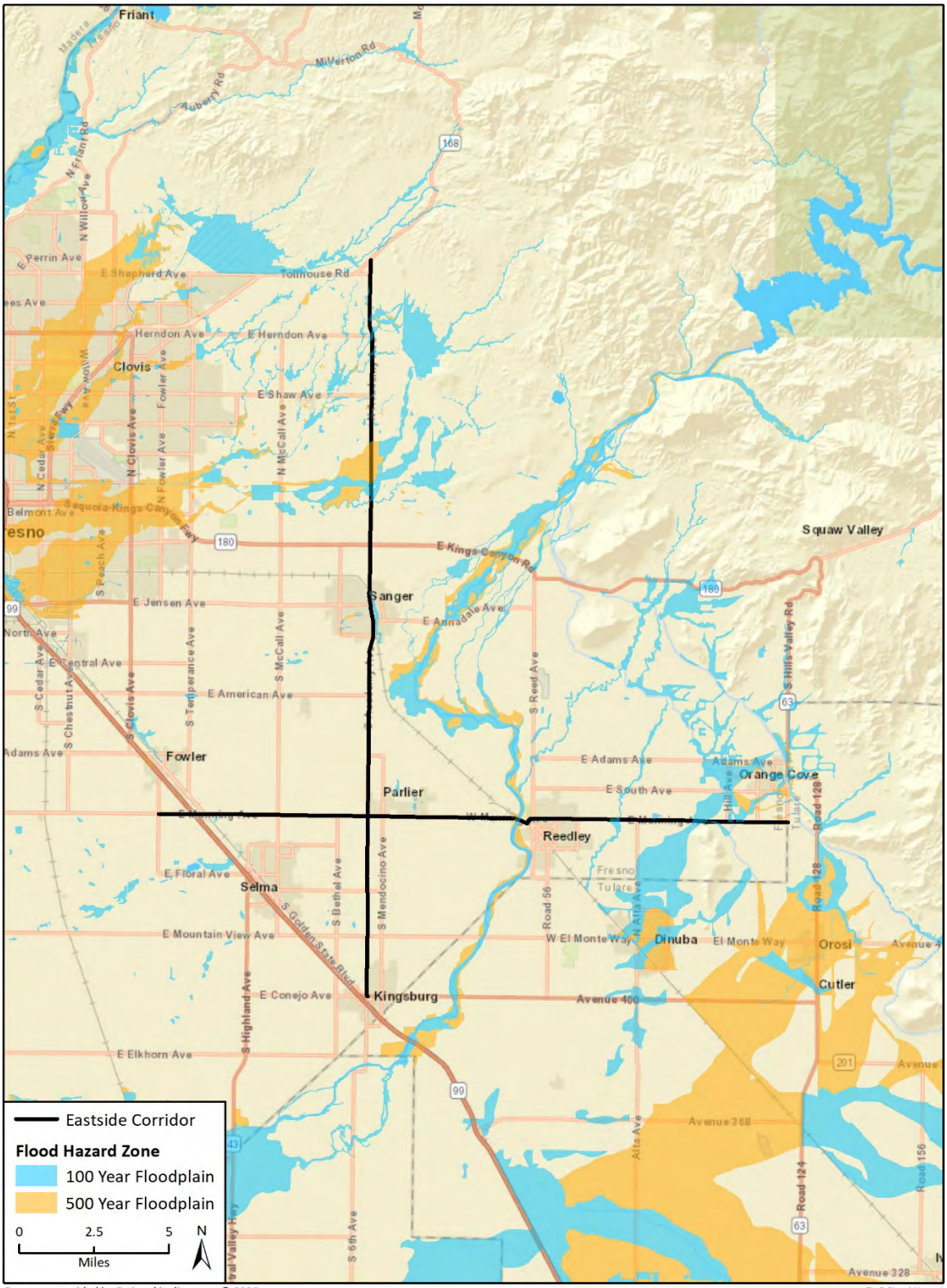
Flooding may inhibit movement of people and goods on the corridors. Additionally, emergency response systems could be affected by flooding through restricted access to and from emergency response systems. Both increased temperatures and altered precipitation patterns can lead to altered seasons and intense rainstorms in California. However, future precipitation projections are difficult to assess, with modeled future precipitation values varying widely. Consistent with the 2018 Caltrans VA, this report uses projected changes in 100-year storm events to analyze the corridors' vulnerability to flooding and inundation. The maps below show the percentage change in the 100-year storm rainfall event predicted for the three analysis periods and the RCP 8.5 emissions scenario.

As shown in Figure 6-22, the change in 100-year storm depth is positive for all timeframes, indicating projected heavier rainfall during storm events. While relatively small, these projected increases in precipitation during storm events would lead to increased flooding and inundation in a region that, as a drainage basin for the watersheds of the surrounding mountain ranges, is currently at risk of flooding from 100- and 500-year floods.

[5] United States Environmental Protection Agency (EPA). n.d. Climate Change Indicators. Accessed November 2020 at: https://www.epa.gov/climate-indicators/weather-climate

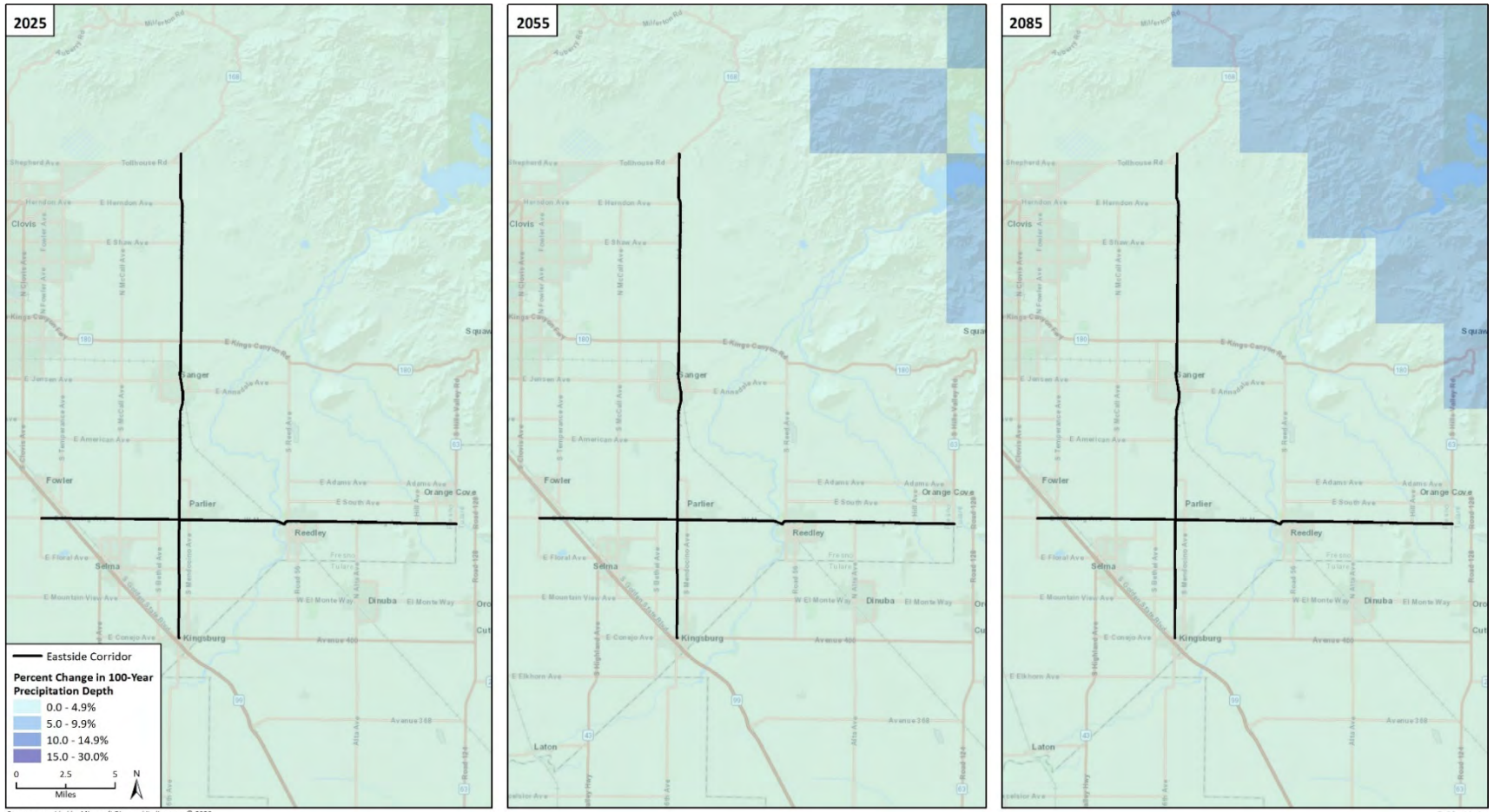
[6] 100-year floodplains are areas with a 1% annual chance of flooding

Figure 6-21. FEMA Flood Hazard Zones



Basemap provided by Esri and its licensors © 2020.
Additional data provided by FEMA, 2020.

Figure 6-22. Percent Change in 100 Year Storm Precipitation Depth



Wildfire

Wildfire is determined by climate variability, local topography, land cover and human activity. Climate change has the potential to affect multiple elements of the wildfire system including fire behavior, ignitions, fire management, and vegetation fuels. Hot dry spells create the highest fire risk and increased temperatures may intensify wildfire danger by warming and drying out vegetation. According to the California Department of Forestry and Fire Protection (CalFire), the corridors are not in a Very High Fire Hazard Severity Zone; however, the foothills just east of the corridors are designated as Moderate and High fire risk areas (CalFire 2007). Figure 6-23 shows fire hazard severity zones in Fresno County, with the blue lines indicating the corridors. Government Code §51181 requires CalFire to periodically reassess and update the Very High Fire Hazard Severity Zones as needed. Due to amount and extent of the wildfires recently, the fire hazard severity zones are currently being reassessed throughout the State.

Wildfires can cause substantial damage to communities and roadways. For example, in 2017 wildfires in the Santa Barbara area stripped the land of protective cover and damaged the soils, such that subsequent rainstorms led to disastrous mudslides that caused catastrophic damage to the community of Montecito and Highway 101 in Santa Barbara County. Because the corridors are located in the flat portion of the county, landslides do not pose a substantial risk.

Not only do wildfires pose a threat to life and property in the communities in which they burn, their smoke can threaten the health of communities up to thousands of miles beyond the areas they burn (TIME 2018). Wildfire smoke is comprised of air pollutants including particulate matter, known to be a public health risk (CDC 2013). The effects of exposure to these pollutants range from eye and respiratory tract irritation to reduced lung function, pulmonary inflammation, bronchitis, exacerbation of asthma, other lung diseases, and cardiovascular disease, and premature death (CDC 2013). The increasing number and extent of wildfires in the Western United States may pose a substantial risk to public health in Fresno. The corridors may act as a potential fire evacuation route, leading from fire hazard severity zones to low risk areas in the more urbanized portions of the county. Wildfires may directly affect traffic and driver safety on the corridors in the event of a wildfire and indirectly affect maintenance workers through wildfire smoke. Additionally, wildfire smoke can decrease visibility, raising health concerns for drivers. Figure 6-24 shows the level of wildfire concern for the Caltrans State Highway System.

As shown in Figure 6-23 and Figure 6-24, both current risk and projected wildfire risk are low within more urbanized areas of Fresno, where the corridors are located. However, given the projected increase in wildfires to the north and east of the corridors, indirect impacts of wildfire could increase over time. This includes potentially increased traffic on the corridors in the event of a wildfire and evacuation order in the Sierra Nevada foothills, and indirect impacts to maintenance workers from wildfire smoke.

Figure 6-23. Fresno County Fire Hazard Safety Zones

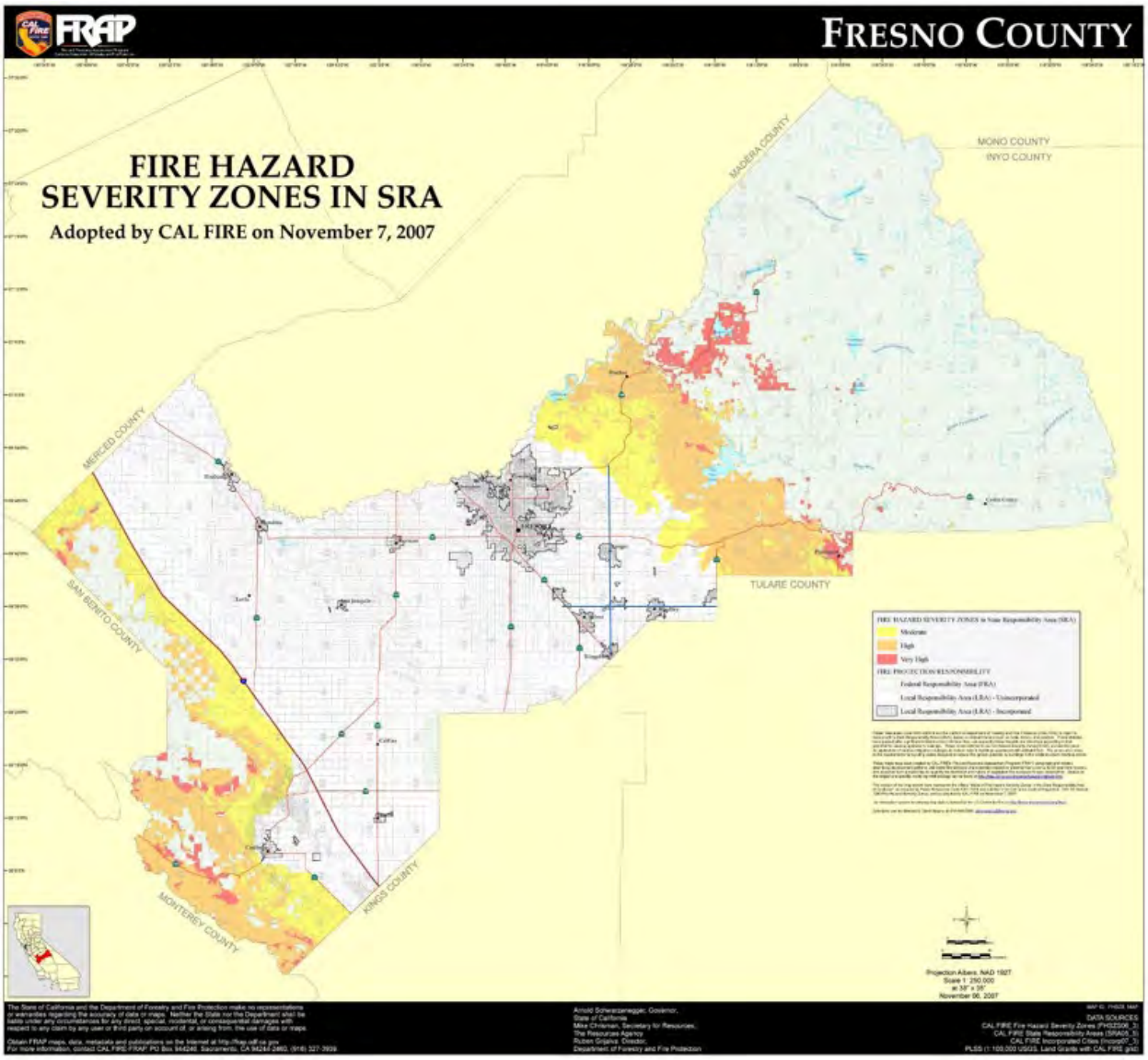
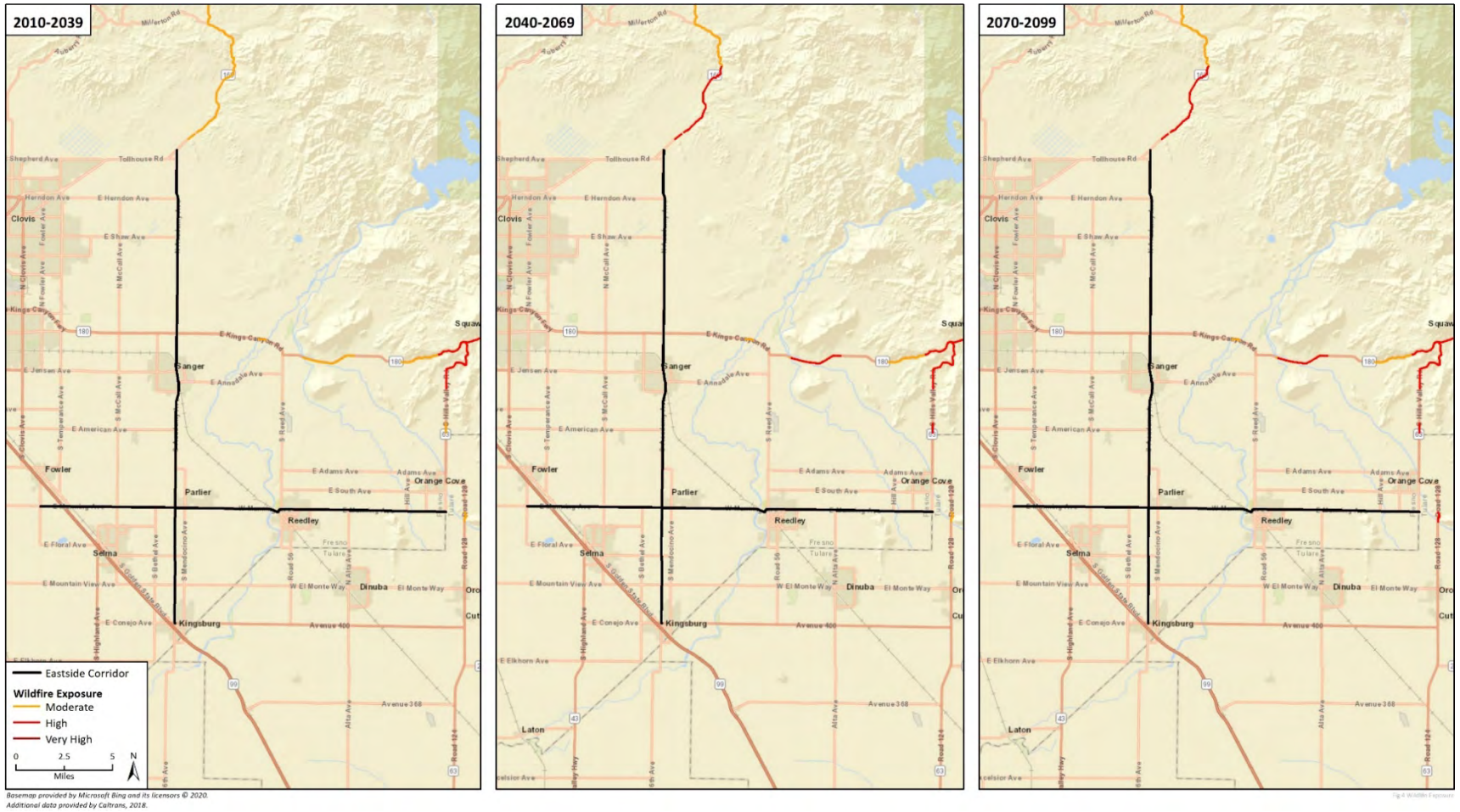


Figure 6-24. Wildfire Exposure



Adaptive Capacity

Adaptive capacity is the ability to manage the results of climate impacts. There are a variety of documents that address historical weather-related impacts, projected climate change impacts, and climate adaptation in Fresno. Table 6-5 lists guiding documents prepared in the region that focus on climate action and adaptation and briefly summarizes how they address transportation systems. These guiding documents promote hazard mitigation, disaster preparedness, and proactive planning in the area.

Table 6-5 illustrates that there are a variety of plans in the region, which consider climate change impacts on transportation systems. These plans all describe the potential impacts of increasing temperatures, precipitation, and wildfires in the region; however, the currently available plans do not detail adaptation strategies for transportation systems in the region. Because of the lack of adaptation strategies for transportation systems, current adaptive capacity of the corridors ranges from medium to high.

Table 6-5. Summary of Relevant Climate Change and Transportation Planning Documents

Document	Established
Fresno Council of Governments – Fresno County Regional Transportation Network Vulnerability Assessment The project aims to assist FCOG and member agencies in understanding potential impacts of climate change on the region's transportation infrastructure. The assessment includes climate projections, transportation system vulnerability scoring, and adaptation strategies.	March 2020
Caltrans Climate Change Vulnerability Assessments – District 6 Summary Report The report provides potential implications of climate change to Caltrans assets, specifically the State Highway System in District 6, and how climate data can be applied in decision-making. There is also a technical report that provides background on the methodology developed, and more in-depth discussion of climate impacts.	July 2018
Fresno County Multi-Hazard Mitigation Plan The plan seeks to better protect the people and property of the county from the effects of hazard events. The plan describes the potential for climate change to affect the frequency and intensity of hazards in the future. The plan describes impacts of fog, flooding, and temperature on transportation systems.	May 2018
The Central Valley Flood Protection Plan The plan seeks to improve flood risk management in the Central Valley and develop strategies for reduction risk that provide multiple benefits, including transportation system protection. The 2017 plan includes climate change considerations such as more frequent precipitation, changes in flood magnitudes and frequencies and increased subsidence.	August 2017 (2022 in progress)
Fresno Council of Governments – Regional Transportation Plan This plan addresses the mobility needed to keep the region moving and communities connected and charts a long-range vision of regional transportation through 2042. The plan considers the long-term impacts that climate change can have on the transportation network, including from more frequent flooding, thermal expansion of paved surfaces, asphalt degradation, and increased maintenance and construction costs.	July 2017 (update in progress)

Document	Established
Integrated Strategies for a Vibrant and Sustainable Fresno County The purpose of the plan is to develop new strategies that will increase the resilience of both human and natural communities to near-term and long-term stressors and changes in Fresno County. The plan summarizes potential climate change impacts to transportation systems such as heat extremes, flooding, and wildfire.	March 2011

Vulnerability Scoring

Vulnerability scores are based on the combination of potential impacts from climate hazards and adaptive capacity. These scores help to identify the climate vulnerabilities to address with additional adaptation strategies. Vulnerability is assessed on a scale from 1 to 5:

- 1: Minimal Vulnerability
- 2: Low Vulnerability
- 3: Moderate Vulnerability
- 4: High
- 5: Severe

Table 6-6 shows how the final vulnerability score was determined. Potential impacts from climate change that are highly likely to occur at the corridors based on projected exposure would create a high vulnerability score. However, if a region has a high adaptive capacity to manage the impact, then the overall vulnerability score would be reduced. The California Governor's Office of Emergency Services (Cal OES), which developed the California Adaptation Planning Guide, recommends the following scoring rubric to determine the vulnerability score for the potential impacts and adaptive capacity:

Potential Impact

- **Low**: Impact is unlikely based on projected exposure; would result in minor consequences to public health, safety, and/or other metrics of concern
- **Medium**: Impact is somewhat likely based on projected exposure; would result in some consequences to public health, safety, and/or other metrics of concern
- **High**: Impact is highly likely based on projected exposure; would result in substantial consequences to public health, safety, and/or other metrics of concern

Adaptive Capacity

- **Low**: The population or asset lacks capacity to manage climate impact; major changes would be required
- **Medium**: The population or asset has some capacity to manage climate impact; some changes would be required
- **High**: The population or asset has high capacity to manage climate impact; minimal to no changes are required

Table 6-6. General Vulnerability Score Matrix

Potential Impacts	High	3	4	5
	Medium	2	3	4
	Low	1	2	3
		High	Medium	Low
Adaptive Capacity				

Potential impact and adaptive capacity of each projected climate change impact on the corridors are as follows:

Temperature

- High Potential Impact – The projections show a clear increase in temperatures
- Medium Adaptive Capacity – While there are many plans that address climate change impacts on transportation systems, there are no adaptation-focused policies or programs in place that are designed to protect roadways from the impacts of extreme heat

Precipitation

- Medium Potential Impact – The projections show an increase in 100-year storm depth and variability in storms and precipitation patterns
- High Adaptive Capacity – The Central Valley Flood Protection Plan provides recommendations on flood risk awareness, flood readiness, and land use planning to reduce flood risk

Wildfire

- Medium Potential Impact – The projections show low concern of wildfire at the corridors' location, however, wildfire in the Sierra Nevada foothills is of concern
- Medium Adaptive Capacity – While there are many plans that address climate change impacts on transportation systems, are no adaptation-focused policies or programs in place that are designed to protect roadways from the impacts of wildfire

The vulnerability scoring for the corridors for each climate impact is included below in Table 6-7 and based on Cal OES California Adaptation Planning Guide. For the purposes of this vulnerability assessment, a score of four or five is considered significant. Populations and assets that score at least a four for one or more exposures are considered substantially vulnerable.

Table 6-7. Eastside Corridor Vulnerability Assessment Results

Increased Temperature	Variable Precipitation	Wildfire
4	2	3

As shown in Table 6-7, the corridors are most vulnerable to increased temperature, and less vulnerable to wildfire and variable precipitation. These results indicate that adaptive measures focused on addressing increased temperature on the corridors should be prioritized first. Adaptive measures are presented in the recommendations chapter of this study in Chapter 9.

7. Existing & Forecasted Operations Analysis

This chapter presents the Existing Conditions Intersection Operations Analysis (IOA), which was prepared to analyze critical intersections and road segments in the study area approved by member agencies. Consistent with the Fresno County guidelines, the following traffic scenarios were evaluated:

- Existing Conditions
- No-Build Cumulative Year 2045 Conditions

Existing Conditions quantify the current traffic operations at the study locations. Cumulative Year 2045 Conditions refer to the no-build scenario that would exist following approximately twenty years of development in the study area.

Study Intersections

The following intersections were identified in coordination with FCOG, County of Fresno and Caltrans. The project area includes 25 intersections as listed in Table 7-1 and illustrated in Figure 7-1.

Table 7-1. Study Intersections

Study Intersections	
Academy Avenue Corridor	**Manning Avenue Corridor**
1. State Route 168 / Academy Ave	15. Manning Ave / Golden State Blvd
2. Shaw Ave / Academy Ave	16. Manning Ave / McCall Ave
3. Ashlan Ave / Academy Ave	17. Manning Ave / Mendocino Ave
4. McKinley Ave / Academy Ave	18. Manning Ave / Lac Jac Ave
5. State Route 180 / Academy Ave*	19. Manning Ave / Reed Ave
6. Jensen Ave / Academy Ave	20. Manning Ave / Frankwood Ave
7. Annadale Ave / Academy Ave	21. Manning Ave / Buttonwillow Ave**
8. North Ave / Academy Ave	22. Manning Ave / Alta Ave
9. Adams Ave / Academy Ave	23. Manning Ave / Hill Ave
10. Manning Ave / Academy Ave	24. Manning Ave / Hills Valley Rd
11. Rose Ave / Academy Ave	25. Manning Ave / State Route 63
12. Mountain View Ave / Academy Ave	
13. Kamm Ave / 10th Ave (Academy Ave)**	
14. Sierra St / 10th Ave (Academy Ave)**	

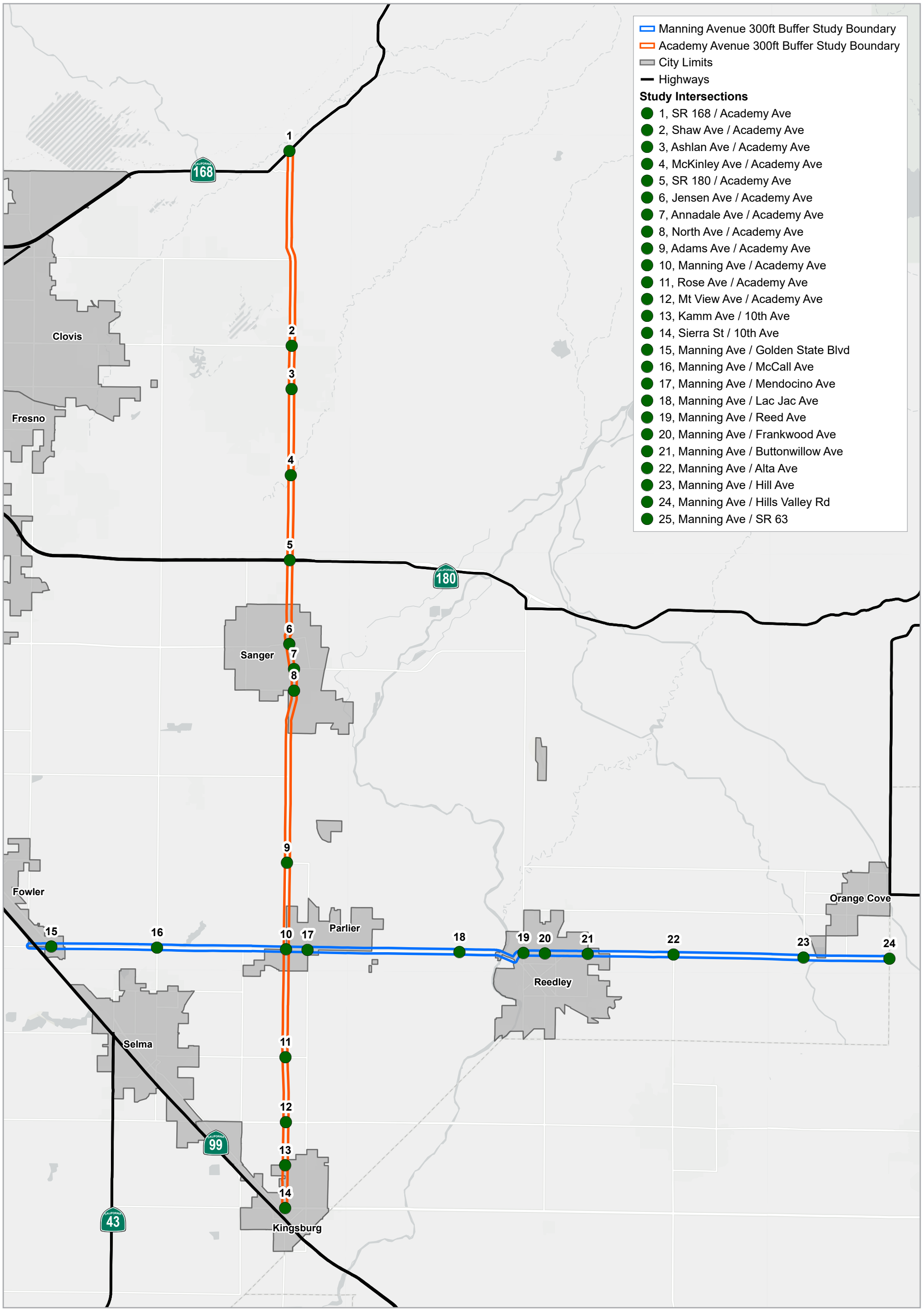
Notes: Traffic volume intersections counts, provided by Streetlight.
*Traffic volume intersection historical counts provided by GHD.
**Traffic volume intersection historical counts provided by National Data & Surveying Services.

Study Roadway Segments

The following roadway segments were identified for analysis as listed in Table 7-2.

Table 7-2. Study Roadway Segments

Study Roadway Segments			
Academy Avenue Corridor		**Manning Avenue Corridor**	
Jurisdiction	**Limits**	**Jurisdiction**	**Limits**
1. Kingsburg	State Route 201 - Stroud	17. Fresno County	State Route 99 - Golden State
2. Kingsburg	Stroud - Kamm	18. Fresno County	Golden State - McCall
3. Fresno County	Kamm - Mountain View	19. Parlier	McCall - Academy
4. Fresno County	Mountain View - Rose	20. Parlier	Academy - Mendocino
5. Parlier	Rose - Manning	21. Fresno County	Mendocino - Zediker
6. Parlier	Manning - Adams	22. Fresno County	Zediker - Upper Bridge
7. Fresno County	Adams - American	23. Reedley	Upper Bridge - Reed
8. Fresno County	American - Central	24. Reedley	Reed - Frankwood
9. Sanger	Central - North	25. Reedley	Frankwood - Buttonwillow
10. Sanger	North - Jensen	26. Fresno County	Buttonwillow - Alta
11. Sanger	Jensen - Church	27. Fresno County	Alta - Hill
12. Sanger	Church - State Route 180	28. Orange Cove	Hill - Hill Valley
13. Fresno County	State Route 180 - Belmont		
14. Fresno County	Belmont - Ashlan		
15. Fresno County	Ashlan - Shaw		
16. Clovis	Shaw - Herndon		



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Map Projection: Lambert Conformal Conic
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane California IV FIPS 0404 Feet

EASTSIDE TRANSPORTATION IMPROVEMENT CORRIDOR STUDY

GHD

Fresno Council of Governments
Eastside Corridor Study

Study Intersections

Project No. 11210046
Revision No. -
Date January 25, 2021

FIGURE 7-1

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Data Source: Light Gray Base: Fresno County Dept. PWP, Esri, HERE, Garmin, SafeGraph, METI/NASA, USGS, Bureau of Land Management, EPA, NPS, USDA. Created by: pthornton

Data Collection

Intersection Data Collection

Due to the COVID-19 shelter-in-place conditions at the time of this analysis, data collection for vehicles was not possible as travel conditions were not considered normal.

As an alternative to normal data collection for vehicles, the project team utilized historical volume intersection counts from a previous project, purchased traffic volume counts from the *National Data & Surveying Services (NDS),* and StreetLight Data provided the remaining traffic volume counts. *NDS* is a data collection and data analysis firm. The sources of intersection volume count are noted in the above table footnotes (Table 7-1).

NDS has developed an extensive traffic study database of historical data supporting both public and private clients. StreetLight Data is an on-demand mobility analytics platform using big data from mobile devices to fuel analysis like Origin-Destination (O-D), travel time and select link studies. StreetLight Data utilizes two different data sources: Location-Based Services (LBS) data, which is created by smartphone apps, and Navigation-GPS data, which is created by connected cars and trucks as well as turn-by-turn navigation tools. Refer to StreetLight *InSight Turning Movements Validation White Paper* for technical details of the validation process.[7]

This analysis used Streetlight Data to obtain historical traffic counts from 2019 for a typical weekday (Tuesday – Thursday) in capturing Pre-COVID-19 traffic flow conditions. Study intersections were analyzed during the weekday AM and PM peak hour period. The AM and PM peak hour is defined as the highest continuous hour of peak traffic flow counted between 7:00 AM to 9:00 AM and 4:00 PM to 6:00 PM, respectively, under typical weekday conditions. No known special events were occurring in the area nor inclement weather present at the time of traffic counts and all local schools were in session.

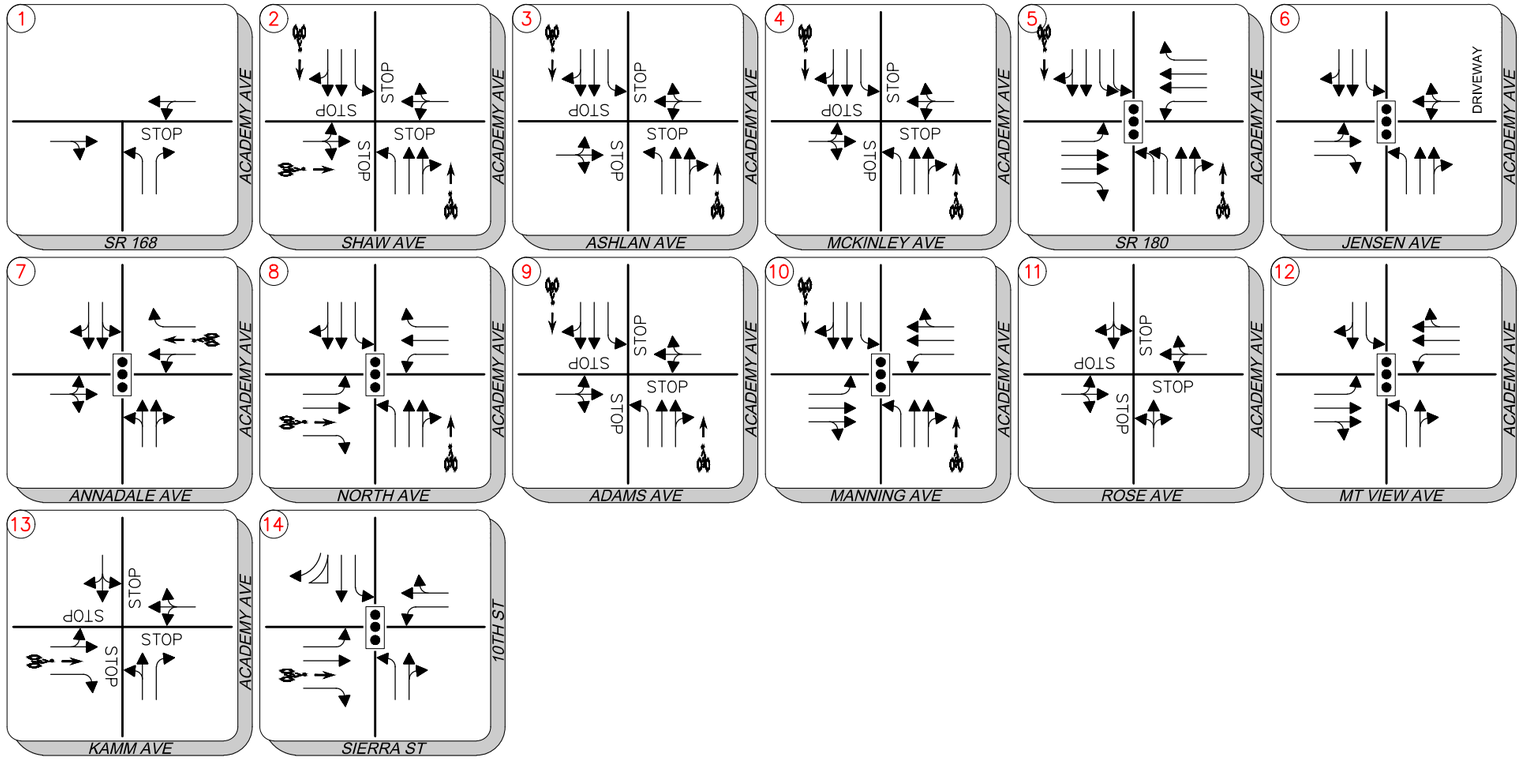
Figure 7-2 and Figure 7-3 present the existing lane geometrics and traffic controls and Figure 7-4 and Figure 7-5 present the intersection peak hourly volumes for Academy Avenue and Manning Avenue.

Daily Segment Data Collection

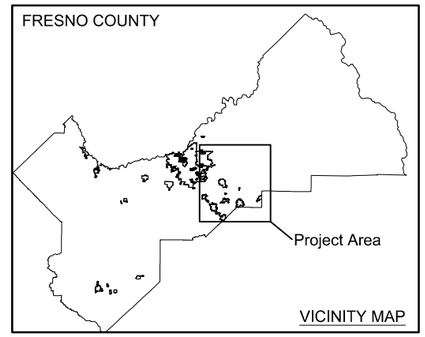
Given the current COVID-19 shelter-in-place conditions, data collection for vehicles is not possible as travel conditions are not considered normal.

Due to limited data, the use of the Fresno COG Regional Travel Demand Forecast Model – 2019 Base Conditions was pursued, and daily traffic counts for Academy Avenue and Manning Avenue corridors obtained using the model. This 2019 base conditions model has been validated by FCOG.

[7] Available online: https://learn.streetlightdata.com/turning-movements-white-paper



EASTSIDE TRANSPORTATION CORRIDOR IMPROVEMENT STUDY



LEGEND:

- BICYCLE LANE
- VEHICLE LANE
- TRAFFIC SIGNAL
- ROUNDABOUT

ACADEMY AVENUE CORRIDOR

N

GHD

Fresno Council of Governments
EASTSIDE CORRIDOR STUDY

EXISTING LANE GEOMETRICS AND CONTROL

Project No. 11210046
Report No. 000
Date 06.19.2020

FIGURE 7-2

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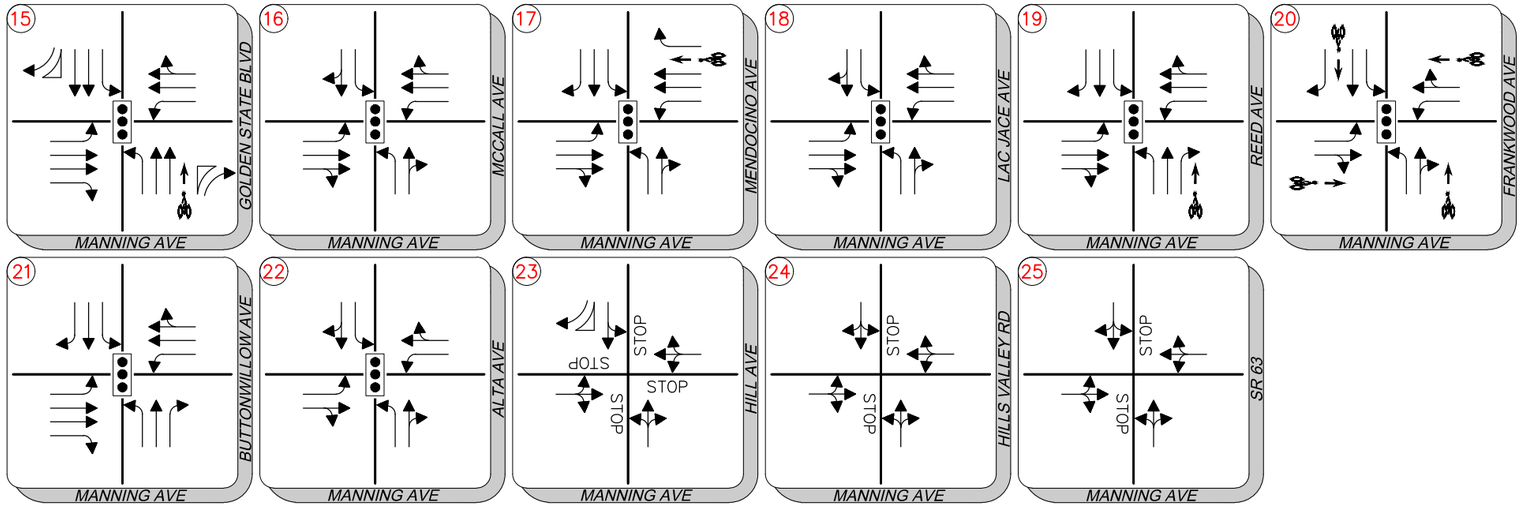
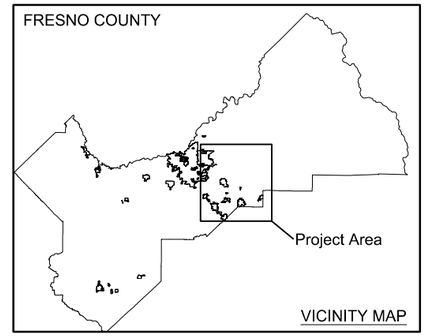
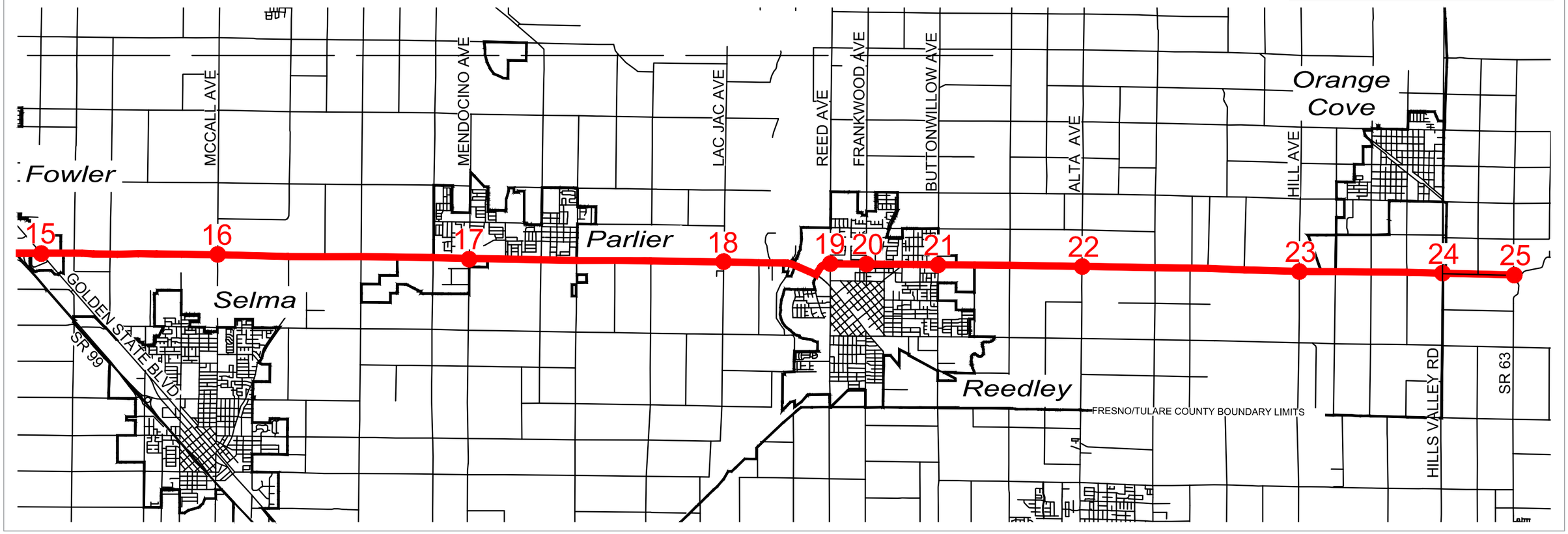


EASTSIDE TRANSPORTATION CORRIDOR IMPROVEMENT STUDY





LEGEND:

- BICYCLE LANE
- VEHICLE LANE
- TRAFFIC SIGNAL
- ROUNDABOUT

MANNING AVENUE CORRIDOR

N

GHD

Fresno Council of Governments
EASTSIDE CORRIDOR STUDY

EXISTING LANE GEOMETRICS AND CONTROL

Project No. 11210046
Report No. 000
Date 06.19.2020

FIGURE 7-3

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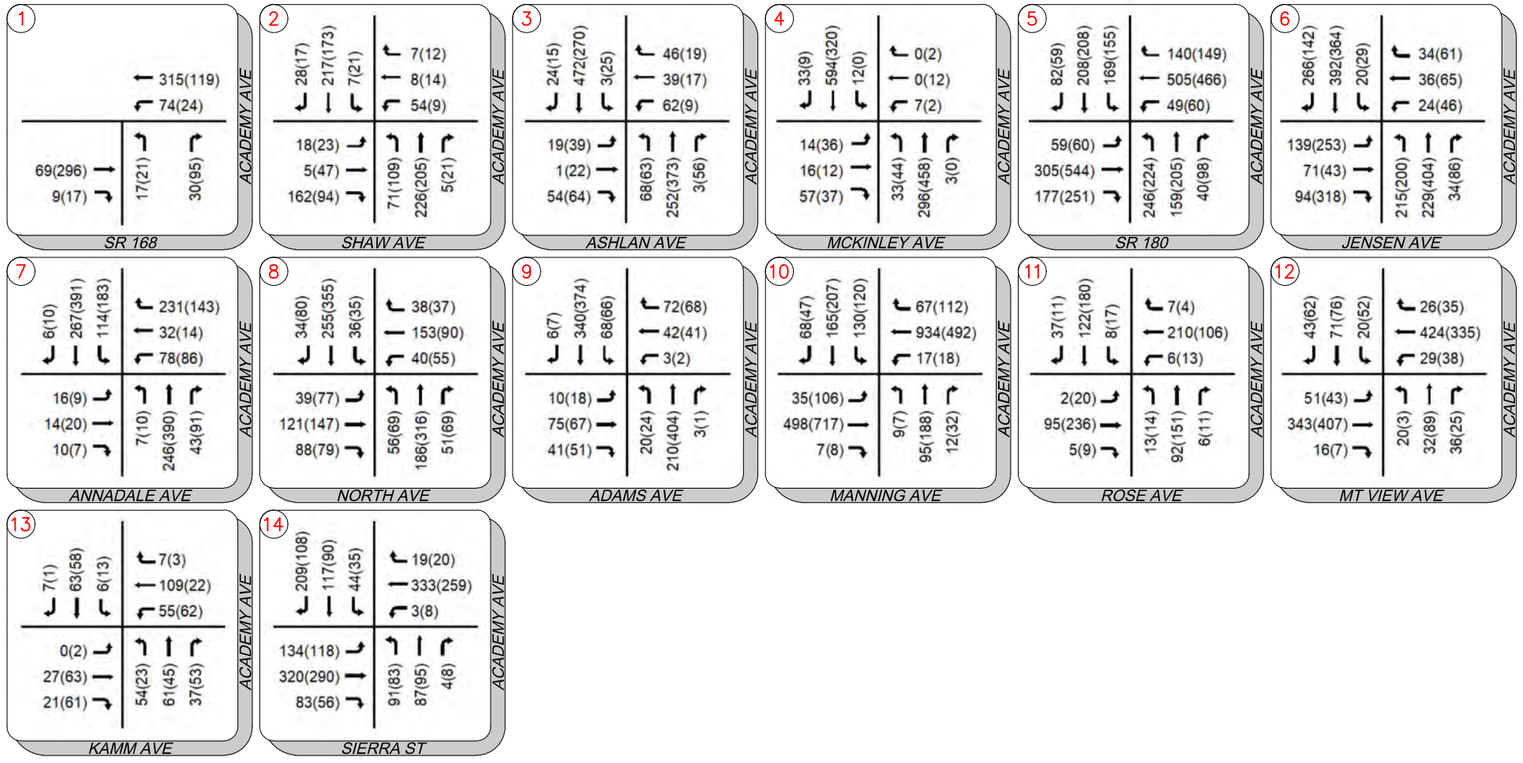
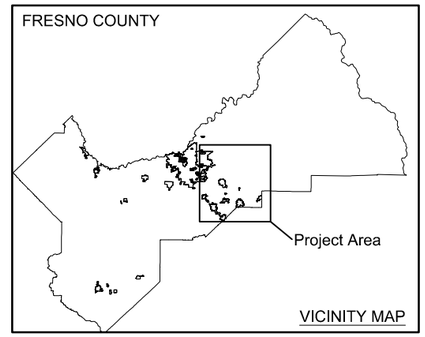


EASTSIDE TRANSPORTATION CORRIDOR IMPROVEMENT STUDY



LEGEND:

XX - AM PEAK HOUR TRAFFIC VOLUMES

(XX) - PM PEAK HOUR TRAFFIC VOLUMES

ACADEMY AVENUE CORRIDOR

N

GHD

Fresno Council of Governments
EASTSIDE CORRIDOR STUDY

EXISTING PEAK HOUR TRAFFIC VOLUMES

Project No. 11210046
Report No. 000
Date 06.15.2020

FIGURE 7-4

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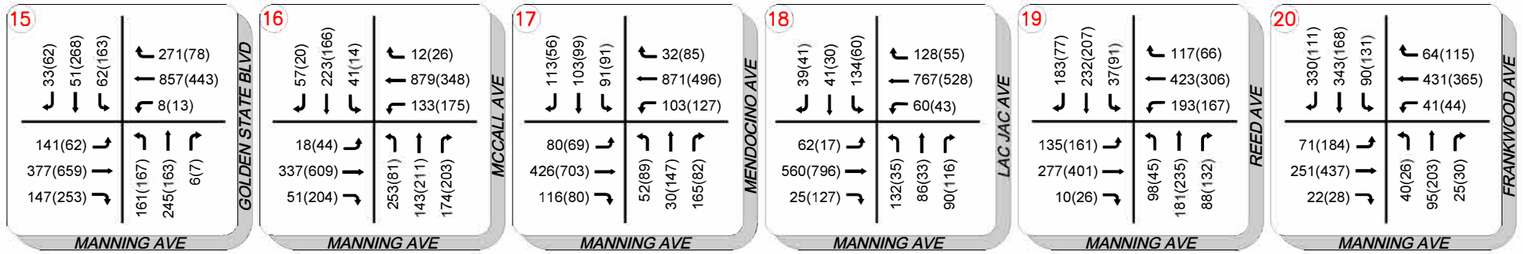
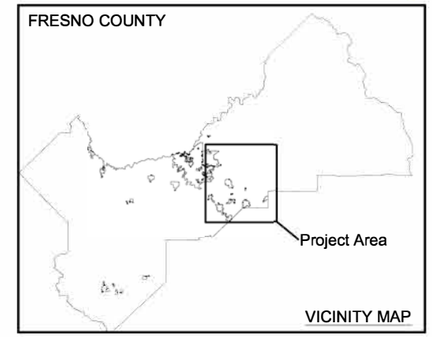
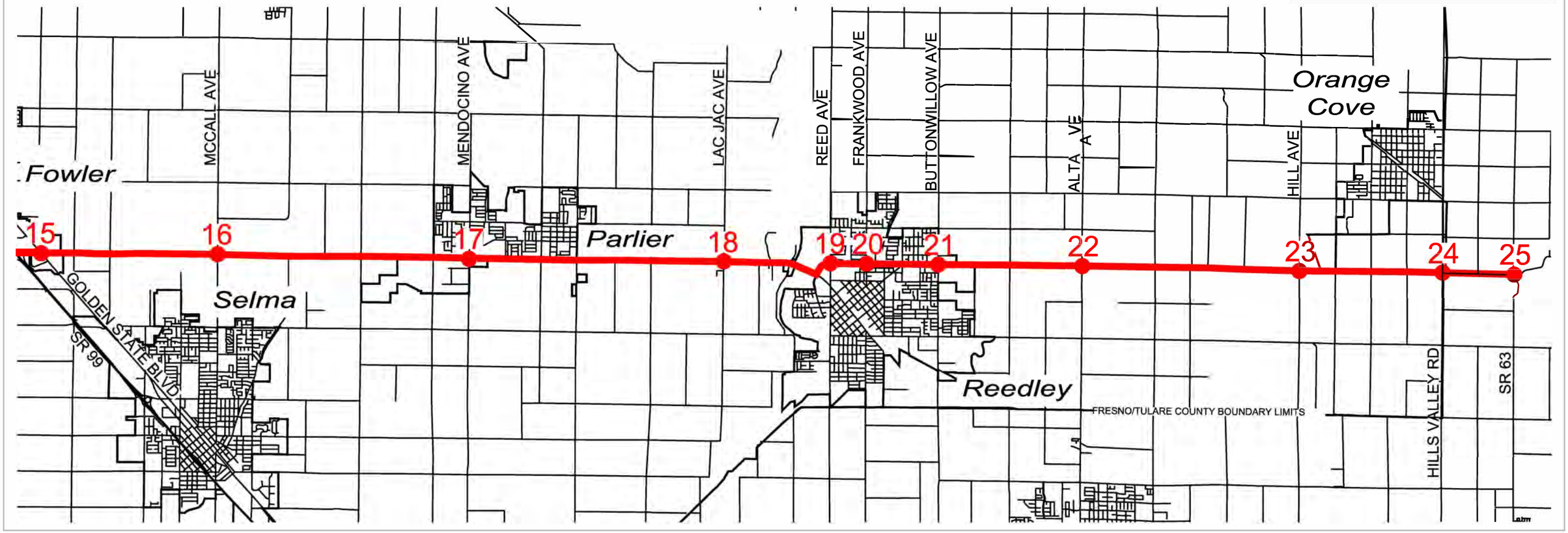


EASTSIDE TRANSPORTATION CORRIDOR IMPROVEMENT STUDY





LEGEND:

XX - AM PEAK HOUR TRAFFIC VOLUMES

(XX) - PM PEAK HOUR TRAFFIC VOLUMES

MANNING AVENUE CORRIDOR

N

GHD

Fresno Council of Governments
EASTSIDE CORRIDOR STUDY

EXISTING PEAK HOUR TRAFFIC VOLUMES

Project No. **11210046**
Report No. **000**
Date **06.15.2020**

FIGURE 7-5

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Source:

Level of Service Methodologies and Guidelines

The following section presents a summary of the general level of service (LOS) methodologies and guidelines used in the analysis of intersections.

Intersection LOS Methodologies

Intersection LOS was calculated for all control types (e.g. signalized, stop sign controlled) using the Synchro 10 (Trafficware) integrated computer software program. This software is based upon the latest assumptions provided in the Highway Capacity Manual (HCM), 6th Edition. LOS determinations are presented on a letter grade scale from "A" to "F", whereby LOS "A" represents "free-flow" conditions and LOS "F" represents over capacity conditions.

For signalized intersections, the intersection delays are average values for all intersection movements. For all-way-stop-control intersections, vehicle delay is the weighted average delay for all approaches. For two-way-stop-control intersections vehicle delay represents the worst delay for the minor-street stop-sign controlled movement(s). Table 7-3 presents the LOS definitions for different types of intersection controls.

Table 7-3. Level of Service (LOS) Criteria for Intersections

Level of Service	Type of Flow	Delay	Maneuverability	Stopped Delay/Vehicle		
				Signalized	Un-signalized	All-Way Stop
A	Stable Flow	Very slight delay. Progression is very favorable, with most vehicles arriving during the green phase not stopping at all.	Turning movements are easily made, and nearly all drivers find freedom of operation.	<10.0	<10.0	<10.0
B	Stable Flow	Good progression and/or short cycle lengths. More vehicles stop than for LOS A, causing higher levels of average delay.	Vehicle platoons are formed. Many drivers begin to feel somewhat restricted within groups of vehicles.	>10.0 and <20.0	>10.0 and <15.0	>10.0 and <15.0

Level of Service	Type of Flow	Delay	Maneuverability	Stopped Delay/Vehicle		
				Signalized	Un-signalized	All-Way Stop
C	Stable Flow	Higher delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures may begin to appear at this level. The number of vehicles stopping is significant, although many still pass through the intersection without stopping.	Back-ups may develop behind turning vehicles. Most drivers feel somewhat restricted	>20.0 and <35.0	>15.0 and <25.0	>15.0 and <25.0
D	Approaching Unstable Flow	The influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high volume-to-capacity ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.	Maneuverability is severely limited during short periods due to temporary back-ups.	>35.0 and <55.0	>25.0 and <35.0	>25.0 and <35.0
E	Unstable Flow	Generally considered to be the limit of acceptable delay. Indicative of poor progression, long cycle lengths, and high volume-to-capacity ratios. Individual cycle failures are frequent occurrences.	There are typically long queues of vehicles waiting upstream of the intersection.	>55.0 and <80.0	>35.0 and <50.0	>35.0 and <50.0
F	Forced Flow	Generally considered to be unacceptable to most drivers. Often occurs with over saturation. May also occur at high volume-to-capacity ratios. There are many individual cycle failures. Poor progression and long cycle lengths may also be major contributing factors.	Jammed conditions. Back-ups from other locations restrict or prevent movement. Volumes may vary widely, depending principally on the downstream back-up conditions.	>80.0	>50.0	>50.0

Reference: Highway Capacity Manual 6th Edition

Agency LOS Guidelines and Policies

County of Fresno: Thresholds of Significance

The County of Fresno guidelines for LOS thresholds of significance is excerpted from the *County of Fresno Guidelines for the Preparation of Traffic Impact Studies.*[8]

> *The analysis methodologies used for analyzing traffic capacity and LOS shall be those of the latest edition of the Highway Capacity Manual (HCM), Transportation Research Board, National Research Council unless otherwise noted herein. Any capacity calculation software that accurately uses the methodologies of the HCM may be used to perform the traffic analysis; however, the results produced by the HCM methodology worksheets shall control in the case of discrepancies.*

Acceptable Levels of Service

> *LOS D and above is considered acceptable on urban roadways within the sphere of influence of the Cities of Fresno and Clovis. LOS C and above is considered acceptable on all other roadways in the County.*

Unacceptable Levels of Service

> *LOS D, E and F, except on urban roadways within the sphere of influence of the City of Fresno and City of Clovis where only LOS D is acceptable.*

The following thresholds is considered to have a significant impact if its traffic, when added to the traffic of the without-project condition, would cause any of the changes in traffic conditions described below.

On roadway segments:

- Cause a roadway that is operating at an acceptable LOS to deteriorate to an unacceptable LOS; or
- Cause the V/C ratio (on a directional peak hour basis) to increase by more than 0.05 on a roadway that is already operating at an unacceptable LOS. It should be noted that a decrease from an unacceptable LOS to a lesser LOS (e.g. from LOS D to LOS E in County areas) is not considered an impact unless the corresponding V/C ratio increase is greater than 0.05.

At signalized intersections:

- Cause an intersection that is operating at an acceptable LOS to deteriorate to an unacceptable LOS; or
- Cause the average delay to increase by more than 5.0 seconds at a signalized intersection that is operating at an unacceptable LOS. It should be noted that a decrease from an unacceptable LOS to a lesser LOS (e.g. from LOS D to LOS E in County areas) is not considered an impact unless the corresponding delay increase is greater than 5.0 seconds.

[8] Fresno County Guidelines for the Preparation of Traffic Impact Studies (Draft May 2018)

At unsignalized intersections, including all-way stop, minor approach stop, and roundabouts

- Cause a movement or approach that is operating at an acceptable LOS to deteriorate to an unacceptable LOS; or
- Cause the average delay to increase by more than 5.0 seconds on a movement or approach that is operating at an unacceptable LOS. It should be noted that a decrease from an unacceptable LOS to a lesser LOS (e.g. from LOS D to LOS E in County areas) is not considered an impact unless the corresponding delay increase is greater than 5.0 seconds.

California Department of Transportation (Caltrans) Guidelines

Caltrans' Guide for the Preparation of Traffic Impact Studies[9] contains the following policy pertaining to the LOS standards within Caltrans jurisdiction:

> *Caltrans endeavors to maintain a target LOS at the transition between LOS "C" and LOS "D" on State highway facilities, however, Caltrans acknowledges that this may not always be feasible and recommends that the lead agency consult with Caltrans to determine the appropriate target LOS.*

City of Sanger Guidelines

The City of Sanger guidelines are provided in the City of Sanger 2025 General Plan.

> *The City has established a target of LOS C along major streets and highways except that LOS D may be allowed at intersections of any major street, highway or along street and highway segments where additional improvements are not feasible.*

City of Reedley Guidelines

The City of Reedley guidelines are provided in the City of Reedley General Plan 2030.

> *Level of Service (LOS) is a description of the ability of a street segment or intersection to accommodate levels of traffic demand. LOS is a qualitative measure of traffic operation conditions, whereby a letter grade "A" through "F" is assigned to an intersection or roadway segment representing worsening representing progressively worsening traffic conditions. LOS A, typically represents unrestricted free flow of traffic and excellent comfort for motorists, to LOS F, which represents highly congested forced flow conditions where traffic exceeds the capabilities of the streets.*

The adopted LOS in the General Plan 2012, Circulation Element is LOS C, which is also the recommended LOS for the proposed update.

[9] California Department of Transportation Guide for the Preparation of Traffic Impact Studies (TIS), December 2002

City of Fowler Policy

The City of Fowler 2025 General Plan establishes the following policy:

> *"Encourage a Level of Service (LOS) "C" throughout the local circulation network, with an LOS "D" along SR 99. An exception to the local road standard is that LOS "D" may be allowed at intersections of major streets, at SR 99 interchanges and along street segments where additional improvements are not feasible."*

A project is considered to have significant impact at an unsignalized intersection if its traffic, when added to the traffic of the no-project condition, would cause any of the changes in traffic conditions described below.

- *Cause a movement or approach that is operating at an acceptable LOS D or better to deteriorate to an unacceptable LOS E or worse; or*
- *Cause the average delay to increase by more than 5.0 seconds on a movement or approach that is already operating at an unacceptable LOS. It should be noted that a decrease from an unacceptable LOS to a lesser LOS (e.g. from LOS E to LOS F) is not considered an impact unless the corresponding delay increase is greater than 5.0 seconds.*

Daily Segment Thresholds

Table 7-4 provides the 2010 Highway Capacity Manual (HCM) planning level volume thresholds for each LOS grade relative to functional class (arterial or collector) number of lanes, and speed limit.

Table 7-4. 2010 HCM Planning Method LOS Thresholds

2010 HCM Planning Method LOS Thresholds													
K-Factor	D-Factor	Two-Lane Roads				Four-Lane Roads				Six-Lane Roads			
		LOS B	LOS C	LOS D	LOS E	LOS B	LOS C	LOS D	LOS E	LOS B	LOS C	LOS D	LOS E
Posted Speed - 30 mi/h (Local/Collector)*													
0.09	0.55	NA	5,900	15,400	19,900	NA	11,300	31,400	37,900	NA	16,300	46,400	54,300
	0.60	NA	5,400	14,100	18,300	NA	10,300	28,800	34,800	NA	15,000	42,500	49,800
0.10	0.55	NA	5,300	13,800	17,900	NA	10,100	28,200	34,100	NA	14,700	41,800	48,900
	0.60	NA	4,800	12,700	16,400	NA	9,300	25,900	31,300	NA	13,500	38,300	44,800
0.11	0.55	NA	4,800	12,600	16,300	NA	9,200	25,700	31,000	NA	13,400	38,000	44,500
	0.60	NA	4,400	11,500	14,900	NA	8,400	23,500	28,400	NA	12,200	34,800	40,800
Posted Speed - 45 mi/h (Arterial/Expressway)**													
0.09	0.55	NA	10,300	18,600	19,900	NA	21,400	37,200	37,900	NA	31,900	54,000	54,300
	0.60	NA	9,400	17,100	18,300	NA	19,600	34,100	34,800	NA	29,200	49,500	49,800
0.10	0.55	NA	9,300	16,800	17,900	NA	19,300	33,500	34,100	NA	28,700	48,600	48,900
	0.60	NA	8,500	15,400	16,400	NA	17,700	30,700	31,300	NA	26,300	44,500	44,800
0.11	0.55	NA	8,400	15,300	16,300	NA	17,500	30,500	31,000	NA	26,100	44,200	44,500
	0.60	NA	7,700	14,000	14,900	NA	16,100	27,900	28,400	NA	23,900	40,500	40,800

**Assumes for 30-mi/h facilities (Local/Collector): signal spacing = 1,050 ft and 20 access points/mi.*

***Assumes for 45-mi/h facilities (Arterial/Expressway): signal spacing = 1,500 ft and 10 access points/mi.*

Technical Analysis Parameters

The following factors are reflected within the data presented in Table 7-5:

Due to the current COVID-19 shelter-in-place and limitations with the historical data obtained from Streetlight, standard HCM defaults were used related to Peak Hour Factor (PHF) and percentage heavy vehicles. Agency provided signal timing information was incorporated for the signalized intersections along Academy Avenue and Manning Avenue study corridors.

Table 7-5. Intersection LOS: Technical Analysis Parameters

Technical Parameters	Assumption
% Trucks	Intersection Overall Approach, based on historical trends
PHF for Existing & Short Term	Intersection Overall Approach, based on HCM 2010 for multi-lane highways
PHF for Future Conditions	Intersection Overall, 0.92
Signal Timings	Based on Agency timing plans
Grade	2% or less at all intersections

Traffic Signal Warrant

The peak hour signal warrant is intended for use at a location where traffic conditions are such that, for a minimum of one (1) hour of an average day, the minor-street suffers undue delay when entering or crossing the major street. Based upon the methodologies outlined in the 2014 California Manual of Uniform Traffic Control Devises (CA-MUTCD), Figure 4C-4: Warrant, Peak Hour (70% Factor) was used for this analysis. Traffic signal warrant worksheets are provided in the Appendices of this report.

Vehicle Queue Standards

Vehicle queues are considered acceptable within this report if the queues are accommodated within the available storage for left-turn and right-turn lanes. When thru-movement queues are longer than an adjacent left-turn or right-turn lane pocket, the pocket length should be extended to allow access where feasible. The thru traffic queues are also quantified to evaluate if they queue significantly. Queues values are rounded up to the nearest fifth (5^{th}), with a minimum default value of 25 feet for passenger cars as indicated in the *Trafficware User Guide (Traffic Signal Optimization and Simulation Modeling Software)*.

Existing Conditions

Existing Conditions is the analysis scenario in which current operations at study locations are analyzed and used to establish the baseline traffic conditions.

Intersection Operations

Existing weekday AM and PM peak hour intersection operations were quantified utilizing the existing traffic volumes, signal timings, and intersection lane geometrics and control. Table 7-6 presents intersection operations for the Existing Conditions.

As presented in Table 7-6, all study intersections for Existing Conditions are currently found to operate at or above the threshold LOS C, except for the following intersections during the AM and/or PM peak hours:

- #16 – Manning Ave / McCall Ave
- #20 – Manning Ave / Frankwood Ave

Interim mitigation measures recommended to improve operations at these intersections is provided in Table 7-7. Long-term improvements to these intersections as well as intersections projected to fall below acceptable LOS by 2045 are presented in the Motorized Recommendations tables in Chapter 9. The projected 2045 LOS associated with these improvements is provided in the Performance Assessment presented in Chapter 10.

Table 7-6. Existing Peak Hour Conditions Intersection Operations

#	Intersection	Control Type[1,2]	Target LOS	AM Peak Hour			PM Peak Hour		
				Delay	LOS	Warrant Met?[3]	Delay	LOS	Warrant Met?[3]
1	SR 168 / Academy Ave	TWSC	C	10.9	B	No	11.9	B	No
2	Shaw Ave / Academy Ave	AWSC	C	10.6	B	No	10.0	A	No
3	Ashlan Ave / Academy Ave	AWSC	C	13.4	B	No	11.4	B	No
4	McKinley Ave / Academy Ave	AWSC	C	13.5	B	No	10.0	A	No
5	SR 180 / Academy Ave	Signal	C	29.6	C		30.3	C	
6	Jensen Ave / Academy Ave	Signal	C	15.6	B		25.1	C	
7	Annadale Ave / Academy Ave	Signal	C	7.9	A		7.9	A	
8	North Ave / Academy Ave	Signal	C	7.4	A		8.1	A	
9	Adams Ave / Academy Ave	AWSC	C	11.2	B	No	13.6	B	No
10	Manning Ave / Academy Ave	Signal	C	19.2	B		20.1	C	
11	Rose Ave / Academy Ave	AWSC	C	9.8	A	No	11.9	B	No
12	Mt View Ave / Academy Ave	Signal	C	19.3	B		20.6	C	
13	Kamm Ave / 10th Ave (Academy)	AWSC	C	9.4	A	No	8.6	A	No
14	Sierra St / 10th Ave (Academy)	Signal	C	26.5	C		26.3	C	
15	Manning Ave / Golden State Blvd	Signal	C	26.2	C		20.5	C	
16	**Manning Ave / McCall Ave**	**Signal**	C	**41.7**	**D**		**53.0**	**D**	
17	Manning Ave / Mendocino Ave	Signal	C	18.9	C		29.6	C	
18	Manning Ave / Lac Jac Ave	Signal	C	26.1	C		23.9	C	
19	Manning Ave / Reed Ave	Signal	C	20.5	D		19.6	D	
20	**Manning Ave / Frankwood Ave**	**Signal**	C	32.3	C		**39.8**	C	
21	Manning Ave / Buttonwillow Ave	Signal	C	26.5	C		28.9	C	
22	Manning Ave / Alta Ave	Signal	C	12.5	B		12.5	B	
23	Manning Ave / Hill Ave	AWSC	C	9.9	A	No	10.7	B	No
24	Manning Ave / Hills Valley Rd	TWSC	C	17.4	C	No	16.0	C	No
25	Manning Ave / SR 63	TWSC	C	10.4	B	No	10.6	B	No

*Notes: **Bold = Unacceptable Conditions***
LOS = Delay based on worst minor approach for TWSC intersections; average all approaches for AWSC, signal
Warrant = Based on California MUTCD Warrant 3

Table 7-7. Existing Mitigation Measures (Existing Conditions)

#	Existing Conditions		Mitigation Measure		
	Control	Lane Geometrics	Control	Lane Geometrics	Delay/LOS
#16	Signal	**EB existing approach includes:** • Dedicated Left-turn movement • Dedicated Thru movement • Dedicated Thru/Right movement	**Signal***	**<u>Widen</u> EB approach to include:** • Dedicated Left-turn movement • Dedicated two (2) Thru movements • Dedicated Right-turn movement with 120 ft. of storage length **Note:** Approximate width from curb to curb, 44 ft. (Google Earth). Redesign of median island could accommodate the dedicated Right-turn lane and extension of the Left-lane.	**30.5 / C**
		WB existing approach includes: • Dedicated Left-turn movement • Dedicated Thru movement • Dedicated Thru/Right movement		**<u>Widen</u> WB approach to include:** • Dedicated Right-turn movement with extended storage length	
		NB existing approach includes: • Dedicated Left-turn movement • Dedicated two (2) Thru movements • Dedicated Right-turn movement (turning island)		**<u>Widen</u> NB approach to include:** • Dedicated Left-turn movement • Dedicated Thru movement • Dedicated Right-turn movement with 120 ft. of storage length **Note:** Approximate width from curb to edge of pavement, 35 ft. (Google Earth). Redesign of median island could accommodate the dedicated Right-turn lane and extension of the Left-lane.	
		SB existing approach includes: • Dedicated Left-turn movement • Dedicated two (2) Thru movements • Dedicated Right-turn movement (turning island)		**No change to SB approach movement**	
#20	Signal	**EB existing approach includes:** • Dedicated Left-turn movement • Dedicated Thru/Right movement	**Signal***	**No change to SB approach movement**	**28.5 / C**
		WB existing approach includes: • Dedicated Left-turn movement • Dedicated Thru/Right movement		**No change to SB approach movement**	
		NB existing approach includes: • Dedicated Left-turn movement • Dedicated Thru/Right movement		**No change to SB approach movement**	
		SB existing approach includes: • Dedicated Left-turn movement • Dedicated Thru movement • Dedicated Right-turn movement		**No change to SB approach movement**	

*** Optimized timing**

Daily Segment Operations

Given the current COVID-19 shelter-in-place conditions, data collection for vehicles was not possible as travel conditions are not considered normal. Existing roadway segments were quantified using the FCOG Regional Travel Demand Forecast Model – 2019 Base Conditions. Table 7-8 lists the jurisdiction, direction, limits, number of lanes, year, AADT and LOS for each study segment. The table shows that all of the study roadway segments are currently operating at acceptable conditions.

Table 7-8. Roadway Segments Level of Service

Jurisdiction	Direction	Limits	No. of Lanes	Functional Classification	Year	AADT	LOS
Academy Avenue Corridor							
Kingsburg	N-S	State Route 201 - Stroud	2	Arterial	2019	11,490	C
Kingsburg	N-S	Stroud - Kamm	2	Arterial	2019	12,160	C
Fresno County	N-S	Kamm - Mountain View	2	Arterial	2019	9,130	C
Fresno County	N-S	Mountain View - Rose	2	Arterial	2019	9,860	C
Parlier	N-S	Rose - Manning	2	Arterial	2019	7,170	C
Parlier	N-S	Manning - Adams	4	Arterial	2019	14,870	B
Fresno County	N-S	Adams - American	4	Arterial	2019	15,900	B
Fresno County	N-S	American - Central	4	Arterial	2019	15,140	B
Sanger	N-S	Central - North	4	Arterial	2019	8,920	B
Sanger	N-S	North - Jensen	4	Arterial	2019	17,370	B
Sanger	N-S	Jensen - Church	4	Arterial	2019	12,330	B
Sanger	N-S	Church - State Route 180	4	Arterial	2019	10,030	B
Fresno County	N-S	State Route 180 - Belmont	4	Arterial	2019	10,120	B
Fresno County	N-S	Belmont - Ashlan	4	Arterial	2019	7,390	B
Fresno County	N-S	Ashlan - Shaw	4	Arterial	2019	7,750	B
Clovis	N-S	Shaw - Herndon	2	Arterial	2019	6,600	C
Clovis	N-S	Herndon - State Route 168	2	Arterial	2019	5,800	C
Manning Avenue Corridor							
Fresno County	E-W	State Route 99 - Golden State	4	Expressway	2019	25,470	C
Fresno County	E-W	Golden State - McCall	4	Expressway	2019	24,370	C
Parlier	E-W	McCall - Academy	4	Expressway	2019	27,380	C
Parlier	E-W	Academy - Mendocino	4	Super Arterial	2019	24,180	C
Fresno County	E-W	Mendocino - Zediker	4	Super Arterial	2019	30,590	C
Fresno County	E-W	Zediker - Upper Bridge	4	Expressway	2019	26,360	C
Reedley	E-W	Upper Bridge - Reed	4	Expressway	2019	15,410	B
Reedley	E-W	Reed - Frankwood	4	Arterial	2019	14,250	B
Reedley	E-W	Frankwood - Buttonwillow	4	Arterial	2019	14,450	B
Fresno County	E-W	Buttonwillow - Alta	2	Arterial	2019	10,440	C
Fresno County	E-W	Alta - Hill	2	Arterial	2019	6,500	B
Orange Cove	E-W	Hill - Hill Valley	2	Arterial	2019	1,300	B

Source: Fresno COG Regional Travel Demand Forecast Model – 2019 Base Conditions

Cumulative Year 2045 Conditions

Future Year Methodology for Traffic Growth

Cumulative conditions refer to a future analysis scenario approximately 20 years in the future. Generation of future baseline (no-build) traffic forecasts for intersection and daily segment operations were established using NCHRP 255 delta method, based on 2019 and 2045 model outputs from Fresno Council of Governments.

Cumulative Year 2045 AM and PM peak hour forecasted intersection volumes for Academy Avenue and Manning Avenue are shown in Table 7-9 and Table 7-10.

Intersection Operations

Cumulative weekday AM and PM peak hour intersection traffic operations were quantified utilizing the developed growth projections traffic volumes, signal timings, and intersection lane geometrics and control. Table 7-9 presents intersection operations for the Cumulative Year 2045 Conditions.

As presented in Table 7-9, approximately half of the study intersections for Cumulative Year 2045 Conditions are forecasted to operate at or above the threshold LOS C. Study intersections forecasted to operate below LOS C are:

- #3 – Ashlan Ave / Academy Ave, (AWSC)
- #4 – McKinley Ave / Academy Ave, (AWSC)
- #5 – SR 180 / Academy Ave, (signal)
- #6 – Jensen Ave / Academy Ave, (signal)
- #9 – Adams Ave / Academy Ave, (ASWC)
- #10 – Manning Ave / Academy Ave, (signal)
- #14 – Sierra St / 10th Ave, (signal)
- #15 – Manning Ave / Golden State Blvd, (signal)
- #16 – Manning Ave / McCall Ave, (signal)
- #17 – Manning Ave / Mendocino, (signal)
- #20 – Manning Ave / Frankwood Ave, (signal)
- #21 – Manning Ave / Buttonwillow Ave, (signal)

Recommendations to address unacceptable LOS for Cumulative Year 2045 Conditions and improve operations are listed in the Motorized Recommendations table in Chapter 9. Forecasted LOS improvements are presented in the Performance Assessment in Chapter 10.

Table 7-9. Cumulative Year 2045 Peak Hour Conditions Intersection Operations

#	Intersection	Control Type[1,2]	Target LOS	AM Peak Hour			PM Peak Hour		
				Delay	LOS	Warrant Met?[3]	Delay	LOS	Warrant Met?[3]
1	SR 168 / Academy Ave	TWSC	C	14.6	B	No	25.3	D	No
2	Shaw Ave / Academy Ave	AWSC	C	15.3	C	No	12.8	B	No
3	**Ashlan Ave / Academy Ave**	**AWSC**	C	**25.7**	**D**	No	13.8	B	No
4	**McKinley Ave / Academy Ave**	**AWSC**	C	**25.4**	**D**	No	11.8	B	No
5	**SR 180 / Academy Ave**	**Signal**	**C**	**42.7**	**D**		**40.4**	**D**	
6	**Jensen Ave / Academy Ave**	**Signal**	**C**	**41.1**	**D**		**46.2**	**D**	
7	Annadale Ave / Academy Ave	Signal	C	8.5	A		8.1	A	
8	North Ave / Academy Ave	Signal	C	8.8	A		13.4	B	
9	**Adams Ave / Academy Ave**	**AWSC**	C	24.0	C	**No**	**35.4**	**E**	**No**
10	**Manning Ave / Academy Ave**	**Signal**	**C**	**39.8**	**D**		**39.0**	**D**	
11	Rose Ave / Academy Ave	AWSC	C	18.2	C	No	21.8	C	No
12	Mt View Ave / Academy Ave	Signal	C	32.7	C		27.2	C	
13	Kamm Ave / 10th Ave (Academy)	AWSC	C	25	C	No	14.9	B	No
14	**Sierra St / 10th Ave (Academy)**	**Signal**	C	**103.9**	**F**		**59.7**	**E**	
15	**Manning Ave / Golden State Blvd**	**Signal**	C	**OVR**	**F**		**OVR**	**F**	
16	**Manning Ave / McCall Ave**	**Signal**	C	**92.8**	**F**		**108.1**	**F**	
17	**Manning Ave / Mendocino Ave**	**Signal**	C	**65.2**	**E**		**78.1**	**E**	
18	Manning Ave / Lac Jac Ave	Signal	C	24.9	C		26.0	C	
19	Manning Ave / Reed Ave	Signal	C	25.0	C		24.9	C	
20	Manning Ave / Frankwood Ave	Signal	C	**69.8**	**E**		**86.3**	**F**	
21	Manning Ave / Buttonwillow Ave	Signal	C	**41.6**	**D**		**46.0**	**D**	
22	Manning Ave / Alta Ave	Signal	C	19.0	B		25.3	C	
23	Manning Ave / Hill Ave	AWSC	C	10.8	B	No	12.6	B	No
24	Manning Ave / Hills Valley Rd	TWSC	C	19.9	C	No	18.2	C	No
25	Manning Ave / SR 63	TWSC	C	11.7	B	No	12.2	B	No

Notes: ***Bold = Unacceptable Conditions***

1. LOS = Delay based on worst minor approach for TWSC intersections; average of all approaches for AWSC, signal

2. Warrant = Based on California MUTCD Warrant 3

Daily Segment Operations

Table 7-10 lists the jurisdiction, direction, limits, number of lanes, year, AADT and forecasted LOS for study segments. The table illustrates that all of the study roadway segments are currently found to operate at or above the threshold LOS C under Cumulative Year 2045 Conditions, except for the following roadway segments:

- Academy Ave Corridor, State Route 201 to Stroud Ave
- Academy Ave Corridor, Stroud Ave to Kamm Ave

Recommendations to address unacceptable LOS for Cumulative Year 2045 Conditions and improve operations are listed in Table 9-1. Motorized Recommendations presented in Chapter 9. Forecasted LOS improvements are presented in the Vehicle Operations section in Chapter 10.

Table 7-10. Forecasted Roadway Segments Level of Service

Jurisdiction	Direction	Limits	No. of Lanes	Functional Classification	Year	AADT	LOS
Academy Avenue Corridor							
Kingsburg	**N-S**	**State Route 201 - Stroud**	**2**	**Arterial**	**2045**	**21,166**	**E**
Kingsburg	**N-S**	**Stroud - Kamm**	**2**	**Arterial**	**2045**	**20,177**	**E**
Fresno County	N-S	Kamm - Mountain View	2	Arterial	2045	16,475	C
Fresno County	N-S	Mountain View - Rose	2	Arterial	2045	13,206	C
Parlier	N-S	Rose - Manning	2	Arterial	2045	10,873	C
Parlier	N-S	Manning - Adams	4	Arterial	2045	19,409	B
Fresno County	N-S	Adams - American	4	Arterial	2045	20,430	B
Fresno County	N-S	American - Central	4	Arterial	2045	19,411	B
Sanger	N-S	Central - North	4	Arterial	2045	11,921	B
Sanger	N-S	North - Jensen	4	Arterial	2045	19,979	B
Sanger	N-S	Jensen - Church	4	Arterial	2045	15,966	B
Sanger	N-S	Church - State Route 180	4	Arterial	2045	13,897	B
Fresno County	N-S	State Route 180 - Belmont	4	Arterial	2045	13,158	B
Fresno County	N-S	Belmont - Ashlan	4	Arterial	2045	9,993	B
Fresno County	N-S	Ashlan - Shaw	4	Arterial	2045	10,949	B
Clovis	N-S	Shaw - Herndon	2	Arterial	2045	9,009	C
Clovis	N-S	Herndon - State Route 168	2	Arterial	2045	8,190	C
Manning Avenue Corridor							
Fresno County	E-W	State Route 99 - Golden State	4	Expressway	2045	31,581	C
Fresno County	E-W	Golden State - McCall	4	Expressway	2045	30,916	C
Parlier	E-W	McCall - Academy	4	Expressway	2045	33,198	C
Parlier	E-W	Academy - Mendocino	4	Super Arterial	2045	28,061	C
Fresno County	E-W	Mendocino - Zediker	4	Super Arterial	2045	35,990	C
Fresno County	E-W	Zediker - Upper Bridge	4	Expressway	2045	30,391	C
Reedley	E-W	Upper Bridge - Reed	4	Expressway	2045	15,684	B
Reedley	E-W	Reed - Frankwood	4	Arterial	2045	18,097	B
Reedley	E-W	Frankwood - Buttonwillow	4	Arterial	2045	14,450	B
Fresno County	E-W	Buttonwillow - Alta	2	Arterial	2045	19,613	D
Fresno County	E-W	Alta - Hill	2	Arterial	2045	9,276	B
Orange Cove	E-W	Hill - Hill Valley	2	Arterial	2045	1,300	B

Source: NCHRP 255 delta method, based on 2019 and 2045 model outputs from Fresno Council of Governments.
Bold = Unacceptable Conditions

Intersection Vehicle Queues: Cumulative Year 2045 Conditions

Table 7-11 presents the calculated 95th - percentile queues at the study intersections for the Cumulative Year 2045 Conditions weekday AM and PM peak hours. Calculated 95th - percentile queues exceeding the length of the turn lane are presented in bold type.

Table 7-11. Intersection 95th – Percentile Queuing Summary

Int. #	Queue Segment - Direction	# of Lanes	Available Storage (ft.)	Cumulative AM Peak-Hour 95th % Queue (ft.) *	Cumulative PM Peak-Hour 95th % Queue (ft.) *
1	Academy Ave / SR 168				
	WB – Left / Thru	1	—	55	70
	NB – Left / Right	1	—	25	125
2	Academy Ave / Shaw Ave				
	EB – Left / Thru / Right	1	—	115	55
	WB – Left / Thru / Right	1	—	75	90
	NB – Left	1	195	55	80
	NB – Thru	1	—	70	70
	NB – Thru / Right	1	—	65	75
	SB – Left	1	200	30	45
	SB – Thru	1	—	85	75
	SB – Thru / Right	1	—	80	50
3	Academy Ave / Ashlan Ave				
	EB – Left / Thru / Right	1	—	50	60
	WB – Left / Thru / Right	1	—	65	50
	NB – Left	1	190	60	55
	NB – Thru	1	—	75	95
	NB – Thru / Right	1	—	55	80
	SB – Left	1	200	25	50
	SB – Thru	1	—	140	80
	SB – Thru / Right	1	—	105	50
4	Academy Ave / McKinley Ave				
	EB – Left / Thru / Right	1	—	65	60
	WB – Left / Thru / Right	1	—	40	60
	NB – Left	1	195	50	55
	NB – Thru	1	—	70	95
	NB – Thru / Right	1	—	55	75
	SB – Left	1	190	45	—
	SB – Thru	1	—	120	85
	SB – Thru / Right	1	—	110	55
5	Academy Ave / SR 180				
	EB – Left	1	615	110	105
	EB – Thru	1	—	185	285
	EB – Thru	1	—	155	245
	EB – Right	1	695	80	120
	WB – Left	1	560	105	155
	WB – Thru	1	—	270	220
	WB – Thru	1	—	225	210
	WB – Right	1	630	85	65

Int. #	Queue Segment - Direction	# of Lanes	Available Storage (ft.)	Cumulative AM Peak-Hour 95th % Queue (ft.) *	Cumulative PM Peak-Hour 95th % Queue (ft.) *
	NB – Left	1	285	215	285
	NB – Left	1	285	230	**300 ***
	NB – Thru	1	—	125	245
	NB – Thru / Right	1	—	140	280
	SB – Left	1	500	185	115
	SB – Left	1	500	200	145
	SB – Thru	1	—	240	185
	SB – Thru / Right	1	—	275	175
6	Academy Ave / Jensen Ave				
	EB – Left / Thru	1	—	240	240
	EB – Right	1	—	50	155
	WB – Left / Thru / Right	1	—	115	125
	NB – Left	1	205	**250 ***	**235 ***
	NB – Thru	1	—	250	215
	NB – Thru / Right	1	—	90	135
	SB – Left	1	125	80	90
	SB – Thru	1	—	225	215
	SB – Thru / Right	1	—	260	220
7	Academy Ave / Annadale Ave				
	EB – Left / Thru / Right	1	—	50	25
	WB – Left / Thru	1	—	95	80
	WB – Right	1	—	95	80
	NB – Left / Thru	1	—	560	555
	NB – Thru / Right	1	—	520	510
	SB – Left / Thru	1	—	330	305
	SB – Thru / Right	1	—	335	—
8	Academy Ave / North Ave				
	EB – Left	1	150	65	80
	EB – Thru	1	—	95	100
	EB – Right	1	120	55	55
	WB – Left	1	125	55	75
	WB – Thru	1	—	110	65
	WB – Right	1	125	50	45
	NB – Left	1	135	75	120
	NB – Thru		—	90	105
	NB – Thru / Right	1	—	60	65
	SB – Left	1	100	50	65
	SB – Thru		—	115	125
	SB – Thru / Right	1	—	65	115
9	Academy Ave / Adams Ave				
	EB – Left / Thru / Right	1	—	65	90
	WB – Left / Thru / Right	1	—	65	50
	NB – Left	1	200	50	45
	NB – Thru	1	—	100	100
	NB – Thru / Right	1	—	75	85
	SB – Left	1	180	60	60
	SB – Thru	1	—	95	115

Int. #	Queue Segment - Direction	# of Lanes	Available Storage (ft.)	Cumulative AM Peak-Hour 95th % Queue (ft.) *	Cumulative PM Peak-Hour 95th % Queue (ft.) *
	SB – Thru / Right	1	—	75	105
10	Academy Ave / Manning Ave				
	EB – Left	1	195	75	**245 ***
	EB – Thru	1	—	230	370
	EB – Thru / Right	1	—	215	325
	WB – Left	1	195	115	120
	WB – Thru	1	—	545	345
	WB – Thru / Right	1	—	490	325
	NB – Left	1	205	60	95
	NB – Thru	1	—	215	270
	NB – Thru / Right	1	—	175	250
	SB – Left	1	195	**255 ***	**220 ***
	SB – Thru	1	—	340	220
	SB – Thru / Right	1	—	230	190
11	Academy Ave / Rose Ave				
	EB – Left / Thru / Right	1	—	60	100
	WB – Left / Thru / Right	1	—	105	70
	NB – Left / Thru / Right	1	—	105	120
	SB – Left / Thru / Right	1	—	115	130
12	Academy Ave / Mt View Ave				
	EB – Left	1	305	95	90
	EB – Thru	1	—	165	230
	EB – Thru / Right	1	—	120	180
	WB – Left	1	255	80	90
	WB – Thru	1	—	290	225
	WB – Thru / Right	1	—	265	290
	NB – Left	1	100	**145 ***	35
	NB – Thru / Right	1	—	320	230
	SB – Left	1	250	85	125
	SB – Thru / Right	1	—	280	165
13	Academy Ave / Kamm Ave				
	EB – Left / Thru	1	—	55	70
	EB – Right	1	145	50	65
	WB – Left / Thru / Right	1	—	95	65
	NB – Left / Thru	1	—	135	70
	NB – Right	1	245	50	60
	SB – Left / Thru / Right	1	—	155	120
14	10th Ave / Sierra St				
	EB – Left	1	535	175	275
	EB – Thru	1	—	335	300
	EB – Right	1	335	125	35
	WB – Left	1	60	25	40
	WB – Thru / Right	1	—	480	475
	NB – Left	1	85	**110 ***	**95 ***
	NB – Thru / Right	1	—	155	130
	SB – Left	1	95	**140 ***	**125 ***
	SB – Thru	1	—	605	235

Int. #	Queue Segment - Direction	# of Lanes	Available Storage (ft.)	Cumulative AM Peak-Hour 95th % Queue (ft.) *	Cumulative PM Peak-Hour 95th % Queue (ft.) *
	SB – Right	1	170	**200 ***	**195 ***
15	Manning Ave / Golden State Blvd				
	EB – Left	1	200	**260 ***	**205 ***
	EB – Thru	1	—	745	380
	EB – Thru	1	—	685	310
	EB – Right	1	285	155	185
	WB – Left	1	265	175	25
	WB – Thru	1	—	1,220	200
	WB – Thru / Right	1	—	1,220	190
	NB – Left	1	155	**185 ***	**180 ***
	NB – Thru	1	—	1,010	1,015
	NB – Thru	1	—	1,215	1,205
	NB – Right	1	220	85	—
	SB – Left	1	220	**250 ***	**245 ***
	SB – Thru	1	—	840	1,140
	SB – Thru	1	—	835	1,365
	SB – Right	1	200	75	**250 ***
16	Manning Ave / McCall Ave				
	EB – Left	1	195	50	**230 ***
	EB – Thru	1	—	215	575
	EB – Thru / Right	1	—	195	555
	WB – Left	1	175	**250 ***	**220 ***
	WB – Thru	1	—	465	300
	WB – Thru / Right	1	—	415	220
	NB – Left	1	95	**130 ***	**150 ***
	NB – Thru / Right	1	—	690	690
	SB – Left	1	80	**100 ***	**85 ***
	SB – Thru / Right	1	—	360	735
17	Manning Ave / Mendocino Ave				
	EB – Left	1	260	120	**315 ***
	EB – Thru	1	—	160	485
	EB – Thru / Right	1	—	150	460
	WB – Left	1	235	**325 ***	**295 ***
	WB – Thru	1	—	845	505
	WB – Thru	1	—	820	415
	WB – Right	1	150	**170 ***	140
	NB – Left	1	115	**95 ***	**180 ***
	NB – Thru / Right	1	—	155	395
	SB – Left	1	100	**130 ***	**135 ***
	SB – Thru	1	—	1,275	525
	SB – Right	1	150	**180 ***	**235 ***
18	Manning Ave / Lac Jac Ave				
	EB – Left	1	285	110	65
	EB – Thru	1	—	250	295
	EB – Thru / Right	1	—	235	275
	WB – Left	1	255	105	105
	WB – Thru	1	—	250	235

Int. #	Queue Segment - Direction	# of Lanes	Available Storage (ft.)	Cumulative AM Peak-Hour 95th % Queue (ft.) *	Cumulative PM Peak-Hour 95th % Queue (ft.) *
	WB – Thru / Right	1	—	235	200
	NB – Left	1	95	**125 ***	70
	NB – Thru / Right	1	—	145	95
	SB – Left	1	250	145	100
	SB – Thru / Right	1	—	60	80
19	Manning Ave / Reed Ave				
	EB – Left	1	230	110	120
	EB – Thru	1	—	125	135
	EB – Thru / Right	1	—	80	135
	WB – Left	1	165	**180 ***	145
	WB – Thru	1	—	220	170
	WB – Thru / Right	1	250	165	145
	NB – Left	1	105	**135 ***	**115 ***
	NB – Thru	1	—	220	335
	NB – Right	1	105	**125 ***	**150 ***
	SB – Left	1	100	80	**130 ***
	SB – Thru	1	—	335	225
	SB – Right	1	100	**155***	**110***
20	Manning Ave / Frankwood Ave				
	EB – Left	1	100	**105 ***	**150 ***
	EB – Thru / Right	1	—	195	710
	WB – Left	1	100	**160 ***	**160 ***
	WB – Thru / Right	1	—	830	830
	NB – Left	1	90	75	75
	NB – Thru / Right	1	—	135	235
	SB – Left	1	110	**150 ***	**120 ***
	SB – Thru	1	—	425	120
	SB – Right	1	130	**185 ***	75
21	Manning Ave / Buttonwillow Ave				
	EB – Left	1	125	80	120
	EB – Thru	1	—	155	195
	EB – Thru	1	—	90	150
	EB – Right	1	80	70	**90 ***
	WB – Left	1	130	120	110
	WB – Thru	1	—	280	215
	WB – Thru / Right	1	620	235	195
	NB – Left	1	130	130	**180 ***
	NB – Thru	1	—	180	330
	NB – Right	1	205	40	120
	SB – Left	1	70	**110 ***	**115 ***
	SB – Thru	1	—	525	505
	SB – Right	1	70	**135 ***	**120 ***
22	Manning Ave / Alta Ave				
	EB – Left	1	100	**145 ***	**120 ***
	EB – Thru / Right	1	—	275	460
	WB – Left	1	100	**110 ***	**125 ***
	WB – Thru / Right	1	—	235	260

Int. #	Queue Segment - Direction	# of Lanes	Available Storage (ft.)	Cumulative AM Peak-Hour 95th % Queue (ft.) *	Cumulative PM Peak-Hour 95th % Queue (ft.) *
	NB – Left	1	110	**140 ***	**165 ***
	NB – Thru / Right	1	—	165	255
	SB – Left	1	115	65	55
	SB – Thru / Right	1	—	205	140
23	Manning Ave / Hill Ave				
	EB – Left / Thru / Right	1	—	70	100
	WB – Left / Thru / Right	1	—	100	85
	NB – Left / Thru / Right	1	—	45	50
	SB – Left / Thru / Right	1	—	60	70
24	Manning Ave / Hill Valley Rd				
	EB – Left / Thru / Right	1	—	80	95
	WB – Left / Thru / Right	1	—	70	50
	NB – Left / Thru / Right	1	—	30	25
	SB – Left / Thru / Right	1	—	20	20
25	Manning Ave / SR 63				
	EB – Left / Thru / Right	1	—	30	50
	WB – Left / Thru / Right	1	—	40	30
	NB – Left / Thru / Right	1	—	—	25
	SB – Left / Thru / Right	1	—	—	25

** Bold = exceeds existing storage length capacity*

8. Community Outreach

This chapter summarizes outreach efforts conducted by the project team to gather feedback from the communities within the project area and other stakeholders interested in the project. Outreach efforts were focused on engaging the public in the assessment of existing conditions and community needs, informing the community of draft recommendations developed to meet those needs, and adjusting recommendations based on that feedback. Throughout the project, a Steering Committee collaborated on the Plan to identify challenges and solutions for the Eastside Corridor. The Steering Committee included representatives from FCOG, Fresno County, Caltrans, project area cities: City of Fresno, Clovis, Sanger, Parlier, Kingsburg, Fowler, Selma, Reedley, and Orange Cove, and local stakeholders including business organizations and bicycling groups.

Outreach efforts were intended to be inclusive and maximize participation of community members and stakeholders of diverse backgrounds. The project team was proactive in engaging the Spanish speaking community by making project materials and presentations available in English and Spanish.

Efforts to reach the Spanish community included:

- A project website in English and Spanish
- Advertising and flyers in English and Spanish
- Providing live Spanish interpretation at the online project workshops

For the duration of the project, the community was under *Shelter in Place* orders due to the COVID-19 pandemic, which restricted the option to do traditional in-person workshops. The following sections describe the purpose and feedback received at outreach events and meetings that were conducted throughout the project.

Online Community Engagement

Project Website

The project website was used as a central location to provide information about the project and project documents. A link to the project website was provided on the FCOG website and shared in social media posts and presentations to the community. Information was provided in both English and Spanish. Materials provided on the website included:

- Basic project information such as purpose and need
- Project documents such as project alternatives or presentation materials
- Meeting summaries and photos
- Project maps
- Public meeting notices
- Public surveys and online comment forms
- Participatory mapping (described below)
- A link to the participatory map portal
- Email list sign-up

Figure 8-1. Project Website Landing Page

Social Media

Throughout the Plan process, posts to Twitter, Instagram, and Facebook notified community members of upcoming public workshops and pop-up events, provided important project updates, links to project documents, and directed people to the website for more information. Facebook advertising was used to publicize the Public Workshops. Team members also used their social media accounts to advertise project events.

Participatory Mapping

A link to the interactive mapping tool was posted on the project website and used throughout the development of this Plan. The interactive mapping tool allowed stakeholders to place pins or draw routes on the map to leave feedback about specific locations within the Eastside Corridor. This input was used to identify potential issues and develop project recommendations.

In-Person Community Engagement

In-person community engagement was used to gather feedback from the public, share maps and examples of proposed recommendations, and gather general input about the Corridor. One pop-up event was hosted at the Blossom Trail Festival in Sanger on March 7, 2020. After mid-March 2020, traditional in-person meetings, such as pop-up events at farmer's markets and other community events, were not possible due to the COVID-19 pandemic and the public health restrictions that were in place for the remainder of the project. Feedback from the community was incorporated into the project recommendations.

Blossom Trail Festival, City of Sanger

March 2, 2020

The project team hosted a booth at the Blossom Trail Festival in the City of Sanger on March 2, 2020. The booth included informational posters and maps of the project area to solicit comments and community priorities for the project area. The project team also invited community members to interact with the project website and submit any additional feed on forthcoming project materials and the interactive mapping tool.

Comments from attendees included:

- Ensure sidewalks are ADA compliant and in good shape
- Some stop signs need flashing beacons to alert drivers of their presence, especially along Academy Avenue
- Striping needs to be updated or maintained, especially along Academy Avenue between Kingsburg and Parlier
- Provide more bike lanes and improve pedestrian mobility
- Address DUI issues

Public Workshop #1, Via Video Conference

July 20, 2020

The first public workshop was held on July 20, 2020 via video conference. The meeting was advertised to the public through social media, project website, City and Chamber websites, and Facebook advertising. Slides were presented in English and Spanish, and a Spanish translator was made available to those who requested to watch the presentation in Spanish. The workshop started with a short presentation to introduce the project background, goals, and some of the challenges facing the corridor. Attendees were encouraged to ask questions and provide feedback following the presentation and were also invited to visit the project website.

Comments from attendees included:

- Improving safety and increasing connectivity for people walking and biking should be the top two priorities for the corridor
- Improve lighting
- Improve facilities for bicycles
- Shoulders should be consistent widths that can accommodate bicycling
- Include considerations for funding when developing recommendations

Public Workshop #2, Via Video Conference

November 5, 2020

The second workshop was held on November 5, 2020 via video conference. The meeting was advertised using the same methods as Public Workshop # 1 and Spanish slides and a Spanish translator were also made available. Preliminary project recommendations for the Eastside Corridor were presented and attendees were encouraged to ask questions, provide feedback, and visit the project website for future materials and updates.

Comments from attendees included:

- Select bicycle facilities that are context appropriate and appropriate for the anticipated type of user (ie. families with children, casual riders, and strong and fearless riders)
- Provide shoulders wide enough to comfortably accommodate bicyclists
- Close bicycle facility gaps along Manning and Academy Ave

ETCIS Steering Committee

The ETCIS Steering Committee was convened to provide strategic direction throughout the project. The Steering Committee included representatives from each of the cities along the two corridors, Fresno

County, and stakeholders from Leadership Counsel for Justice and Accountability, Fresno Cycling Club, and Chambers of Commerce.

The Steering Committee met three times throughout the project to share feedback and provide input on key project milestones. All stakeholder meetings were held via Zoom due to COVID-19 restrictions.

February 20, 2020

A kick-off meeting for the Steering Committee was held on February 20, 2020. An informational handout was provided ahead of the meeting to provide Committee members with background information about the project and how Committee members would play an advisory role throughout the planning process. At the meeting, introductions were made, and the purpose of the study and the role of the Committee were discussed in greater detail. Committee members also helped identify additional Steering Committee members and discussed ideas about how to engage the community in the process.

June 11, 2020

The second Steering Committee meeting was held to introduce the project and gather input on existing challenges and goals for the project.

Comments from the Steering Committee included:

- The project and future phases should coordinate between multiple jurisdictional boundaries to implement improvements
- Ensure that unincorporated communities are included in the project
- Limit turning movements on the corridor

August 19, 2020

The third Steering Committee meeting was held to present preliminary findings from the existing conditions data collection and analysis. Committee members asked clarifying questions to understand the project limits and findings of the report. Committee members were also provided with a copy of the existing conditions report. Though committee members were invited to provide feedback about the report, the second meeting was mostly informational. Presentation of the findings confirmed that the analysis accurately represented the corridor and provided the committee with additional background information to evaluate the improvement recommendations that would be presented and discussed at the following meeting.

January 6, 2021

The final Steering Committee meeting was held to review project goals, present draft recommendations, and gather feedback on the report and recommendations. Prior to the final meeting, Steering Committee members were provided draft copies of this report and a list of recommended improvements.

Comments from the Steering Committee included:

- Academy is heavily traveled by the cycling community and they prefer Class II facilities that are typically less congested and conducive to faster speeds
- This project will be especially helpful to communities without the budget to conduct this type of study

The committee was also encouraged to share the project website and draft report with their networks to gather feedback from the wider community.

Corridor Business Outreach

Due to COVID-19 limitations for conducting additional pop-up events, the team conducted individual outreach to businesses located on the two corridors to gain additional input from the business communities. Eighteen businesses were contacted to gain their input on corridor issues and improvements that would be benefit their businesses. Their feedback was incorporated into the project recommendations.

Summaries of community outreach events and example advertisement flyers are included in Appendix I.

9. Recommendations

This chapter presents the recommended improvements for the Manning Avenue and Academy Avenue corridors that were developed through this Eastside Transportation Corridor Improvement Study. These recommendations were developed in coordination with FCOG, Fresno County, Caltrans, and the project area cities of Clovis, Sanger, Parlier, Kingsburg, Fowler, Selma, Reedley, and Orange Cove. Community input was also essential in identifying challenges and desired solutions. Collectively, the recommendations presented in this chapter represent a long-term vision of multimodal solutions for the study area. Recommended facility improvements for the motorized and active transportation network are illustrated in Figure 9-1 through Figure 9-9.

Facility improvements address intersections and spot locations, segments of roadway, and network connectivity between and within project area cities. In addition to facility improvements, this chapter also includes recommendations for transit and climate change adaptation. The chapter concludes with programmatic recommendations, which include recommendations that address issues or trends that were found throughout the project area as well as industry recognized best practices that will benefit the study area overall.

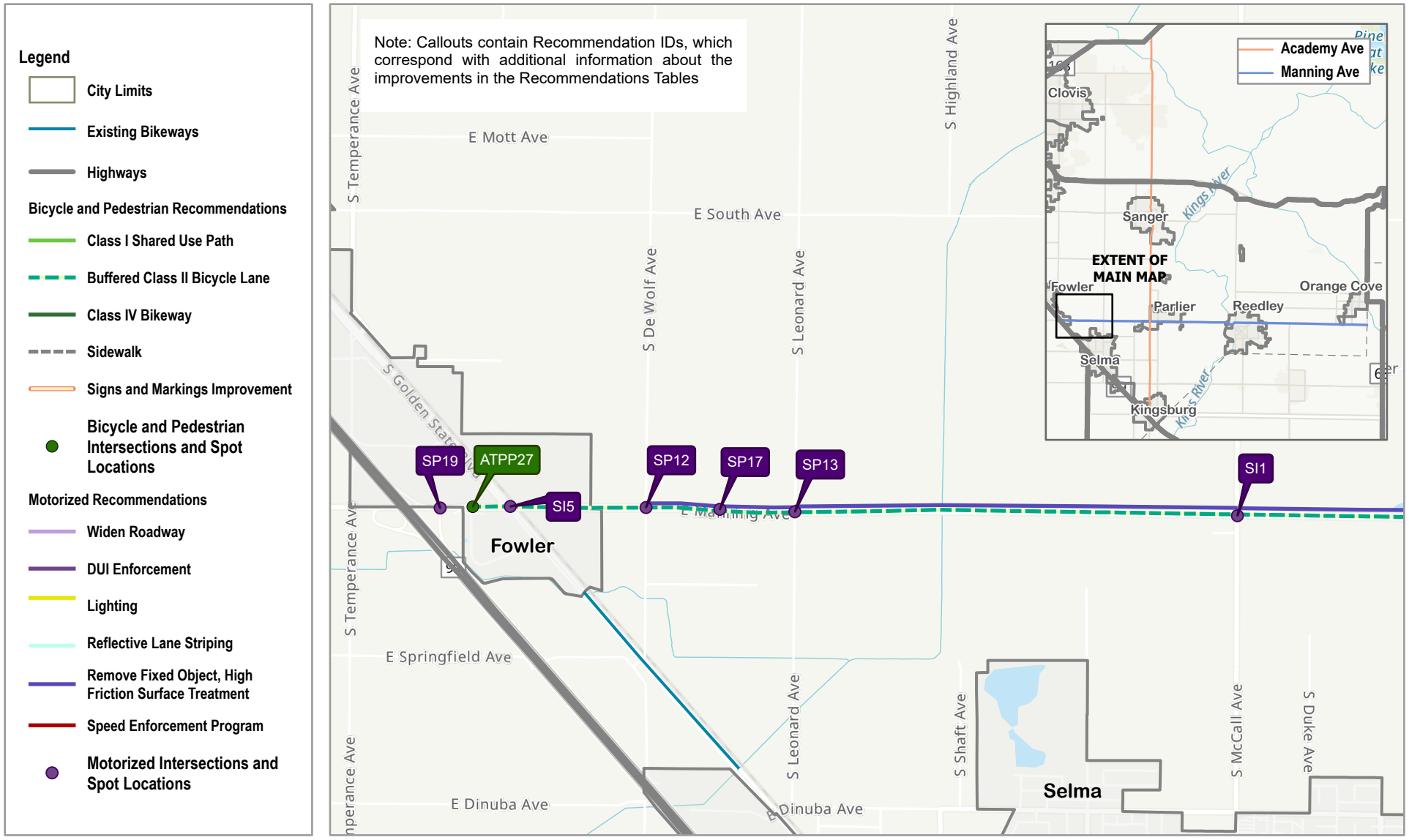
The recommended improvements presented in this chapter were developed to address several goals, including:

- Safety Improvements
- Capacity Improvements
- Multimodal and Transit Mobility
- Economic Enhancement
- Climate Adaptation

The recommendations development also guided by regional, state and federal guidelines, manuals, and other reference materials. Some key references include, but are not limited to the following:

Manual for Selecting Safety Improvements on High Risk Rural Roads: This manual was published by the FHWA in 2014. Compared to urban roads, rural roads generally have higher rates of collisions due to physical and behavioral factors like missing or inadequate shoulders, higher speeds, higher rates of impaired driving, and greater distance and response time from emergency medical services. The manual provides a detailed list of countermeasures to address these unique challenges and their associated CRF, life expectancy, and relative cost.

California Local Roadway Safety Manual (LRSM): This manual is published and regularly updated by Caltrans. The LRSM includes countermeasures and their associated crash reduction factors (CRF), life expectancy of the facility, and relative cost. Highway Safety Improvement Program (HSIP) funding eligibility is also documented for each countermeasure presented in the manual.



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Miles

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EASTSIDE TRANSPORTATION IMPROVEMENT CORRIDOR STUDY

Fresno County Council of Governments

Recommendations: Manning Ave Fowler to Parlier

Project No. **11210046**
Revision No. **-**
Date **Jan 2021**

FIGURE 9-1

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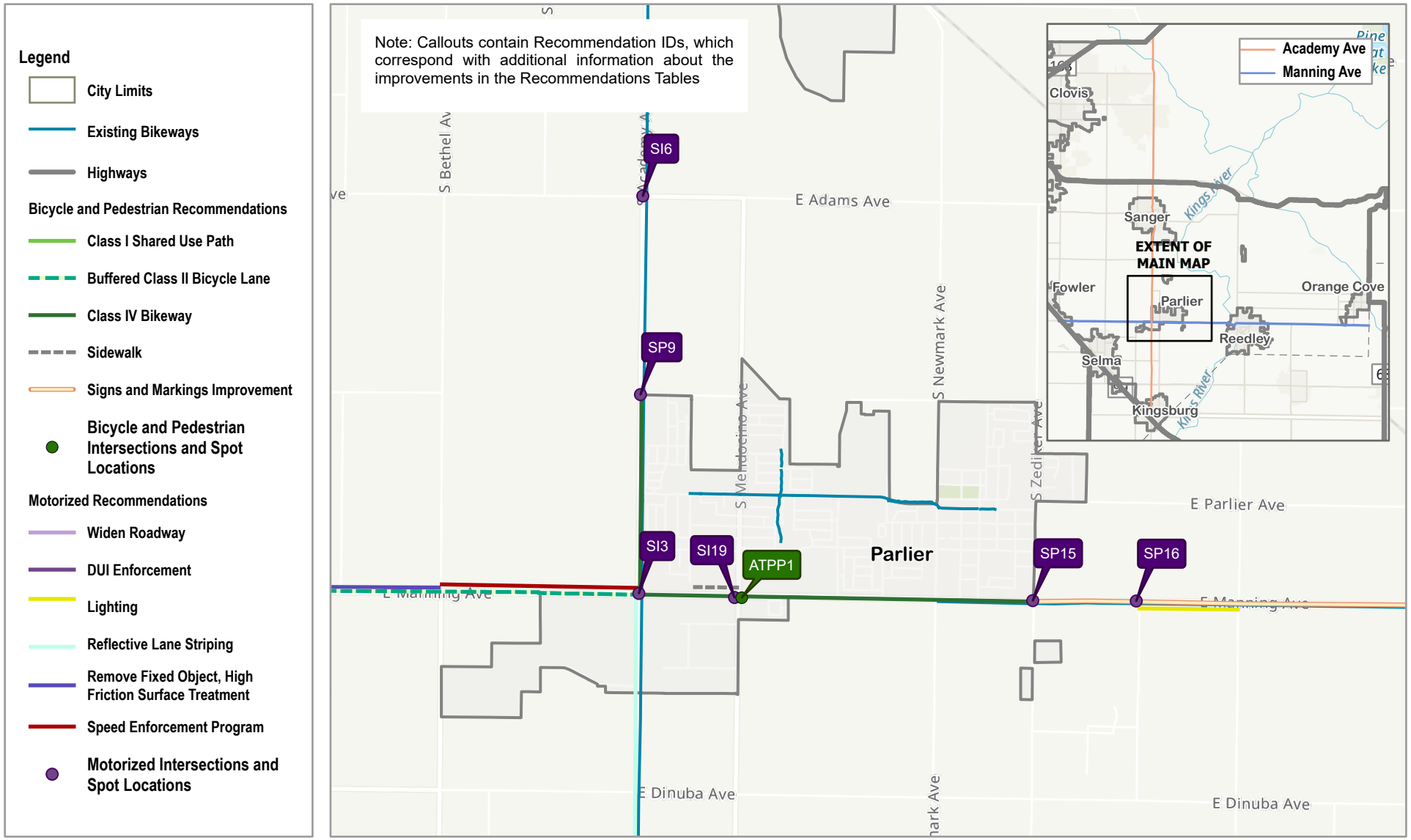
Data Source:Layer Fresno County Dept. PWP, Esri, HERE, Garmin, SafeGraph, INCREMENT P, METI/NASA, USGS, Bureau of Land Management, EPA, NPS, US Census Bureau, USDA
Layer Fresno County Dept. PWP, Esri, HERE, Garmin, SafeGraph, FAO, METI/NASA, USGS, Bureau of Land Management, EPA, NPS



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Map Projection: Lambert Conformal Conic
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane California IV FIPS 0404 Feet

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GHD

EASTSIDE TRANSPORTATION IMPROVEMENT CORRIDOR STUDY

Fresno County Council of Governments

Recommendations: Manning and Academy Ave Through Parlier

Project No. **11210046**
Revision No. **-**
Date **Jan 2021**

FIGURE 9-2

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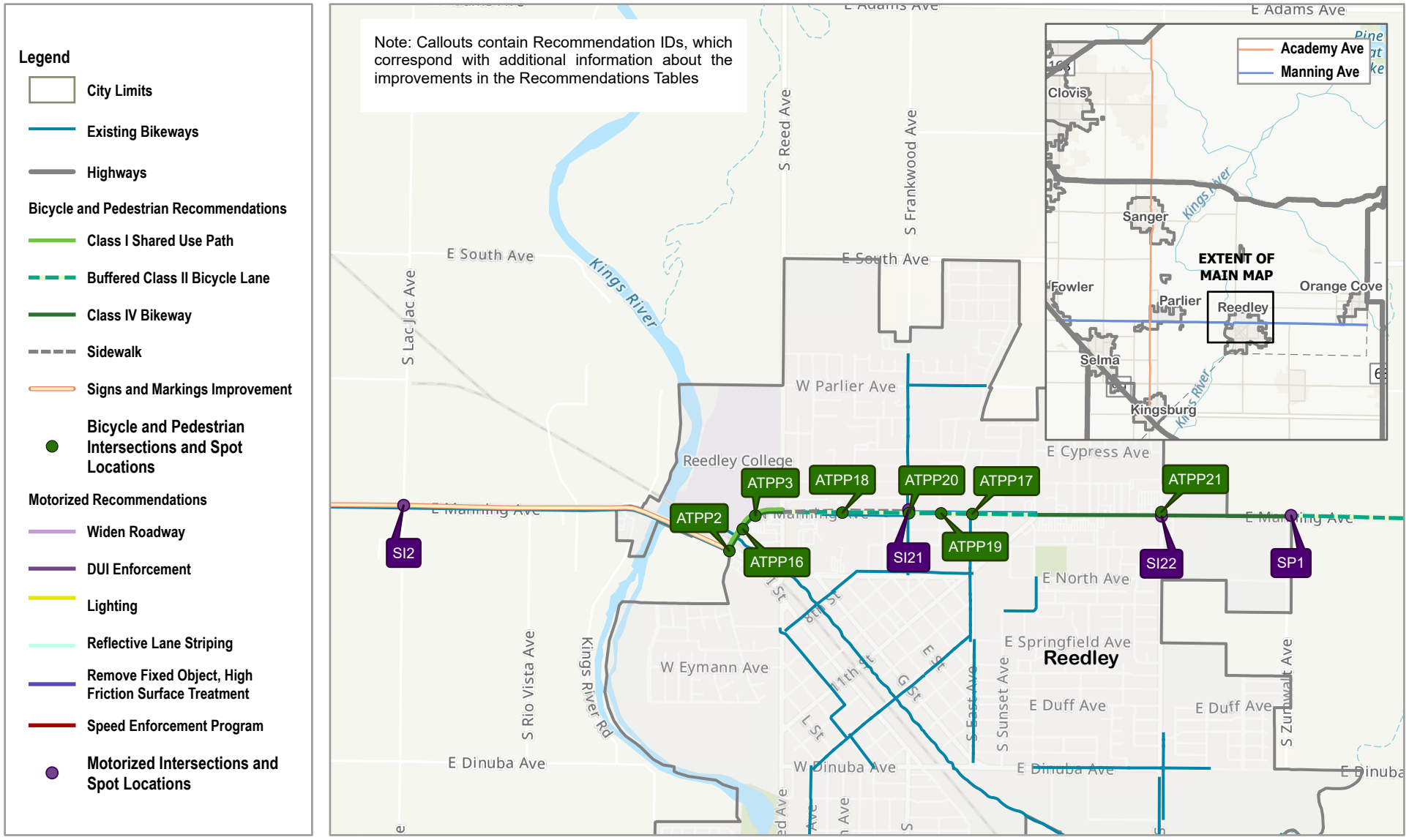

Paper Size ANSI A

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Miles

Map Projection: Lambert Conformal Conic
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane California IV FIPS 0404 Feet

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GHD

EASTSIDE TRANSPORTATION IMPROVEMENT CORRIDOR STUDY

Fresno County Council of Governments

Recommendations: Manning Ave Through Reedley

Project No. **11210046**
Revision No. **-**
Date **Jan 2021**

FIGURE 9-3

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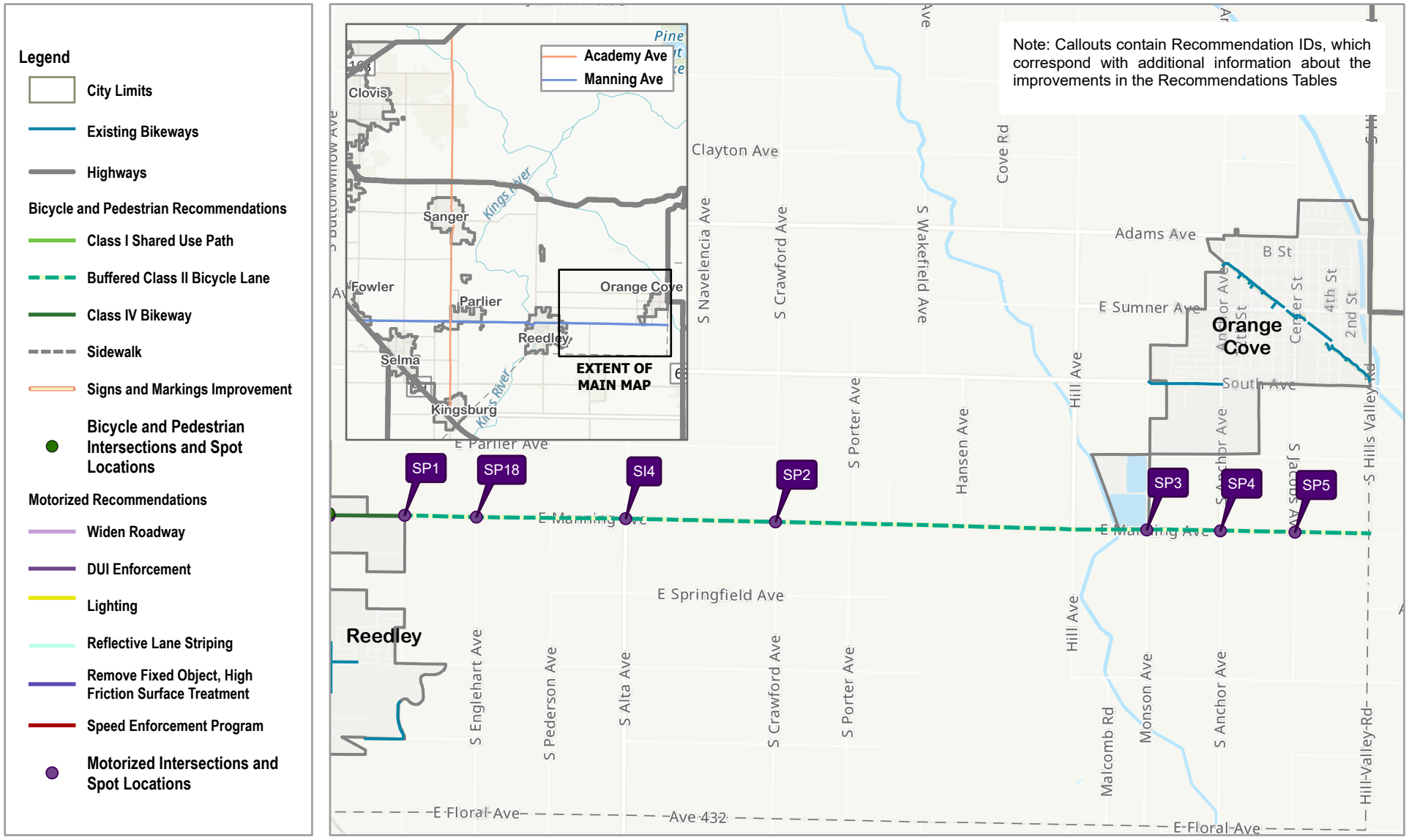

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EASTSIDE TRANSPORTATION IMPROVEMENT CORRIDOR STUDY

Fresno County Council of Governments

Recommendations: Manning Ave Reedley to County Line

Project No. **11210046**
Revision No. **-**
Date **Jan 2021**

FIGURE 9-4

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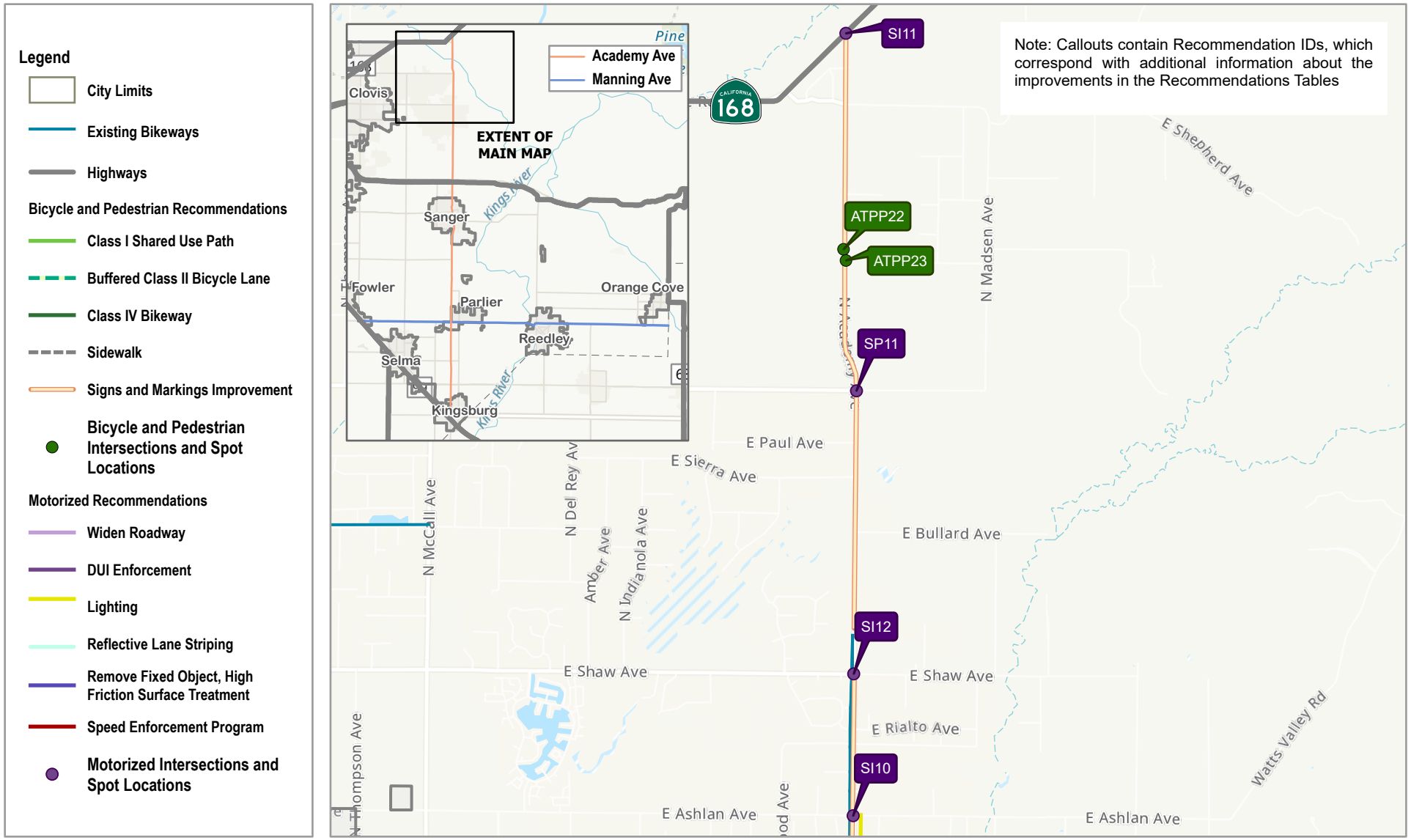

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EASTSIDE TRANSPORTATION IMPROVEMENT CORRIDOR STUDY

Fresno County Council of Governments

Recommendations: Academy Ave SR 168 to E Ashlan Ave

Project No. **11210046**
Revision No. **-**
Date **Jan 2021**

FIGURE 9-5

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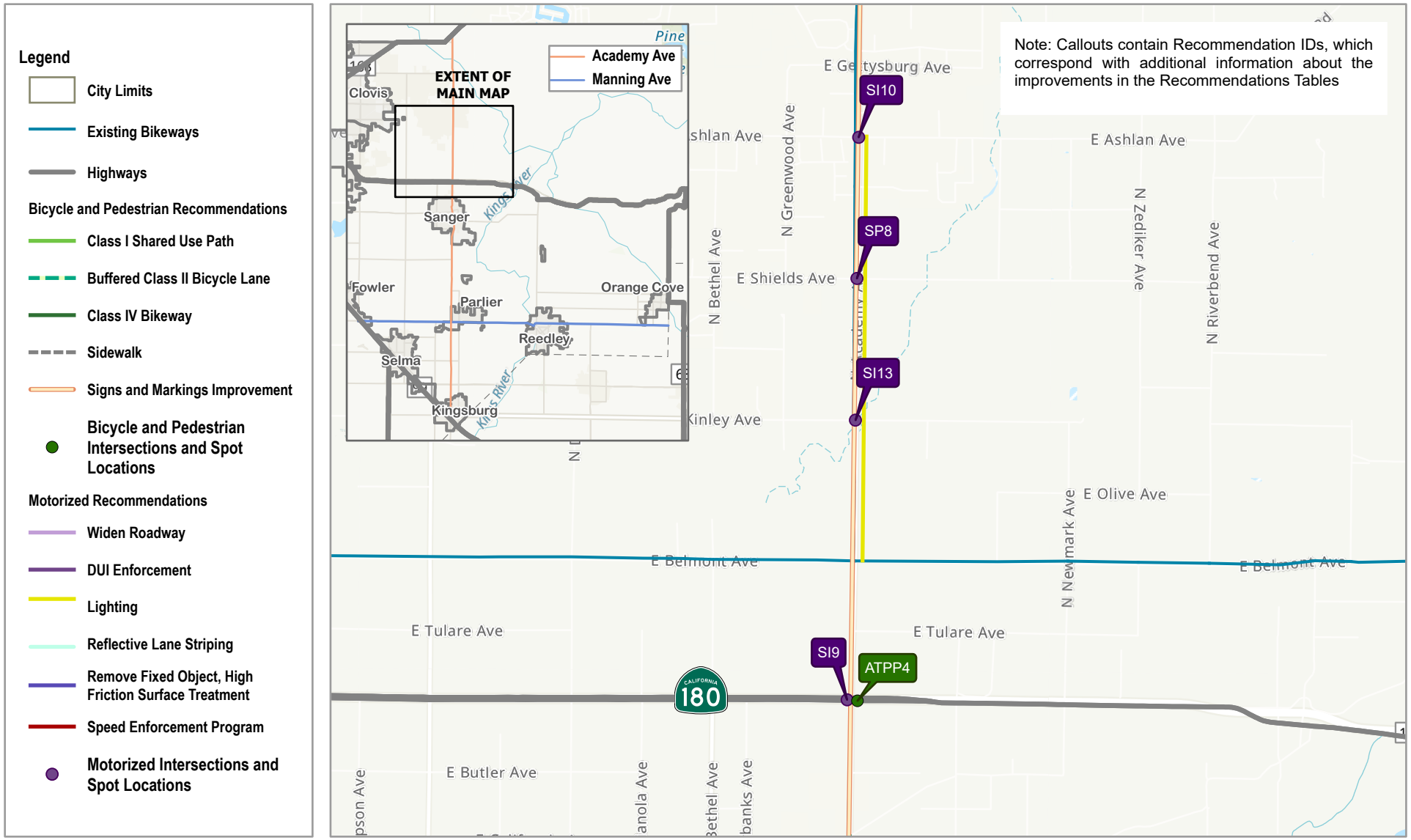

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EASTSIDE TRANSPORTATION IMPROVEMENT CORRIDOR STUDY

Fresno County Council of Governments

Recommendations: Academy Ave E Ashlan Ave to SR 180

Project No. **11210046**
Revision No. **-**
Date **Jan 2021**

FIGURE 9-6

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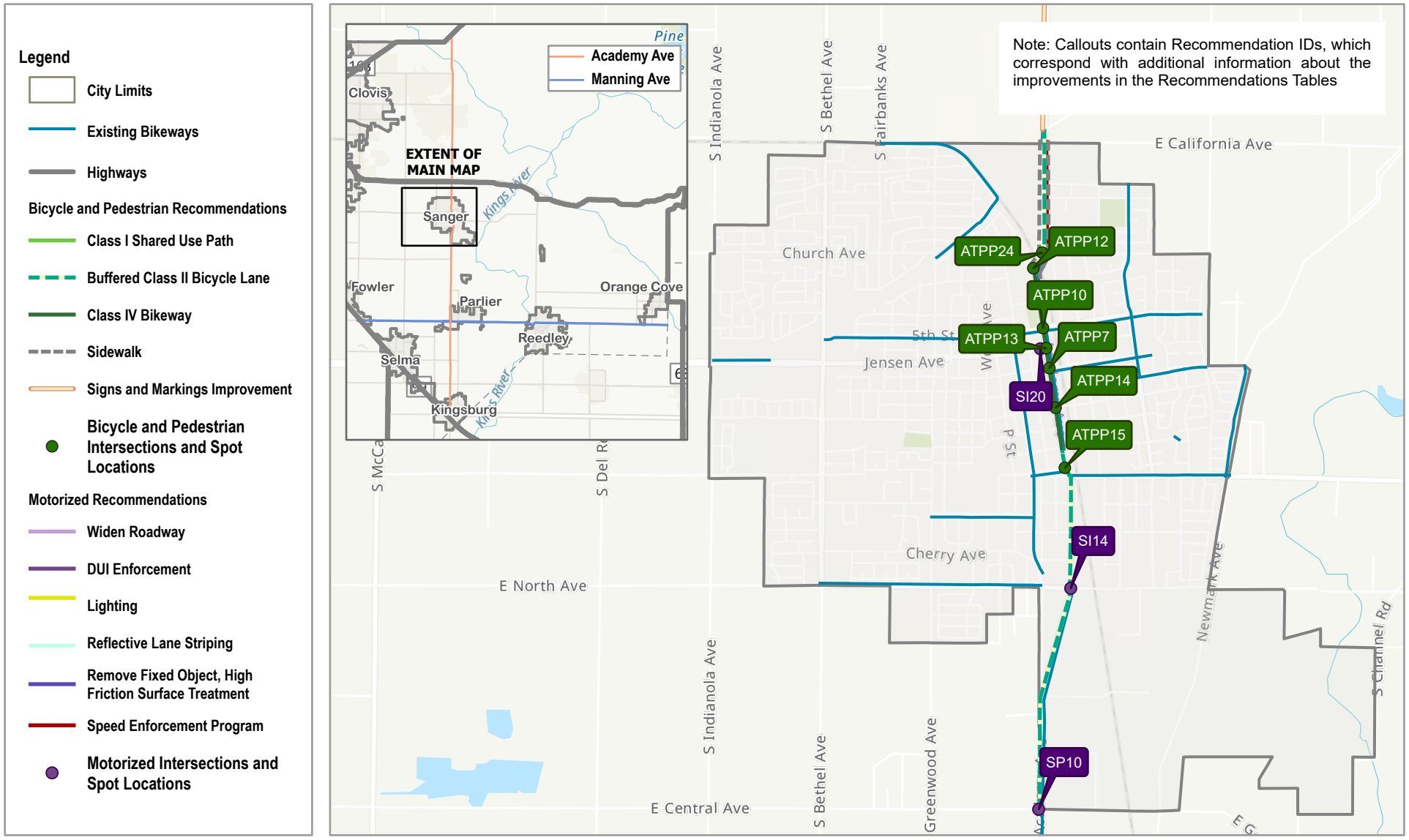

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EASTSIDE TRANSPORTATION IMPROVEMENT CORRIDOR STUDY

Fresno County Council of Governments

Recommendations: Academy Ave Through Sanger

Project No. **11210046**
Revision No. **-**
Date **Jan 2021**

FIGURE 9-7

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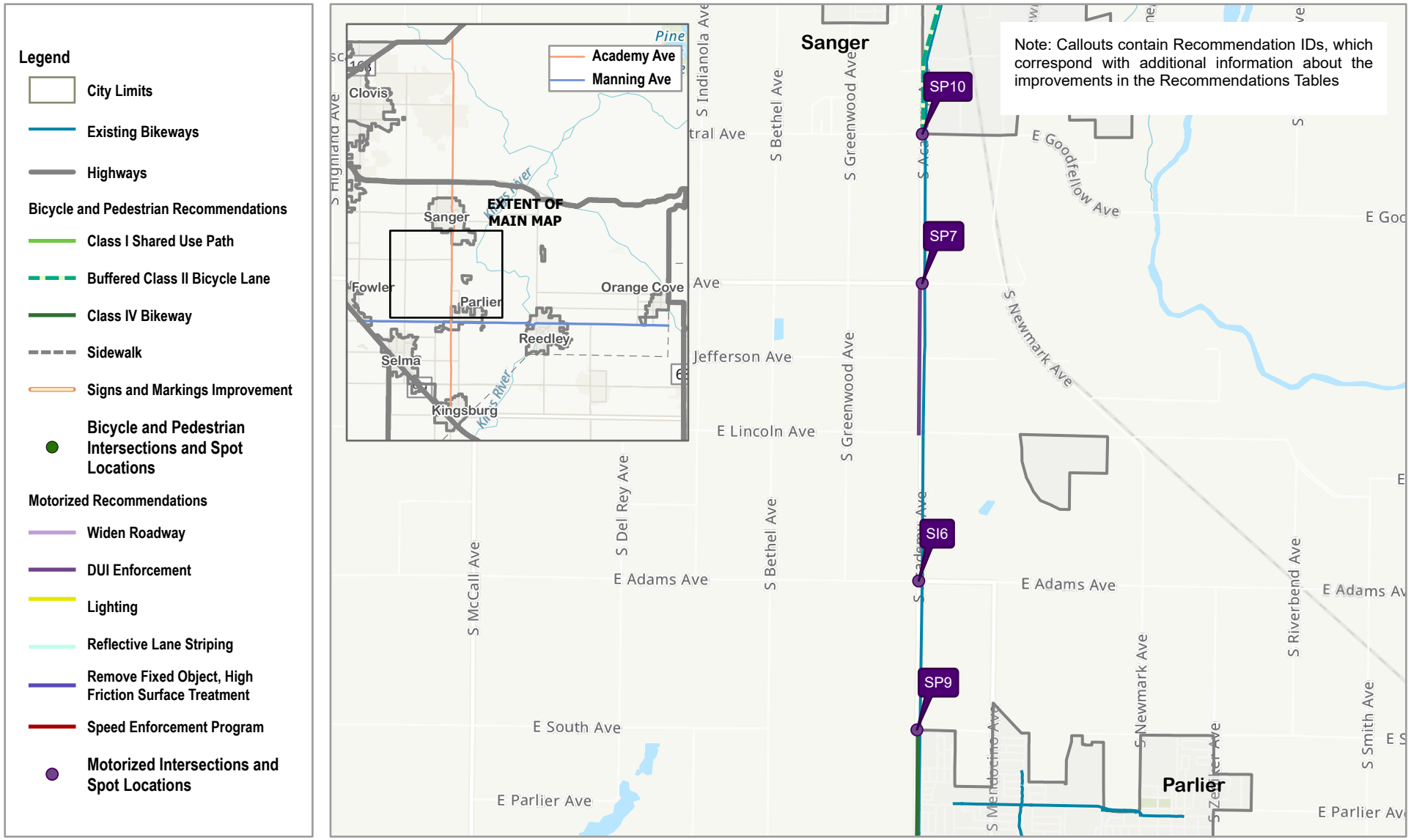

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EASTSIDE TRANSPORTATION CORRIDOR IMPROVEMENT STUDY

Fresno County Council of Governments

Recommendations: Academy Ave Sanger to Parlier

Project No. **11210046**
Revision No. **-**
Date **Jan 2021**

FIGURE 9-8

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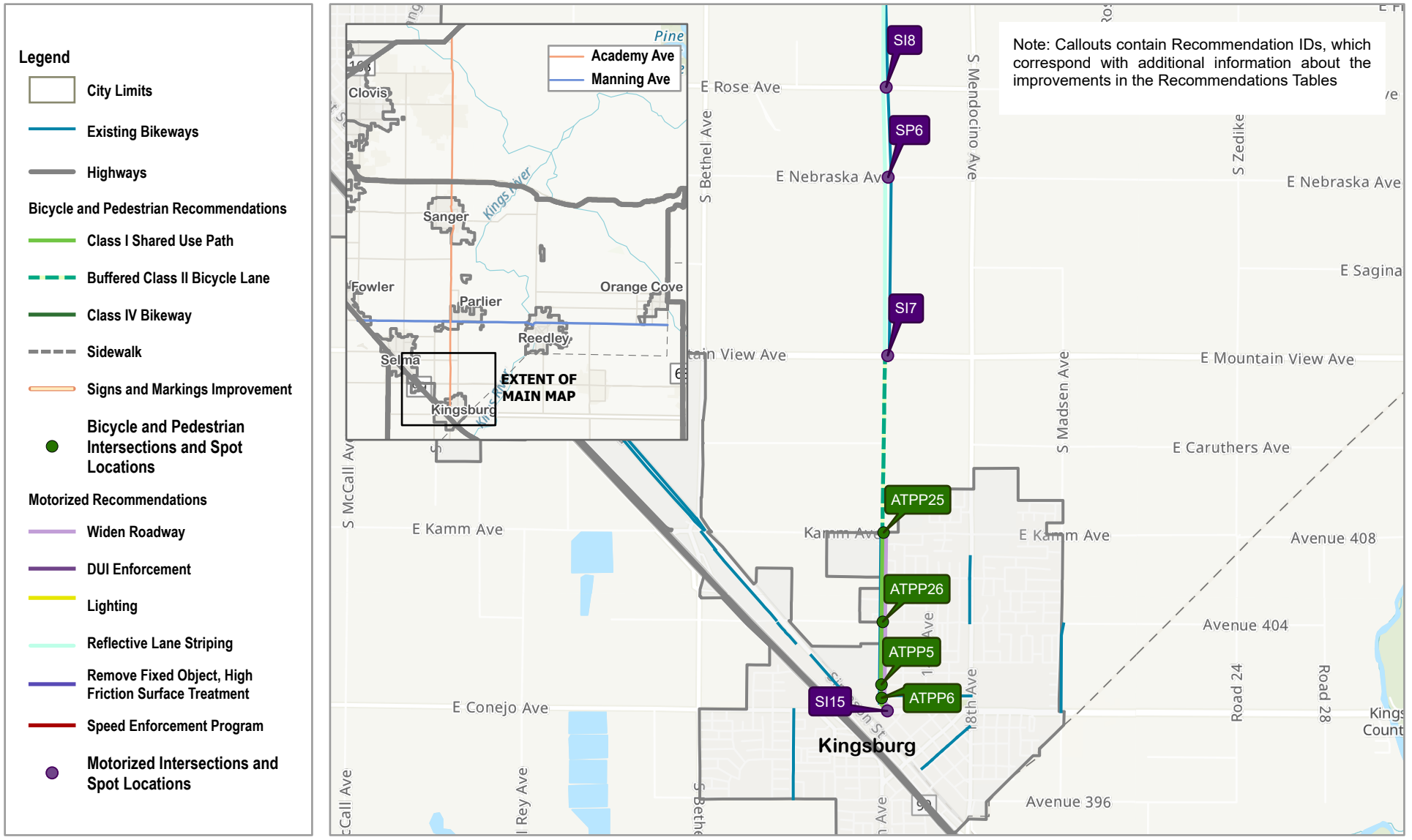

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EASTSIDE TRANSPORTATION IMPROVEMENT CORRIDOR STUDY

Fresno County Council of Governments

Recommendations: Academy Ave E Rose Ave to Kingsburg

Project No. **11210046**
Revision No. **-**
Date **Jan 2021**

FIGURE 9-9

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Explanation of Table Elements

This section explains how to interpret the labels of the columns in the recommendation tables presented in the sections that follow. Some columns do not apply to all recommendations and may be blank.

Recommendation ID

Each recommendation has a unique project ID number that can be used as a reference between this study and future studies or projects.

Project Corridor

This field identifies whether the project is located on the east-west corridor, Manning Avenue, or the north-south corridor, Academy Avenue.

Jurisdiction

Jurisdiction indicates the location of a recommendation within a project area city or unincorporated Fresno County

Begin/Cross Street

This indicates the beginning cross street of a roadway segment or intersection.

End

This indicates the ending cross street of a roadway segment. If the recommendation is for an intersection this column will be blank.

Capacity Recommendation

This column includes recommendations to improve LOS, where current or future capacity is projected to fall below acceptable levels. These recommendations are also presented in Chapter 7, under Section 7.7 Mitigation Measures.

Safety Recommendation

This column includes recommendations to improve safety, addressing collision trends identified in the collision analysis of this study.

Safety Recommendation Notes

Notes provide detail or clarifying information about the proposed safety recommendation.

Cost Estimate

This column includes the estimated costs to implement the recommendations.

SR2S

SR2S refers to Safe Routes to School. This column provides information about how an active transportation recommendation may support school travel.

LRSM CM Codes

These are related to the unique identifying numbers provided in the list of countermeasures in the California Local Roadway Safety Manual (LRSM). For additional information, the current version of the LRSM is available at this link. Countermeasure selection was also guided by the FHWA's Manual for Selecting Safety Improvements on High Risk Rural Roads, which can be found here.

Length

Indicates the length of recommendations that span roadway segments.

Motorized Recommendations

Motorized recommendations were developed with a focus on improving safety and addressing unacceptable levels of service. Recommendations include roadway segments, intersections, and other spot locations. Safety improvements were guided, in part, by the collisions analysis described in Chapter 6, which allowed the project team to identify and isolate particularly challenging intersections and segments of the corridors where reported collisions were concentrated. The methodology used to address unacceptable levels of service is discussed at length in Chapter 7. The LOS recommendations align with state and regional requirements, where agencies' requirements may be stricter than state guidelines.

Facility Definitions

To provide a clear understanding of the terminology utilized in the tables, definitions of facilities, which may not be self-explanatory, are described here. All recommendations will require additional transportation engineering and design to be implemented.

- **Roundabout:** A circular intersection where traffic enters and proceeds through the intersection in a counterclockwise movement around a center island, yielding to vehicles in the roundabout. Roundabouts may have a single lane or two lanes. Roundabouts have fewer vehicle conflict points than traditional stop-controlled intersections and also reduce vehicles speeds.
- **Median U-Turn Intersection (MUT):** Eliminates left-turns onto intersecting streets, reducing potential conflict points. Drivers travel straight through the intersection or turn right, then they make a U-turn at an opening in the median, and then turn right when they reach the cross street.
- **Restricted Crossing U-Turn (RCUT):** Similar to the MUT intersection, a RCUT eliminates left-turns and through movement from the minor cross street. Drivers turn right onto the main road and then make a U-turn at an opening in the median, and then either turn right at the cross street or continue straight.
- **Advanced Dilemma Zone Detection (ADZD):** Modifies signal timing using the speed and sizes of individual vehicles approaching the intersection to reduce the number of drivers that may have difficulty deciding whether to stop or proceed during a yellow phase.
- **Advanced Intersection Warning Signs:** Advance intersection warning signs should alert drivers of an upcoming intersection. Many intersection warning signs throughout the project area are inadequate or outdated and many drivers may not be alert to potential cross traffic.

Table 9 -1. Motorized Recommendations

ID	Project Corridor	Jurisdiction	Begin/Cross Street	End	Capacity Recommendation	Safety Recommendation	Safety Recommendation Notes	Cost Estimate	LRSM CM Code	Length
SP12	Manning	Unincorporated	S De Wolf Ave	-	-	Advanced Intersection Warning Improvements	Install intersection lighting, install advanced intersection warning signs and pavement markings on Manning. Study option to convert to RCUT.	$708,000	NS1, NS6; NS16	-
SP13	Manning	Unincorporated	S Leonard Ave	-	-	New Signal or possible RCUT	Study option to convert to signal or RCUT. Install intersection lighting. Provide advanced warning signs and pavement markings on Manning. Provide stop ahead markings in addition to existing signs on S Leonard.	$707,000	NS1, NS6; NS16	-
SP15	Manning	Parlier	S Zediker Ave	-	-	Signal improvements	Install ADZD. Add retroreflective borders to signals.	$42,800	S02, S04, S10	-
SP16	Manning	Unincorporated	S Riverbend Ave	-	-	Advance Reduce Speed Warning; potential RCUT	Upgrade advance warning of reduced speed ahead with flashing beacons, yellow diamond signs. Study option to convert to MUT/RCUT/RNDBT.	$10,000	NS16,	-
SP17	Manning	Unincorporated	S De Wolf Ave (1320 feet east)	-	-	Left turn lane or MUT	Install a left turn lane on the south side of Manning for vehicles that are currently crossing the gravel median to access utilities north of Manning; could also be implemented with RCUT for De Wolfe. Study the use of this access road.	$100,000	NS16, NS15, or NS18	-
SP1	Manning	Reedley	S Zumwalt Ave	-	-	Advanced Intersection Warning Improvements	Upgrade advanced intersection warning signs with bigger signs with retroreflective borders.	$1,800	NS06	-
SP2	Manning	Unincorporated	S Crawford Ave	-	-	Advanced Intersection Warning Improvements	Install yellow diamond advanced intersection warning signs on Manning. Install flashing beacons on existing stop signs on S Crawford Ave and install larger stop signs.	$11,000	NS09, NS06, NS08, NS01	-
SP3	Manning	Orange Cove	Monson Ave	-	-	Advanced Intersection Warning Improvements	Install advanced intersection warning signs on both Manning approaches. Install flashing beacons on existing stop signs on minor approach and install larger signs.	$11,000	NS06, NS08	-
SP4	Manning	Unincorporated	S Anchor Ave	-	-	Advanced Intersection Warning Improvements	Install advanced intersection warning signs on both Manning approaches. Install flashing beacons on existing stop signs on minor approach and install larger signs.	$11,000	NS06, NS08	-
SP5	Manning	Unincorporated	S Jacobs Ave	-	-	Advanced Intersection Warning Improvements	Install advanced intersection warning signs on both Manning approaches. Install flashing beacons on existing stop signs on minor approach and install larger signs.	$11,000	NS06, NS08	-

Table 9 -1. Motorized Recommendations

ID	Project Corridor	Jurisdiction	Begin/Cross Street	End	Capacity Recommendation	Safety Recommendation	Safety Recommendation Notes	Cost Estimate	LRSM CM Code	Length
SP6	Academy	Unincorporated	E Nebraska Ave	-	-	Intersection Conversion to RNDBT or signal, AWSC in short-term, Signage Upgrades/Improvements, Pavement Marking Upgrade/Improvements	Convert intersection from TWSC to AWSC if warrants met, ultimately Roundabout or signal recommended; upgrade signage with additional/larger stop signs and advanced intersection/regulatory signage, install flashing beacon as advance warning of intersection.	$12,400	NS02; NS06; NS07; NS09 OR NS05	-
SP7	Academy	Unincorporated	E American Ave	-	-	Advanced Intersection Warning Improvements	Add intersection lighting, upgrade signage with additional/larger stop signs and advance intersection signs with flashing beacons, upgrade intersection pavement markings, transverse rumble strips. Study option to convert intersection from TWSC to AWSC/RNDBT/MUT.	$714,400	NS01; NS02 or NS16; NS06; NS07; NS09; NS10	-
SP8	Academy	Unincorporated	E Shields Ave	-	-	Advanced Intersection Warning Improvements	Add intersection lighting, upgrade signage with additional/larger stop signs on E+W approach, and install advance intersection warning signage with flashing beacons (NS), install "cross traffic does not stop" (EW).	$713,000	NS01; NS06; NS09; NS16	-
SP9	Academy	Parlier	E South Ave	-	-	Advanced Intersection Warning Improvements	Upgrade signage with additional/larger stop signs and advance intersection/regulatory signage on N+S approach, upgrade intersection pavement markings, on N+S legs and install advance warning flashing beacons. Study option to convert intersection to AWSC/RNDBT/MUT.	$16,000	NS02; NS16 (or NS06); NS07; NS09	-
SP10	Academy	Sanger	E Central Ave	-	-	Advanced Intersection Warning Improvements	Add intersection lighting, upgrade signage with additional/larger stop signs on E+W approaches, upgrade advance intersection warning signage and install flashing beacons on stop signs on all approaches.	$712,000	NS01; NS06; NS08	-
SP11	Academy	Unincorporated	E Herndon Ave	-	-	Advanced Intersection Warning Improvements	Install intersection lighting, install/upgrade advance warning signs on all approaches, upgraded intersection pavement markings on N & S approach. Study option to convert to AWSC or RNDBT.	$705,000	NS01; NS05 or NS02; NS06; NS07; NS10	-
SP18	Manning	Unincorporated	S Englehart Ave	-	-	Advanced Intersection Warning	Upgrade advance warning and stop signs with larger signs with retroreflective borders on N and S legs.	$1,800		-

Table 9 -1. Motorized Recommendations

ID	Project Corridor	Jurisdiction	Begin/Cross Street	End	Capacity Recommendation	Safety Recommendation	Safety Recommendation Notes	Cost Estimate	LRSM CM Code	Length
SI1	Manning	Unincorporated	S McCall Ave	-	Add Right-turn pockets (All); extend LT pockets; Optimize Signal Timings	Advanced Intersection Warning Improvements	Provide advanced warning flashing beacons with existing signs at all intersection approaches. Install retroreflective backplates on existing traffic signals. Install Advanced Dilemma Zone Detection. Study option to convert to RNDBT or MUT.	$832,000	S02, S04, S10, S16, S15	-
SI2	Manning	Unincorporated	S Lac Jac Ave	-	-	Roundabout/MUT	Replace signalized intersection with a roundabout or MUT. Install advanced warning signs.	$4,502,400	S16, S15, S10	-
SI3	Manning	Parlier	Academy	-	Add WB Right-Turn Pockets; Extend Dedicated Left-turn pockets; Optimize Signal Timings	Signal Improvements	Install retroreflective borders on signal backplates. Install two large "Signal Ahead" signs with retroreflective borders on E approach. Study option to convert intersection to RNDBT.	$505,200	S02, S04, S15	-
SI4	Manning	Unincorporated	S Alta Ave	-	-	Roundabout/Advanced Intersection Warning Improvements	Install Roundabout (Single lane). Alternatively, Install advanced signal warning signs and flashing beacon signal ahead and install retroreflective borders on signals.	$2,500,000	S16, S10, S04	-
SI5	Manning	Fowler	Golden State	-	Add dual left turns all approaches, add WB right-turn pocket; remove RT islands; Optimize Signal Timings	Advanced Intersection Warning Improvements	Upgrade signal heads with rectroreflective borders & back-plates, provide advanced dilemma-zone detection for all approaches.	$594,400	S02, S04, S10	-
SI6	Academy	Unincorporated	E Adams Ave	-	Signal	Signal	Install Signal and advance warning signage on all legs, install advance warning flashing beacons on all legs to improve motorist awareness of new intx control. Study MUT for long-term improvement.	$8,020,000	NS03; NS09; NS16	-
SI7	Academy	Unincorporated	E Mountain View Ave	-	-	Signal Modifications, Flashing Beacons	Upgrade signal heads with retroreflective border back-plates, provide advanced dilemma-zone detection for all approaches, install flashing beacon as advance warning.	$104,000	S02; S04; S10	-
SI8	Academy	Unincorporated	E Rose Ave	-	-	Advanced Intersection Warning Improvements	Install lighting, install advance warning flashing beacons on all approaches, install transverse rumble strips on all approaches. Study option to convert to roundabout or signal.	$724,000	NS01; NS04; NS09; NS10	-
SI9	Academy	Unincorporated	SR 180 (E Kings Canyon Road)	-	Add NB & SB Right Turn Pockets; Optimize Signal Timings	Capacity Improvements	Upgrade signal hardware to include retroreflective borders. Study option to convert to RNDBT.	$204,800	S16, or S15, S02, S04	-

Table 9 -1. Motorized Recommendations

ID	Project Corridor	Jurisdiction	Begin/Cross Street	End	Capacity Recommendation	Safety Recommendation	Safety Recommendation Notes	Cost Estimate	LRSM CM Code	Length
SI10	Academy	Unincorporated	Ashlan Ave	-	Signal	Roundabout or Signal	Convert AWSC to roundabout or signal to mitigate safety concerns, as well as accomodate future operational conditions (LOS D in the AM in cumulative scenario).	$4,502,400	NS04 or NS03	-
SI11	Academy	Unincorporated	SR 168	-	Signalize, Add EB right turn pocket, add WB and NB left-turn pocket with protected phase	Advanced Intersection Warning Improvements	Improve driver awareness of intersection. Install intersection lighting and larger "Signal Ahead" signs with retroreflective borders and flashing beacons. Caltrans' future plans for SR 168 will be a 4-lane freeway.	$7,720,000	NS03 OR NS05	-
SI12	Academy	Unincorporated	E Shaw Ave	-	-	Advanced Intersection Warning Improvements	Install intersection lighting, install/upgrade additional stop signs on E + W legs and upgrade/install advance warning signage and flashing beacons on all approaches.	$722,000	NS01, NS06, NS09	-
SI13	Academy	Unincorporated	McKinley Ave	-	Signal	Roundabout or Signal with MUT	Convert AWSC to Signal or roundabout to accommodate future operational conditions (LOS D in the AM in cumulative scenario). Option to install Signal with MUT.	$4,502,400	NS04 or NS03, NS16	-
SI14	Academy	Sanger	North Ave	-	-	Signal Modification	Install intersection lighting (x4). Install retroreflective borders on signals (x12), add an additional signal head (all 4 legs) to improve visibility of intersection, add protected left turn phase for all approaches (x4, no approach roadway work).	$4,602,400	S02; S07	-
SI15	Academy (10th Ave)	Kingsburg	Sierra St	-	Add WB right-turn pocket	Signal Modifications	Upgrade signal heads with retroreflective border back-plates. Study option to convert to roundabout.	$104,000	S02, S16	-
SI19	Manning	Parlier	Mendocino Ave	-	Add EB and NB right-turn pockets, extend LT pockets, optimize signal timings	Advanced Intersection Warning Improvements	Install advanced signal warning signs on both sides of the road (all), install taller and larger signs and "signal ahead" pavement markings. Install retroreflective borders on signals.	$214,000	S02, S03	-
SI20	Academy	Sanger	Jensen Ave	-	Add EB left-turn pocket; Optimize signal timing	Signal Improvements	Improve signal timing and install retroreflective borders at signals (x17)	$103,400	S02, S03	-
SI21	Manning	Reedley	Frankwood Ave	-	Add EB, WB, and NB right-turn pockets, extend EB and WB left-turn pockets, optimize signal timing	See ATPP20- curb extensions recommended		$500,000		-
SI22	Manning	Reedley	Buttonwillow Ave	-	Extend EB right-turn pocket, extend WB, NB, SB left-turn pocket, add a NB through lane, optimize signal timings			$500,000		-

Table 9 -1. Motorized Recommendations

ID	Project Corridor	Jurisdiction	Begin/Cross Street	End	Capacity Recommendation	Safety Recommendation	Safety Recommendation Notes	Cost Estimate	LRSM CM Code	Length
SP19	Academy	Sanger	Annadale Ave	-	-	Signal Improvements	Improve signal timing and install retroreflective borders at signals (x12)	$2,400	S02, S03	-
SP20	Academy	Sanger	9th St	-	-	Signal Improvements	Improve signal timing and install retroreflective borders at signals (x20)	$4,000	S02, S03	-
SP21	Academy	Sanger	7th St	-	-	Signal Improvements	Improve signal timing and install retroreflective borders at signals (x18)	$3,600	S02, S03	-
SP22	Academy	Sanger	5th St	-	-	Signal Improvements	Improve signal timing and install retroreflective borders at signals (x20)	$4,000	S02, S03	-
SL1	Manning	Unincorporated	S De Wolf Ave	S Leonard Ave	-	Roadway Improvements	Remove F.O. outside clear recovery zone (CRZ) (cost too variable, not included in estimate). Possible HFST for rear-end collisions. Speed enforcement needed here.	$400,812	R21	0.49
SL2	Manning	Unincorporated	S Leonard Ave	S McCall Ave	-	Roadway Improvements	Remove F.O. outside clear recovery zone (CRZ) (cost too variable, not included in estimate). Possible HFST for rear-end collisions. Speed enforcement needed here.	$1,191,065	R15, R02, R21	1.48
SL3	Manning	Unincorporated	S McCall Ave	Bethel Ave	-	Roadway Improvements	Remove F.O. outside clear recovery zone (CRZ) (cost too variable, not included in estimate). Possible HFST for rear-end collisions. Speed enforcement needed here.	$1,584,504	R15, R02, R21	1.97
SL4	Manning	Unincorporated/Parlier	S Bethel Ave	Academy Ave	-	Speed Enforcement Program	Speed enforcement needed here.	$7,500	N/A	0.99
SL5	Manning	Unincorporated	S Riverbend Ave	S Smith Ave	-	Lighting	Install segment lighting, HFST also can address rear-end collisions.	$1,383,071	R01, R21	0.49
SL6	Academy	Unincorporated	McKinley Ave	Belmont Ave	-	Lighting	Install lighting along segment due to high frequency of nighttime collisions coded as no street lights present.	$5,989,346	R01, R02	2.99
SL9	Academy	Sanger	Church	E California Ave	-	Speed Enforcement Program	Speed enforcement needed here	$7,500	S02; S03; R14	0.50
SL10	Academy	Unincorporated	E Lincoln Ave	American	-	DUI Enforcement	Partner with law enforcement to create a checkpoint. Increase DUI enforcement due to high number of DUI collisions along segment - (between Sanger and Parlier).	Staff Time	N/A - Programmatic Rec	1.01
SL11	Academy	Kingsburg	SR 201	Stroud	Widen from 2 lanes to 4 lanes	-	-	Varies	-	0.50
SL12	Academy	Kingsburg	Stroud Ave	Kamm Ave	Widen from 2 lanes to 4 lanes	-	-	Varies	-	0.50
SL13	Academy	Unincorporated	Manning Ave	E Mountainview Ave	-	Reflective Lane Striping	Update lane striping to high reflectivity striping.	$635,778	R28	4.01
SP19	Manning	Fowler	SR-99 NB Off-ramp	-	-	Advanced Intersection Warning Improvements, Right Turn Lane	Install dedicated right turn lane and install advanced warning flashing beacon with existing signs.	$105,000	NS08, NS17	-

Multimodal and Transit Recommendations

Bicycle and Pedestrian Recommendations

Bicycle and pedestrian recommendations were developed with a focus on improving safety and connectivity between project area cities and community destinations. Recommendations include roadway segments, intersections, and other spot locations. As described for motorized recommendations, safety improvements for active transportation were guided, in part, by the collisions analysis described in Chapter 6 and the crash modification factors outlined in the California Local Roadway Safety Manual. Gaps in the sidewalk and bicycle network were identified using County GIS data of existing facilities and confirming areas that required further analysis by using Google Street view.

Closing gaps between existing facilities and providing improved connections between project area cities was identified as high priority for the community at several community outreach events. The community also indicated a desire for clear signage and facilities that create greater visibility of bicyclists and pedestrians.

Facility Definitions

To provide a clear understanding of the terminology utilized in the tables, definitions of common facilities are provided here. All recommendations will require additional transportation engineering and design to be implemented. All federal, state, and local regulations and design standards should be met in future phases as these projects are developed.

- **Class I Shared-Use Paths (Class I):** Dedicated paths for walking and biking, which are separated from the roadway
- **Class II Bicycle Lanes:** Striped lanes for bicyclists
    - **Class II Bicycle Lanes:** Striped lanes for bicyclists that may include green-colored pavement, either as a corridor treatment along the length of a bike lane or in conflict areas
    - **Class II Buffered Bicycle Lanes:** Bicycle lanes that includes a striped “buffer” area either between the bicycle lane and travel lane or between the bicycle lanes and parked cars
- **Class IV Separated Bikeways:** On-street bicycle facilities with a physical barrier between the bicycle space and motor vehicle lanes, including bollards, curbs, or parking
- **Bike Boxes:** Designated area for bicycles to wait in front of stopped motor vehicles during a red signal phase
- **Crosswalks**: Legal crosswalks exist at all intersections, however crosswalk markings increase driver awareness of the crossing and visibility of people that may be crossing the street. Marked crosswalks should be as wide as or wider than the walkway it connects to so that groups of people can pass comfortably.
    - **High Visibility Continental Markings:** Bold white bars that run perpendicular to the pedestrian path of travel.

- **Advance Stop Bar:** A bold white bar located six to eight feet in advance of a crosswalk to reinforce yielding to pedestrians. Stop bars are placed perpendicular to the travel lane and not necessarily parallel to the crosswalk or the adjacent street.
- **Rectangular Rapid Flashing Beacon (RRFB):** User-actuated flashing lights that supplement pedestrian crosswalk signs at unsignalized intersections and midblock crosswalks, where traffic volumes do not warrant a signal or stop.
- **Signalized Midblock Crossing:** A signalized midblock crossing stops road traffic as needed to allow for non-motorized crossings of major streets at midblock locations where a beacon is determined to be insufficient. A traffic signal at the crossing location rests on green until it is activated by a pedestrian.
- **ADA Curb Ramp:** Curb ramps must be provided at all street crossings that involve a change in grade to ensure crosswalks are accessible to people using wheelchairs, people with wheeled devices, and people with low or no vision.
- **Curb Extensions:** Curb extensions extend the sidewalk or curb line into the parking lane on a street, reducing the street width at crossings.

Table 9-2. Active Transportation Recommendations

ID	Project Corridor	Jurisdiction	Begin/Cross Street	End	Recommendation	Recommendation Notes	Cost Estimate	SR2S	LRSM CM Code	Length
ATPL1	Manning	Reedley	N Reed Ave	420 ft west of San Joaquin Cir	Buffered Class II	Close a major gap between existing Class II bikeways that end at I st to the west and San Joaquin Cir on the east end. Connect residents to several key destinations where bicycling use is already high. Include conflict markings near intersection approach and driveways to improve visibility of cyclists and reduce traffic stress.	$ 27,410	Reedley High School is located along the route. Lincoln Elementary is located a 1/4 mile south of Manning Ave. Reedley College is also adjacent to the corridor	R32PB	0.16
ATPL10	Manning	Unincorporated	Golden State Blvd	S Bethel Ave	Buffered Class II	Connect the network between the cities of Parlier and Fowler by widening the existing narrow shoulder and installing a paved Class II path that can also serve as an emergency shoulder.	Varies	-	R32PB	4.93
ATPL11	Academy	Sanger	Church Ave	140 ft north of Church Ave	Sidewalk	Connect the existing sidewalks to the proposed signal and crossing at Church Ave.	$ 31,741	-	R34PB	0.05
ATPL12	Academy	Sanger	Annadale	12th St	Buffered Class II	Close the gap between the existing Class II bike lanes on Annadale Ave and 12th St.	$ 8,254	-	R32PB	0.05
ATPL13	Academy	Sanger	12th St	11th St	Buffered Class II	Road Diet and install Buffered Class II bike lanes. Close the gap between existing and proposed bike facilities along Academy.	$ 15,618	-	R33PB, R14	0.09
ATPL14	Manning	Reedley	Eastbound approach to the I St intersection	I St	Signs and Markings Improvement	Upgrade the existing Class II bike lane to a green painted lane with conflict zone markings along the 1,000 ft long right turn pocket.	$ 67,536	Route to adjacent Reedley College		0.21
ATPL15	Manning	Reedley	I St	N Reed Ave	Class IV	Alternative 1 - Remove on-street parking and install a two way separated Class IV bikeway. Close the gap between existing Class II facilities that end at I st and San Joaquin Cir.	$ 204,019	Adjacent to Reedley College. Route to Reedley High School	R33PB	0.27
ATPL16	Manning	Reedley	I St	N Reed Ave	Class I	Alternative 2 - Construct a Class I path that connects to the existing Class I Reedley Rail Trail, fill the gap between existing facilities that end at I St and San Joaquin Cir.		Adjacent to Reedley College. Route to Reedley High School	R32PB	0.28
ATPL17	Academy	Sanger	Church Ave	E California Ave	Sidewalk	East side of Academy Ave	$ 386,134	-	R34PB	0.56
ATPL18	Academy	Sanger	Church Ave	E California Ave	Sidewalk	West side of Academy Ave	$ 391,987	-	R34PB	0.57
ATPL19	Academy	Sanger	11th	Church	Class IV	Road diet and install separated Class IV bikeways.	$ 610,286	-	R33PB, R14	0.81
ATPL2	Manning	Reedley	N Reed Ave	N Frankwood Ave	Sidewalk	Fills a major gap between residential, schools, motel, churches, athletic facilities.	$ 280,557	Reedley High School is located along the route. Lincoln Elementary is located a 1/4 mile south of Manning Ave. Reedley College is also adjacent to the corridor	R34PB	0.41
ATPL20	Manning	Parlier	Apartments at 13360 Manning	S Mendocino Ave	Sidewalk	Close the gap between existing sidewalks in front of the apartment and along Manning, west of S Mendocino Ave.	$ 145,945	-	R34PB	0.21
ATPL21	Manning	Parlier	Western city limits of Parlier	S Mendocino Ave	Buffered Class II	The existing shoulder has inconsistent widths with debris that may pose challenges to cyclists. Convert the existing shoulder to a Class II facility. Widen and add pavement markings and bike lane signage.	$ 176,589	-	R32PB	1.01
ATPL23	Manning	Parlier	Academy Ave	S Zediker Ave	Class IV Bikeway	Install Class IV. Would require widening and/or road diet.	Varies	-	R32PB	2.00
ATPL24	Manning	Unincorporated	S Zumwalt Ave	S Hills Valley Rd	Buffered Class II	Widen the narrow paved shoulder and add bike lane pavement markings. Close a gap in bicycle facilities between Reedley and Orange Cove.	Varies	-	R32PB	6.50

Table 9-2. Active Transportation Recommendations

ID	Project Corridor	Jurisdiction	Begin/Cross Street	End	Recommendation	Recommendation Notes	Cost Estimate	SR2S	LRSM CM Code	Length
ATPL27	Manning	Unincorporated	S Zediker Ave	W Upper Bridge Ave	Signs and Markings Improvement	Increase visibility and driver awareness of bicyclists that may be in the bike lane by increasing the frequency of pavement markings and signs. Markings should be placed near intersections or with no more than 1 mile of space between them.	$ 31,294	-	?	3.13
ATPL28	Academy	Unincorporated	Shaw Ave	SR 168	Signs and Markings Improvement	Install additional markings/signs, especially near intersections and conflict zones or with no more than 1 mile of space between them to increase driver awareness and visibility of cyclists.	$ 42,200	-	R32PB	4.22
ATPL29	Academy	Unincorporated	Shaw Ave	E California Ave	Signs and Markings Improvement	Install additional markings/signs, especially near intersections and conflict zones or with no more than 1 mile of space between them to increase driver awareness and visibility of cyclists.	$ 59,322	-	?	5.93
ATPL3	Manning	Reedley	N Columbia Ave	S Buttonwillow Ave	Class IV	Road diet to a 3 lane road with center turn pocket. Install Class IV bikeways and close the gap between existing bikeways.	$ 370,616	Provides a primary route to several Reedley Schools: Reedley High School, Lincoln Elementary School, General Grant Middle School, St La Salle School, Silas Bartsch School	R14, R33PB	0.49
ATPL30	Manning	Reedley	Proposed Class II East of North Reed Avenue	North Carolina Ave	Buffered Class II	Upgrade existing Class II to Buffered Class II Bicycle Lane for additional separation from vehicle traffic. Include conflict markings in conflict zones along segment.	$ 148,951	-	R32PB	0.85
ATPL31	Academy	Parlier	E South Ave	Manning Ave	Class IV Bikeway	Install Class IV Bikeway for low stress connectivity along Academy to connect to low stress residential streets to the East through Parlier.	$ 748,977	John C Martinez Junior High School to the east of Academy.	R33PB	0.999
ATPL4	Manning	Reedley	S Buttonwillow Ave	S Zumwalt Ave	Class IV Bikeway	Install a Class IV Separated Bikeway or a Class I Path. Connect the proposed Class II to the eastern limits of Reedley, to S Zumwalt Ave where Silas Bartsch K-8 school is located a block south of the intersection.	$ 370,494	Manning is one of few routes to Silas Bartsh Middle School, located 1/4 mile south of the corridor	R33PB	0.49
ATPL5	Academy	Kingsburg	SR 201	Kamm Ave	Class I Shared-Use Path	Class I will provide safer bike & ped connections to Rafer Johnson Jr High School, especially as the North Kingsburg Specific Plan is implemented. Ensure adequate traffic calming measures are implemented to slow speeds along this segment.	$ 1,014,147	Rafer Johnson Jr High School is located along the route	R32PB	1.01
ATPL6	Academy	Unincorporated	Kamm Ave	E Mountainview Ave	Buffered Class II	Fill the gap between the Existing Class III (Proposed Buffered Class II) route to the south and the existing Class II to the north.	$ 170,971	-	R32PB	0.98
ATPL7	Academy	Sanger	E Central Ave	Annadale Ave	Buffered Class II	Road diet and install buffered Class II bike lanes. Close the gap between the existing Class II facilities south of North Ave and the existing Class III (proposed Class IV) north of 11th.	$ 86,482	Route provides access to Washington Academic Middle School and Lincoln Elementary School, located 1/3 mile west of the corridor	R33PB, R14	0.49
ATPL8	Academy	Sanger	Church Ave	E Switch Ave	Buffered Class II	Replace existing Class III bikeways. Upgrade the wide roadway with Class II bikeways with a buffer.	$ 110,787	-	R32PB	0.63
ATPL9	Academy	Sanger	Lime Ave	North Ave	Buffered Class II	Extend the existing Class II (upgrade to Buffered Class II)past the commercial area and up to the intersection and the proposed Class II. Add additional signage and markings entering segment at Academy & Central Ave to improve motorist's awareness of bicyclists.	$ 27,255	-	R33PB	0.16

Table 9-2. Active Transportation Recommendations

ID	Project Corridor	Jurisdiction	Begin/Cross Street	End	Recommendation	Recommendation Notes	Cost Estimate	SR2S	LRSM CM Code	Length
ATPP1	Manning	Parlier	S Mendocino Ave	-	Crossing Improvements	Update with high visibility crosswalks and expand existing median refuges to be longer and wider. Install advance stop bars. (All four legs)	$ 22,200	-	See NS21PB, S20PB, See NS19PB	-
ATPP10	Academy	Sanger	5th St	-	Curb extensions, high visibility crosswalks, & bike boxes	Install curb extensions and high visibility crosswalks. Install bike boxes to facilitate left turns and improve visibility of bicyclists at the intersection.	$ 29,600	Key route to many Sanger schools	See NS21PB, S20PB	-
ATPP12	Academy	Sanger	Church Ave	-	Crosswalk	Install three high visibility crosswalks and study feasibility of a new signal to connect pedestrians walking to destinations along the west side of Academy.	$ 5,400	Key route to many Sanger schools	NS21PB	-
ATPP13	Academy	Sanger	Jensen Ave	-	Crosswalk	Upgrade crosswalks to high visibility markings.	$ 5,400	Key route to many Sanger schools	See NS21PB	-
ATPP14	Academy	Sanger	9th St	-	Bike Boxes	Install bike boxes and conflict zone markings on proposed buffered bikeways.	$ 16,400	Key route to many Sanger schools	S20PB	-
ATPP15	Academy	Sanger	12th St	-	Curb Extensions & Ramps	Replace raised curbs with ADA compliant curb ramps and repair the sidewalk on the northwest corner.	$ 41,300	Key route to many Sanger schools	See NS21PB	-
ATPP16	Manning	Reedley	I St (485 ft east)	-	Crosswalk	Install a high visibility crosswalk with RRFB for pedestrians crossing between Reedley College and the strip commercial.	$ 326,800	Crossing to Reedley College	NS21PB, NS22PB	-
ATPP17	Manning	Reedley	N East Ave	-	Crossing Improvements	Upgrade existing crosswalk to high visibility markings, install curb extensions on the north and south sides of the west leg.	$ 12,600	Provides direct access to St La Salle School. Located along an arterial route to Lincoln Elementary School and General Grant Middle School, 1/4 mile south of Manning	NS21PB, NS22PB	-
ATPP18	Manning	Reedley	San Joaquin Cir	-	Crosswalk	Install marked crosswalk and RRFB.	$ 326,800	Provides direct access to Reedley High School and its recreation facilities	NS21PB, NS22PB	-
ATPP19	Manning	Reedley	Del Altair Ave	-	Curb Extensions & Ramps	Install curb extensions at all four corners.	$ 18,000	-	NS21PB	-
ATPP2	Manning	Reedley	I St	-	Bike Boxes	Install bike boxes for left turning bicyclists on west, east and north legs of the intersection.	$ 3,300	Adjacent to Reedley College	S20PB	-
ATPP20	Manning	Reedley	N Frankwood Ave	-	Curb Extensions & Ramps	Install curb extensions for crossing pedestrians and traffic calming.	$ 18,000	Reedley High School is one block away	See NS21PB	-
ATPP21	Manning	Reedley	Buttonwillow Ave	-	Crossing Improvements	Install advanced stop bars and median refuge islands on all legs of this wide intersection.	$ 15,000	-	NS19PB	-
ATPP22	Academy	Unincorporated	Bridge over Friant-Kern Canal (300 feet north)	-	Signage	Install "Share the Road" Signs.	$ 1,000	-		-
ATPP23	Academy	Unincorporated	Bridge over Friant-Kern Canal (300 feet south)	-	Signage	Install "Share the Road" signs.	$ 1,000	-		-
ATPP3	Manning	Reedley	N Reed Ave (575 feet west)	-	Crosswalk	Install a midblock crosswalk with a pedestrian hybrid beacon for people crossing from Reedley College on the north side of the street to the dining options and other amenities on the south side of the street.	$ 100,000	Crossing to Reedley College	NS20PB	-
ATPP4	Academy	Unincorporated	SR 180 (E Kings Canyon Rd)	-	Crossing Improvements	Install median refuge islands on all legs of the intersection.	$ 12,000	-	See NS19PB	-

Table 9-2. Active Transportation Recommendations

ID	Project Corridor	Jurisdiction	Begin/Cross Street	End	Recommendation	Recommendation Notes	Cost Estimate	SR2S	LRSM CM Code	Length
ATPP5	Academy	Kingsburg	Union St	-	Crossing Improvements	Install high visibility crosswalks on the north, east, and west legs of this intersection.	$ 5,400	Route to Rafer Johnson Jr High School	NS21PB	-
ATPP6	Academy	Kingsburg	Tulare St	-	Crossing Improvements	Install high visibility crosswalks on all legs.	$ 7,200	Route to Rafer Johnson Jr High School	NS21PB	-
ATPP7	Academy	Sanger	7th St	-	Curb Extensions & Bike Boxes	Curb extensions exist on the west side of the west leg, install curb extensions on all legs for pedestrians accessing downtown via 7th street. Install bike boxes on the north, south, and east leg.	$ 16,800	Key route to many Sanger schools	See NS21PB, S20PB, R33PB	-
ATPP24	Academy	Sanger	Church Ave (east leg of Church)	-	Crossing Improvements	Install high visibility crosswalk across Academy Ave with RRFB, and advance yield markings/signage to connect land uses on east and west sides of Academy Ave.	$ 78,300	Jackson Elementary School to the west of Academy and Wilson Elementary School to the southeast of Academy.	NS21PB, NS22PB	-
ATPP25	Academy	Kingsburg	Kamm Ave	-	Crossing Improvements	Install high visibility transverse crosswalks and RRFB on south and east legs, with advance stop markings and signage on all approaches to provide connectivity and increase motorist awareness of stop and active transportation users.	$ 155,100	Rafer Johnson Junior High School to the South	NS21PB, NS22PB	-
ATPP26	Academy	Kingsburg	Stroud Ave	-	Crossing Improvements	Install high visibility transverse crosswalks and RRFB on north and east legs, with advance stop markings and signage on all approaches to increase motorist awareness. Connects proposed Class I to residential use and school.	$ 155,100	Adjacent to Rafer Johnson Junior High School	NS21PB, NS22PB	-
ATPL32	Manning	Fowler	Golden State Blvd	Vineyard Pl	Buffered Class II	Install buffered Class II bicycle facilities extending to Vineyard Pl.	$ 22,750	-	R32PB	0.13
ATPP27	Manning	Fowler	Vineyard Pl	-	Crossing Improvements	Upgrade existing crossings to high visibility markings to improve visibility of intersection and crossings.	$ 3,600	-	NS21PB	-

Transit Recommendations

Offering safe, affordable, and attractive public transit is an important strategy to reduce VMT, improve air quality, and improve equitable transportation options for transportation-disadvantaged residents. Due to the study area's low density and spatially dispersed development as well as its high utilization of carpooling and dial-a-ride services, this study's transit recommendations focus largely on programmatic recommendations. A strong, coordinated network of other mobility services, including demand response services, vanpools, social service transportation, as well as walking and biking, supplements limited fixed route service in rural Fresno County. Recommendations to expand or improve these services are included here. In addition to these strategies, FCRTA should continue to monitor fixed route service to ensure that it continues to meet the diverse needs of rural Fresno County residents.

Active Transportation

Transit recommendations and active transportation recommendations should be complimentary and implemented simultaneously to maximize mobility benefits for all commuters who do not travel in a single-occupancy motor vehicle. Sidewalks and bike facilities should provide a first and last mile connection to transit. On-board bicycle storage should be included with all existing and future buses. Bike storage and e-bike charging stations should be placed at or near transit stops.

Vanpooling

This study recommends the County and its incorporated cities continue to strengthen vanpooling services as a supplement to existing bus service. Monthly fares should be kept low through public-private partnerships and other federal and local funding to supplement fare costs for riders. In the past, partnerships with universities, hospitals and other large regional employers have helped to supplement costs, along with Measure C funds. Improving and maintaining the vanpool program can also be achieved through implementation of multiple strategies, such as expanding education and marketing; continuing to provide and develop resources to find vanpools through the Valley Rides program; and regularly evaluating and addressing transportation needs by hiring a Countywide Mobility Manager.

Safety, Accessibility, and Comfort

Transit facilities should be safe, accessible, and comfortable. Facilities should be setback a safe distance from the curb and provide shade and protection from rain and other weather. Lighting can provide a sense of safety and deter crime. Additionally, other Fresno County transit studies and plans recommend installing security cameras at bus stops to monitor and deter crime. Facilities should also be ADA compliant.

Education and Marketing

The 2015 Fresno County Transportation Gap Analysis and Service Coordination Plan found there is a relatively high awareness of public transit services among transportation-disadvantaged individuals; however, it is largely based on word of mouth and information conveyed by drivers. Within the County and particularly among transportation disadvantaged individuals, there is a desire for better sources of information, such as printed schedules, bus stop information displays, online information, and information provided by social service agencies. However information is provided, it should be multi-lingual to reach individuals with limited English proficiency. Expanded information should make services

easier to understand and access for all County residents and travelers. A Countywide Mobility Manager could also play a facilitator role in an educational campaign.

Emerging Technology

Emerging transportation technologies related to electrification, automation, ridesharing, and big data are rapidly transforming the way people use transportation. As these technologies continue to emerge and evolve, the County and the project area cities should stay abreast of the latest trends and their implications for land use and transportation planning and policy decisions. Feedback from the community shows Fresno County residents wish to see electric buses and electric ridesharing vehicles.[10] As autonomous vehicles become more affordable and easier to obtain, they may improve the efficiency and convenience of ridesharing services by using big data to connect commuters to each other and to the most direct route to their destination. Currently, ride-hailing services such as Uber and Lyft compensate for limited fixed route transit service in the project area, especially during evenings and weekends. A community-based rideshare program could be implemented to replace or supplement Uber and Lyft to meet rural County ride-hailing needs while also keeping profits of the program in the hands of the community. This study recommends the County continue to monitor findings from other California communities that have received pilot funding for such a program, like Huron, Cantua Creek and El Porvenir. A long-term vision for a community-based ridesharing program would be to improve safety and convenience, reduce vehicle emissions, and reinvest profits of the program back into the County.

Programmatic Recommendations

Speeding

Speeding is a systemic issue along the Manning and Academy corridors, which can lead to crashes when a motorist does not have enough time to react to a red light, stop sign, or other vehicles or obstacles in their path of travel. Decreased speed zones within cities should be implemented and where they exist already, greater compliance is needed. Strategies to encourage greater compliance of speed limits include traffic calming infrastructure, installing advanced warning signage of reduced speeds ahead, installing radar feedback signs with the posted speed limit, and educational campaigns that may include signage or other print or radio media. The County and local jurisdictions may also wish to implement roundabouts at intersections near city limits where speeds are reduced, which require vehicles to reduce their speed through an intersection, opposed to a signalized intersection, that, when green, allows a driver to maintain his current speed. Roundabouts also reduce potential conflict points compared to an all way stop or signalized intersection.

Driving Under the Influence

Addressing challenges related to alcohol-impaired driving requires a multi-pronged approach. County and local governments should take steps to reduce or limit alcohol availability, including the number of locations and time of day when it may be sold. Sobriety checkpoints should be conducted regularly, along with widespread publicity to promote awareness of the enforcement as well as the dangers of

[10] See Fresno County Regional Long-Range Transit Plan for more details.

driving under the influence. This study also recommends the County, along with local jurisdictions, establish an impaired driving task force to develop a comprehensive and achievable strategy to reduce impaired driving within the Eastside Study area.

Road Safety Sign Audit (RSSA)

Performing a Road Safety Sign Audit (RSSA) of the Manning and Academy corridors will allow the County and project area cities to identify insufficient or outdated signage. The RSSA inventories regulatory and warning signs along the corridors and gathers information including locations, types, sizes, and conditions of signs. Following the inventory, signs should be added or replaced and should be compliant with the California Manual on Uniform Traffic Control Devices.

Monitor Rural Conditions

The County should continue to monitor rural conditions to identify challenging conditions for rural residents. Key conditions to monitor include:

- **Needs for Transportation Disadvantaged Residents:** Throughout the Eastside Study area, much of the community is designated as low-income or disadvantaged, with multi-lingual needs, and limited access to vehicles compared to Fresno City and other more urbanized areas.
- **Needs for Bicyclists and Pedestrians:** As the mode share of active transportation continues to grow, the County and project area cities should continue to monitor the conditions and availability of bicycle and pedestrian facilities and amenities.
- **Safety for all Modes:** Rural roads face unique safety challenges and the Eastside Corridor is no exception. To continue to address safety issues, the County and local jurisdictions should regularly monitor safety data for collision hot spots and trends that should be addressed.

Countywide Mobility Manager

In concurrence with the Fresno County Regional Long-Range Transit Plan, this study recommends establishing a Countywide Mobility Manager to provide an institutional framework for coordinating and implementing recommendations identified here and in other related transportation plans. Fresno County meets its mobility needs through a diverse network of public transit, vanpooling, ride hailing, ridesharing services. Establishing a Countywide Mobility Manager would help to enhance the quality of mobility services going forward and ensure progress that has already been made is preserved. If funding is not available to create a new position, FCOG may consider hiring interns to work on mobility projects until a full-time staff member can be funded. Ultimately, the Mobility Manager would oversee a team of four to six local community Mobility Managers who would oversee the coordination of each program.

Education and Encouragement for Active Transportation

Increasing the use of active transportation is important for the County and local jurisdictions to achieve several goals related to physical and environmental health. Active transportation programs should

improve safety and encourage people to walk and bike more frequently. Possible active transportation programs include:

- **May is Bike Month:** National Bike Month occurs in May. Fresno County participates in the Central Valley Bike Month. Continue to participate in, and expand Fresno County's participation in Bike Month activities. Encourage Bike Month activities that specifically involve rural community members.
- **Streetsmarts Campaign:** A Streetsmarts campaign uses print and digital media, radio, and television to educate the community about safe driving, bicycling, and walking behavior.
- **Social Walks and Rides:** People who may be uncomfortable walking or biking alone or unfamiliar with local routes will benefit from riding in a group to a common destination. Group walking and riding can create informal education opportunities about safe walking and biking practices and foster social connections between community members.
- **Local Partnerships:** Partner with local community groups like the Fresno County Bicycle Coalition to identify possible funding opportunities and develop educational and encouragement programs that are appropriate for the region.

Climate Change Adaptation Recommendations

Adaptation measures to increase the Eastside Corridor's climate change resilience are included in this section. Chapter 6 presents this study's findings on the Eastside Transportation Corridor's climate change preparedness and vulnerability to impacts from increasing temperatures, precipitation, and wildfires. To recap, vulnerability scores are based on the combination of potential impacts from climate hazards and adaptive capacity. These scores help to identify the climate vulnerabilities to address with additional adaptation strategies. Vulnerability is assessed on a scale from one to five:

- 1: Minimal Vulnerability
- 2: Low Vulnerability
- 3: Moderate Vulnerability
- 4: High
- 5: Severe

As shown in Table 6-7, the corridors are most vulnerable to increasing temperatures, and less vulnerable to wildfire and variable precipitation. The results indicate that adaptive measures focused on addressing increased temperature on the corridors should be prioritized first, followed by wildfire and variable precipitation. Additionally, these measures should be compared with measures being developed for the FCOG Fresno County Regional Transportation Network Vulnerability Assessment, once released, to ensure consistency.

Climate adaptation recommendations are organized into three categories: temperature, precipitation, and wildfire, which correspond with the assessment presented in Chapter 6.

Temperature

Increase proactive maintenance of corridor to decrease degradation

Given that pavement condition is expected to deteriorate at a faster rate under temperature changes (rutting in high temperatures and potholes in cold temperatures):

- Monitor the maintenance costs and pavement conditions every 5-years over the lifetime of the corridors.
- Track pervasive maintenance and repair issues.

During routine pavement rehabilitation or maintenance, replace current pavements with a new pavement binder grade mix that can withstand projected changes in temperatures

- Select pavement with binder grade that can withstand projected temperature changes through the end of estimated pavement lifespan.
- Consider utilizing cooler pavements (e.g., light-colored aggregate) to reduce surface temperatures.

Maintain and improve safety conditions for employees who work long hours outdoors maintaining and repairing the corridors

- Train existing personnel on the potential climate change impacts and risks of extreme heat on the corridors and themselves.
- Review current safety protocols and practices and revise using the Occupational Safety and Health Administration (OSHA) heat index guidance[11] such as:
    - Revising the construction season to start earlier and end later due to increased temperatures
    - Shifting construction work to early morning and evening hours in the height of summer
    - Monitoring employee health when working in hot conditions

Precipitation

Reduce risk of corridor flooding and inundation

- Monitor the maintenance costs and pavement conditions following heavy storm events to assess potential need for:
    - Installing pumps to keep flood waters off the surface of the road
    - Installing additional culverts or increasing culvert capacity
    - Installing flood barriers to keep flood waters off the road
- Encourage natural infrastructure interventions such as allocating open space near roadways for natural habitat and flood water retention, which can mitigate flash flooding and accelerate water infiltration into the soil.

Improve response during and following a flooding event

- Develop a plan for maintenance of traffic during weather events of various intensities (including non-severe, recurrent weather) such as providing detours and wide area communications to support adequate traveler information.
- Generate plans for maintenance or asset management activities following heavy rain events.
- Create after-event reports that assess what worked and what did not, revising plans based on lessons learned.
- Increase cost tracking to respond to specific extreme weather events and consider establishing a "rainy-day" fund for unexpectedly bad years.

[11] OSHA Using the Heat Index: A Guide for Employers https://www.osha.gov/SLTC/heatillness/heat_index/. This guide is advisory, not a standard or regulation.

Wildfire

Improve traffic flows for evacuation

- Improve communications with the public and travelers regarding evacuation routes and dangers of wildfire smoke decreasing visibility.
- Consider changes to asset design to accommodate evacuations (road widening).

Increase safety conditions for employees during wildfire events

- Monitor air quality levels and cancel non-essential maintenance activities in hazardous conditions.
- Provide N95 or P100 respirators when maintenance or operational support is required in the event of a wildfire.

10. Performance Assessment

The performance metrics selected for the ETCIS informed each of the six Smart Mobility Framework objectives to ensure the resulting improvement recommendations provide a balanced, sustainable, and multimodal assessment of current and forecasted corridor conditions. The Smart Mobility Framework is described in detail in the Study Approach section in Chapter 2.

Using these tools to measure effectiveness, the following quantitative and qualitative performance analyses are summarized below and presented in the following sections:

- Safety
- Induced Demand/Bicycle Mode Shift
- Multimodal Connectivity/Level of Traffic Stress
- Vehicle Operations
- Air Quality
- Environmental Justice and Social Equity
- Economic Development
- Plan and Policy Consistency and Community Support

Additional detail on the employed methodologies can be found in the appendix that accompanies this report.

Safety

This collision reduction benefit calculation utilized the methodology described in the Highway Safety Manual, 1st Edition (AASHTO 2010). Crash modification factors (CMFs) from the California Local Roadway Safety Manual (version 1.5, April 2020) were utilized to estimate the reduction in collisions resulting from the implementation of the recommended improvements. Historical collision data was gathered for the years 2015-2019 from Statewide Integrated Traffic Records System (SWITRS). As shown in Table 10-1, the recommended improvements across both corridors will reduce the estimated number of fatal collisions by nine, injury collisions by 210, and property damage only (PDO) collisions by 190.

Table 10-1. Collision Reduction Summary

Improvement Category	Corridor	Locations	Collisions Reduced		
			Fatal	Injury	PDO
Motorized Improvements	Motorized Improvement Subtotal		8	174	190
	Academy	Intersections	2	57	36
		Segments	2	22	18
	Manning	Intersections	0	42	48
		Segments	4	53	88
Bicycle and Pedestrian Improvements	Bike/Pedestrian Improvement Subtotal		1	36	0
	Academy	Intersections	0	7	0
		Segments	1	15	0
	Manning	Intersections	0	1	0
		Segments	0	13	0
Grand Total			**9**	**210**	**190**

A limitation of this analysis is the collision data do not yet reflect the changes that would be expected as a result of any of the projects that were recently completed prior to this study, particularly at high-crash intersections along Manning Avenue. If the crash modification factors of recently completed improvement projects were factored into this analysis, it is expected that the collision reduction for the Manning and Academy corridors would be even greater.

Induced Bicycle Demand

Based on the research cited in National Cooperative Highway Research Program (NCHRP) Report 552, *Guidelines for Analysis of Investment in Bicycle Facilities*, the bicycle facilities proposed in The ECTIS, may result in induced demand for the new facilities among both existing and new bicyclists. The methodology describes an approach for estimating the induced demand associated with a given bicycle facility improvement and translates the projected increase in demand to monetized benefits related to mobility, health, recreation, and decreased auto use. The following sections describe the application of the NCHRP 552 methodology in this study, and the anticipated benefits in terms of induced demand for bicycle facilities between both existing and new bicyclists, and the annualized monetized benefits associated with the estimated increase in bicycle demand.

Methodology

To estimate the induced demand benefits associated with the bicycle improvements proposed in The ECTIS, the project team utilized the NCHRP 552 methodology, as well as Census population and commute pattern data, and NHTS average trip length estimates.

The NCHRP 552 methodology[12] is centered on several assumptions:

[12] NCHRP Report 552, Appendix A

1. Existing Bicyclists near a new facility will shift from the existing nearby facility to the new facility.

2. The new facility will result in induced number of bicyclists as a function of the number of existing bicyclists, relative to the attractiveness of the proposed facility (i.e. Class I shared-use path vs. Class II bicycle lanes).

3. People are more likely to ride a bicycle if they live within 1.5 miles of a facility than if they live outside that distance.

The methodology suggests that existing bicycle rates can be utilized to estimate the number of existing and future bicycle ridership based on low, moderate, and high estimates of existing bicycling rates, the population within 1.5 mile, 1 mile, and 0.5 mile buffers surrounding a facility, and likelihood multipliers for each distance.13 As stated, the closer an individual lives to the new facility, the greater the likelihood they will utilize the facility. Those who live within 0.5 miles of a new facility are the most likely to shift modes to access the facility, or shift from an existing facility to using the new facility.

To project the existing and future bicycling demand in study area, the existing population near the proposed improvements was estimated using 2018 American Community Survey (ACS) population estimates by Census block group and the distance buffers described previously. Each buffer area—at 0.5, 1 and 1.5 mile distances from the proposed bicycle improvement are created using a network-based analysis in a GIS environment. The buffers are utilized in conjunction with the Census block group population estimates to estimate the population within each buffer area. Using the NCHRP 552 methodology, existing bicycling rates are applied to the estimated population of existing bicyclists to project the induced demand associated with the proposed improvements. Additional details describing this approach are provided in Appendix G.

Induced Bicycle Demand

Using the population estimated near each proposed facility segment, as well as bicycle commute share estimates, and the NCHRP 552 methodology, induced demand associated with the bicycle facilities proposed within the study area is estimated. Induced demand was analyzed independently for separated facilities (Class I shared-use paths and Class IV bikeways) and on-street facilities (Class II bicycle lanes) because according to the NCHRP 552 methodology, the anticipated mobility benefits associated with different facility types are not the same. These results are provided in Table 10-2, and the full analysis results are presented in Appendix G.

Shown in Table 10-2, the estimated increase in bicycle demand associated with the proposed facilities ranges from 1,572 total new bicyclists based on the low bicycling rate estimates, and 2,835 total new bicyclists based on the high bicycling rate estimates. As seen, induced bicycle demand is expected to result from the proposed Class II facilities compared to separated facilities. This does not necessarily suggest that higher densities of population surround Class II facilities, or that it is a comparatively better facility based on these metrics. Because there are more Class II bicycle facilities proposed throughout the study area, the facility is located in a greater number of locations, which results in higher existing population amounts identified as near the facility. With induced demand estimates based the

[13] NCHRP Report 552, Appendix B.

population near a given facility, this results in higher induced demand estimates for the proposed Class II facilities.

Table 10-2. Induced Demand Analysis

	Separated Facilities[1]	Class II Facilities[2]	All Facilities
Existing Population[1]			
Total Existing Population near Facility, 2400m	60,102	109,466	169,568
Total Existing Population near Facility, 1600m	40,989	69,288	110,277
Total Existing Population near Facility, 800m	16,734	30,908	47,642
Total Existing Population near Facility, 2400m	60,102	109,466	169,568
Bicycling Rates & Likelihood Multipliers by Buffer Distance			
Bicycle Commute Mode Share[2]	0.60%	0.60%	0.60%
Children Bicycle Percentage[3]	2.00%	2.00%	2.00%
Adult Bicycling Rate, High[4]	2.40%	2.40%	2.40%
Adult Bicycling Rate, Moderate[4]	1.12%	1.12%	1.12%
Adult Bicycling Rate, Low[4]	0.60%	0.60%	0.60%
Likelihood Multiplier, 2400m[5]	0.15	0.15	0.15
Likelihood Multiplier, 1600m[5]	0.44	0.44	0.44
Likelihood Multiplier, 800m[5]	0.51	0.51	0.51
Induced Demand Estimates Summary			
Total New Bicyclist Commuters[6]	214	376	590
Total New Adult Bicyclists (Non-Commuters)[7]			
High Estimate	610	1,074	1,684
Moderate Estimate	285	501	786
Low Estimate	152	268	420
Total New Child Bicyclists[8]	204	358	562
Total New Bicyclists[9]			
High Estimate	**1,027**	**1,808**	**2,835**
Moderate Estimate	**702**	**1,236**	**1,936**
Low Estimate	**569**	**1,003**	**1,572**

Notes:

[1] US Census population estimates within a given buffer distance from proposed facility. Greater numbers of the population is captured by the buffer distances surrounding Class II facilities, because a greater number of Class II facilities are recommended.

[2] American Community Survey (ACS) Commuting Characteristics for Fresno County, Ca, 5-Year Estimates, 2018

[3] National Household Transportation Survey (NHTS), 2017

[4] High Estimate Rate = .06% + 3(Census Bicycle Commute Mode Share); Medium Estimate Rate = 0.4% +1.2(Census Bicycle Commute Mode Share); Low Estimate Rate = Census Commute Mode Share

[5] Established by NCHRP 552 research; see Appendix B

[6] Sum of new commuter Bicyclists at each buffer distance

[7] Sum of new adult Bicyclists (non-commuters) at each buffer distances for low, medium and high estimate levels

[8] Sum of new child Bicyclists at each buffer distance

[9] Sum of total new commuter Bicyclists, total new child Bicyclists and total new adult Bicyclists (non-commuters) at high medium and low estimate levels

Vehicle Miles Traveled (VMT)

Induced bicycle demand can be measured in terms of the reduction in vehicle trips and vehicle miles traveled (VMT) associated with the proposed bicycle improvements using the methodology described

above. The number of trips and VMT reduction is calculated using the number of new bicycle commuters estimated using the NCHRP Report 552 methodology and the average person trip length (12.20 miles) reported by the 2017 National Household Transportation Survey (NHTS). Because the NCHRP 552 methodology uses new bicycle commuters to estimate decreased auto trips, trip and VMT reductions are annualized using the assumption that a working year is comprised of 47 weeks and 5 days per week to account for the typical work week and vacation time. The estimated VMT reduction can be utilized as an input to calculate air quality benefits using other methods, as well as provides another metric to use as a lens to view decreased auto use benefits associated with bicycle mode shift. These results are reported in Table 10-3. The VMT reduction reported herein is used to calculate the air quality benefits associated with proposed bicycle improvements, which is described in further detail the Air Quality section of this Chapter.

Table 10-3. VMT Reduction Benefits – All Facilities

	Separated Facilities	Class II Facilities	All Facilities
New Commuters	214	376	590
Daily Commute Trips [1]	427	752	1,179
Annual Commute Trips [2]	100,349	176,729	277,078
Average Trip Length [3]	12.20	12.20	12.20
Daily VMT [4]	**5,210**	**9,175**	**14,385**
Annual VMT [5]	**1,224,259**	**2,156,088**	**3,380,347**

Notes:
[1] Number of daily commuter x 2 commute trips per day
[2] Number of daily commute trips x 365 days per year
[3] 2017 National Household Transportation Survey (NHTS) Average trip length by Urban/Rural Indicator for average of Small Town, Suburban and Rural and 2010 Census division classification "Pacific"
[4] Daily commute trips x average trip length
[5] Annual commute trips x average trip length

Multimodal Connectivity and Level of Traffic Stress

While the quantitative benefits associated with active transportation improvements are assessed using induced bicycle demand, qualitative benefits of these improvements can be analyzed by examining improvements in multimodal connectivity along the Manning and Academy Avenue corridors. The LTS analysis presented herein incorporates Bicycle LTS methodologies as a proxy for all active transportation facilities. Connectivity benefits associated with the improvements recommended in this study are analyzed using the Bicycle Level of Traffic Stress (LTS) methodologies described in Chapter 6.

Roadway segments, intersection crossings and intersection approaches assigned LTS scores of one or two are considered lower stress, while LTS scores of three or four are considered higher stress. The following sections present the anticipated multimodal connectivity and level of traffic stress of the Manning and Academy Avenue corridors through the incorporated and unincorporated areas of the study area with the implementation of the recommended improvements, which is also referred to as “Future LTS.” Additional description of Bicycle LTS methodologies employed in this study area is provided in Appendix C.

Figure 10-6 and Figure 10-7 show the level of traffic stress anticipated in the future scenario with the implementation of the recommended improvements across the entire study area, while the next sections discuss the future scenario level of traffic stress results for the unincorporated and incorporated areas separately, as the context and connectivity needs are unique for each.

Unincorporated Areas

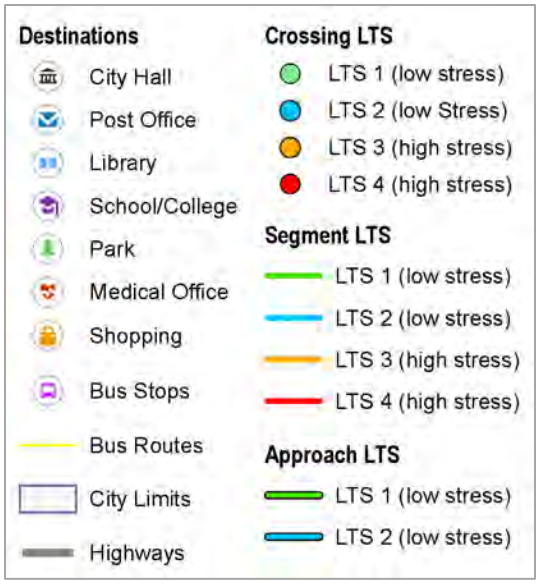
Within unincorporated areas, the goal is to lower traffic stress scores to at least LTS three, where feasible. To achieve this traffic stress improvement goal, where feasible, facilities proposed within incorporated areas include: buffered bicycle lanes, additional and more frequent signage and markings, advance warning signage and flashing beacons at intersections, and spot improvements to calm traffic, slow speeds and improve motorist awareness of bicyclists and pedestrians. Spot improvements should be implemented near conflict zones, major destinations, and transitions between unincorporated and incorporated areas.

While some of the more rural segments within the study area were assigned existing LTS scores of two due to lower traffic volumes, the majority was assigned high stress scores of LTS three or four due to higher traffic volumes and speeds (see Figure 6-16 and Figure 6-17). Without implementation of facilities that separate bicyclists and pedestrians from high-speed traffic (i.e., Class I shared-use paths and Class IV bikeways), low stress LTS scores of one or two are not possible along the unincorporated segments of Academy and Manning Avenues. That said, separated facilities along these relatively rural, low-density roadways may not be context specific and demand for these types of facilities along rural, unincorporated segments of the study area may be too low to warrant the improvement costs associated with separated facilities. Thus, feasibility due to the geographic context, low demand and funding constraints were a concern when lower stress, separated facilities were considered for recommendation along the unincorporated segments of the study area. However, the potential for increased demand and community support for low stress, separated facilities along or parallel to unincorporated routes should be further studied as rural Fresno County develops over time.

Incorporated Areas

As stated previously, within incorporated areas, the goal of this study is to provide recommendations that will connect the more densely populated points of interest in these locations by lowering traffic scores to LTS one or two, where possible. This will facilitate safe and comfortable connectivity for active transportation users of all ages and abilities in the locations where the demand for low stress connectivity is the highest. In particular, locations near schools, residential land use and those close to transit stops were identified for connectivity-based improvements that would result in the most comfortable and lowest stress experience feasible for the context.

Figure 10-1. Multimodal Connectivity and Level of Traffic Stress Legend



To provide low stress facilities in these areas, recommendations include but are not limited to Class I shared-use paths, Class IV bikeways, sidewalks, and high-visibility crossing improvements. Providing facilities such as Class I shared-use paths, sidewalks and Class IV bikeways will provide dedicated space for bicyclists and/or pedestrians that is separated from higher speed traffic along segments of roadway featuring roadway widths that facilitate higher traffic volumes.[14] Crossing improvements increase motorist awareness, calm traffic and/or slow speeds, and facilitate safe and comfortable crossing between areas with points of interest. Multimodal connectivity results for corridor segments in the incorporated areas encompassed by the study area are discussed in the following sections for each relevant incorporated jurisdiction.

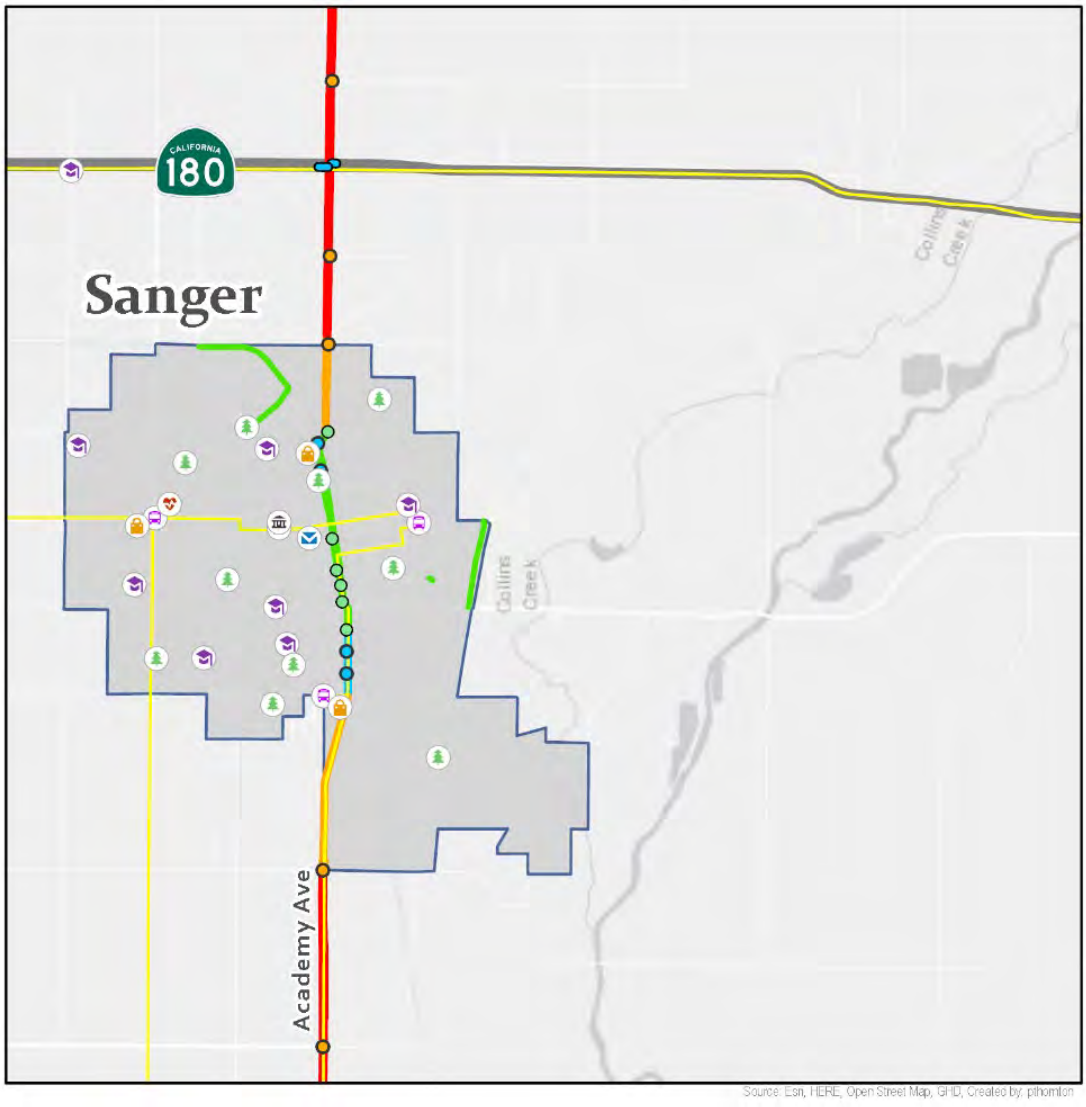
Figure 10-1 shows the legend each of the figures presented below, which depict the multimodal connectivity and future level of traffic stress results for the incorporated areas within the study area.

While the cities of Fowler and Selma are incorporated areas near or adjacent to the study area, these jurisdictions are not discussed in this section. Fowler is not discussed because only a small segment of Manning Avenue falls within the city's limits, with very few destinations in the area of the city the segment crosses into. Selma is not discussed, because the city is south of and does not touch or intersect either study corridor.

[14] In incorporated areas, speeds higher than 35 mph are considered LTS 3 (high stress). See the LTS criteria tables provided in Appendix C for roadway widths considered high stress in the various types of roadway infrastructure conditions.

Sanger

Figure 10-2. Multimodal Connectivity and Level of Traffic Stress - Sanger



Academy Avenue intersects the City of Sanger, north to south. Figure 10-2 shows the multimodal connectivity and level of traffic stress improvements associated with the study recommendations along Academy Avenue through the City. The improvements recommended along Academy Ave will allow for low stress connectivity between the destinations to the east and west of the corridor through Central Sanger, which is depicted in Figure 10-2.

As discussed in the existing conditions chapter, the full length of Academy Avenue through the City of Sanger is presently considered high stress.[15] With 4-5 lane roadways and speeds of 35-40 mph, the

[15] Existing LTS is shown in Figure 6-16 and Figure 6-17

resulting existing level of traffic stress along Academy Avenue in Sanger creates a barrier to connectivity between the destinations on either side of the study corridor through the entire City.

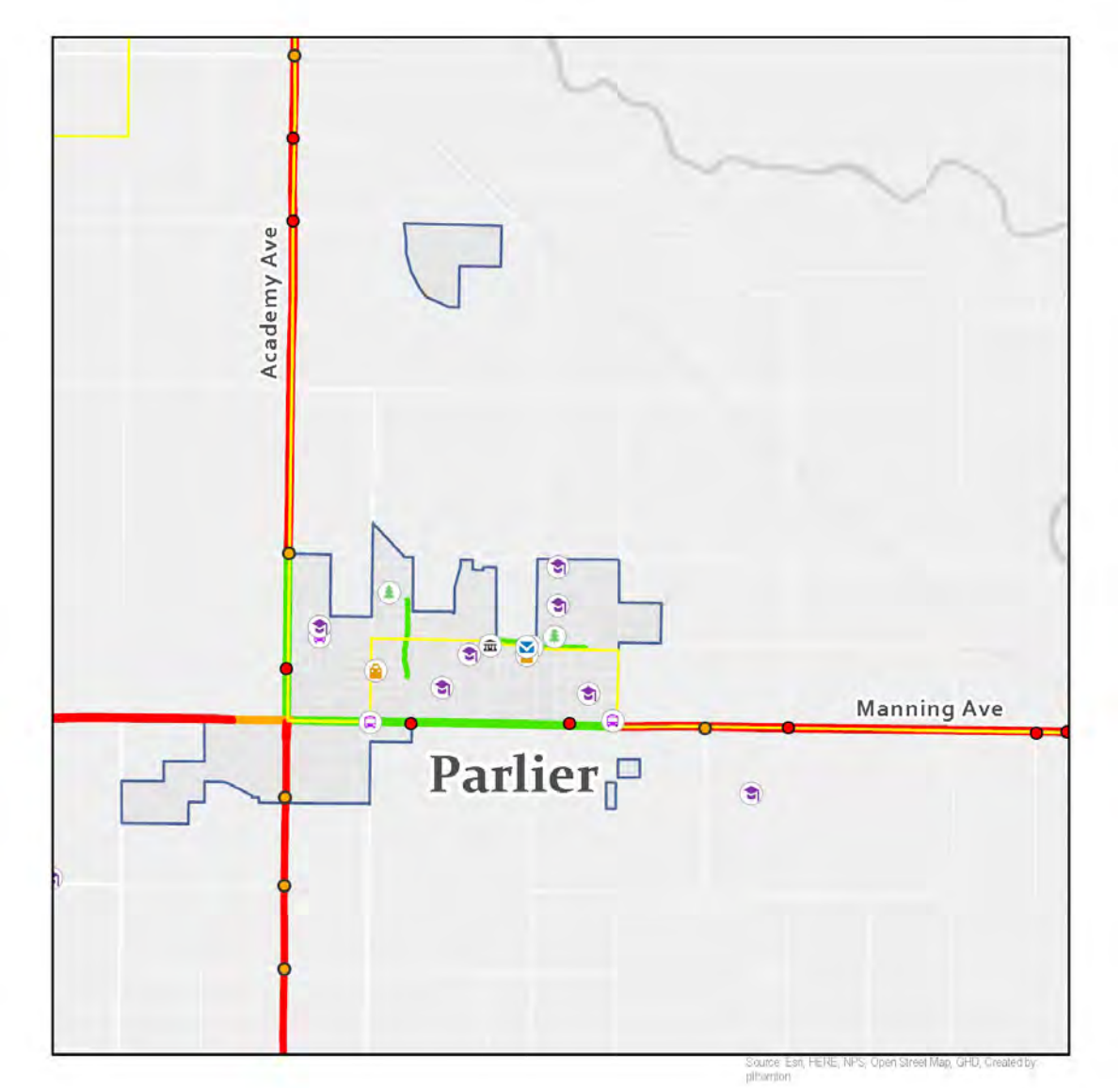
Destinations directly adjacent to the study area segment within the City consist of mostly commercial land use, including shopping, grocery stores, and restaurants. As seen in Figure 10-2, the local streets to the east and west of the Academy Avenue study area connect to multiple other destination types throughout the City. Transit routes run north/south and east/west within the City, one of which runs along Academy south of 9th Street through the City's southern limits. While there are no transit stops on Academy Ave within the City, a stop located a block to the west of the study area at North Ave/Sanger Ave.

The recommended bicycle and pedestrian enhancements in Sanger will improve the level of traffic stress and connectivity along and across Academy Ave. Between E Church Avenue and North Avenue, traffic stress will improve from LTS four (high stress) to LTS one and LTS two (low stress). By installing a mixture of Class IV, and Class II bicycle facilities, including segments of standard Class II and Class II buffered bicycle lane, separation between bicyclists and vehicles is increased and traffic stress is reduced.

A variety of crossing improvements will also improve crossing LTS along this segment by improving the visibility of active users. Improvements along this segment will remove the high stress barrier caused by existing roadway infrastructure and allow for low stress connectivity along and across Academy Avenue. North of E Church Ave to the northern city limits and South of North Ave to the southern city limits destinations are less concentrated and the context begins to change to more industrial and rural land uses. Traffic stress along these segments will improve from LTS four to LTS three before transitioning into unincorporated areas of Academy Avenue.

Parlier

Figure 10-3. Multimodal Connectivity and Level of Traffic Stress – Parlier



Academy and Manning Avenues both intersect the City of Parlier, with Academy Avenue running north to south and Manning Avenue running east to west. Figure 10-3 shows the multimodal connectivity and level of traffic stress improvements associated with active transportation improvements recommended along Academy and Manning Avenues within and adjacent to the City of Parlier.

Due to speeds of more than 50 mph and high traffic volumes along both Manning and Academy Avenues in Parlier, the existing level of traffic stress analysis resulted in stressful conditions along both roadways, which highlights the high-stress barrier to connectivity caused by the two study corridors.

Points of interest in Parlier, including destinations such as residential land use, shopping, parks, and several schools are concentrated to the east of Academy Avenue, and to the north of Manning Avenue. Transit routes run adjacent to the city's western limits along Academy Ave, along Manning Avenue for a short segment, through the city's local streets. There are several transit stops within the City, two of which are located on Manning Avenue.

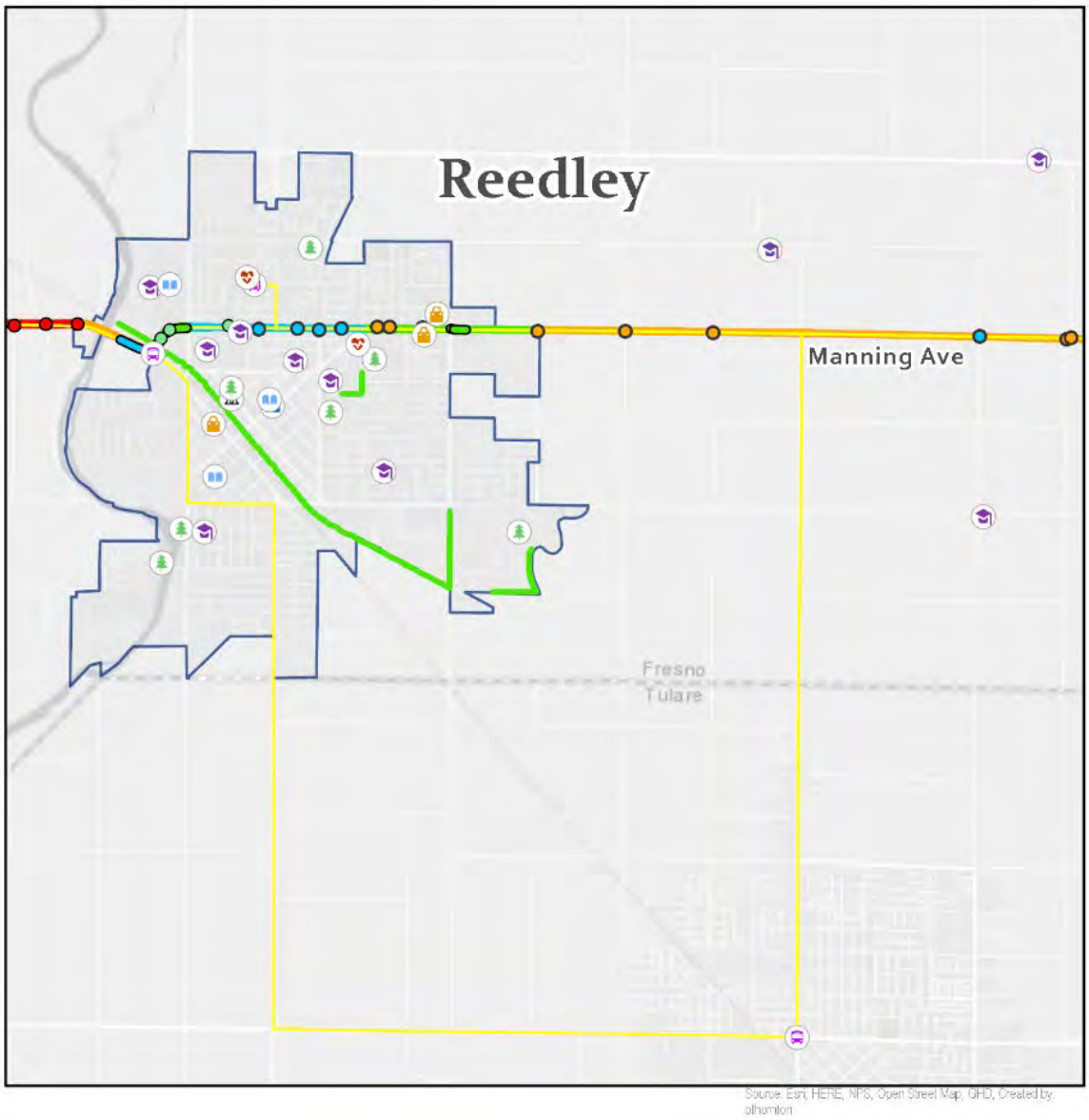
The recommended bicycle and pedestrian improvements will significantly improve traffic stress and multimodal connectivity in the City of Parlier. Because destinations in Parlier are concentrated the north of Manning, and east of Academy, improvement recommendations are more focused on improving low stress connectivity along the two study corridors, and less focused on improving the ability to cross the corridors. However, intersection improvements are recommended at S Mendocino Avenue/Manning Ave, which will improve pedestrian crossing conditions at the location by providing additional refuge space for active users crossing Manning Avenue and by improving intersection visibility with the installation of high visibility crossings and advance stop markings and signage.

By installing Class IV bikeways along both Manning and Academy Avenues in Parlier, traffic stress is reduced from LTS four to LTS one and low stress multimodal connectivity is improved along both study corridors. While Academy Avenue has existing sidewalk along the east side of the roadway through the City, which provides pedestrian connectivity along this route, there are sidewalk gaps along Manning Avenue. Sidewalk proposed along Manning Avenue will close gaps in pedestrian infrastructure and provide complete connectivity along the study area segment.

By connecting to the low stress, local streets of Parlier, the recommended improvements along Manning and Academy Avenues will close gaps in connectivity and provide more direct, low stress routes along both roadways.

Reedley

Figure 10-4. Multimodal Connectivity and Level of Traffic Stress - Reedley



Manning Avenue runs east to west, intersecting the City of Reedley. The multimodal connectivity and level of traffic stress improvements associated with the bicycle and pedestrian improvements proposed in this study are shown in Figure 10-4.

With multiple destinations types located to the north and south of Manning Avenue in Reedley, as shown in Figure 10-4, low stress active transportation conditions along this roadway are important in providing connectivity along and across Manning Avenue for both bicyclists and pedestrians.

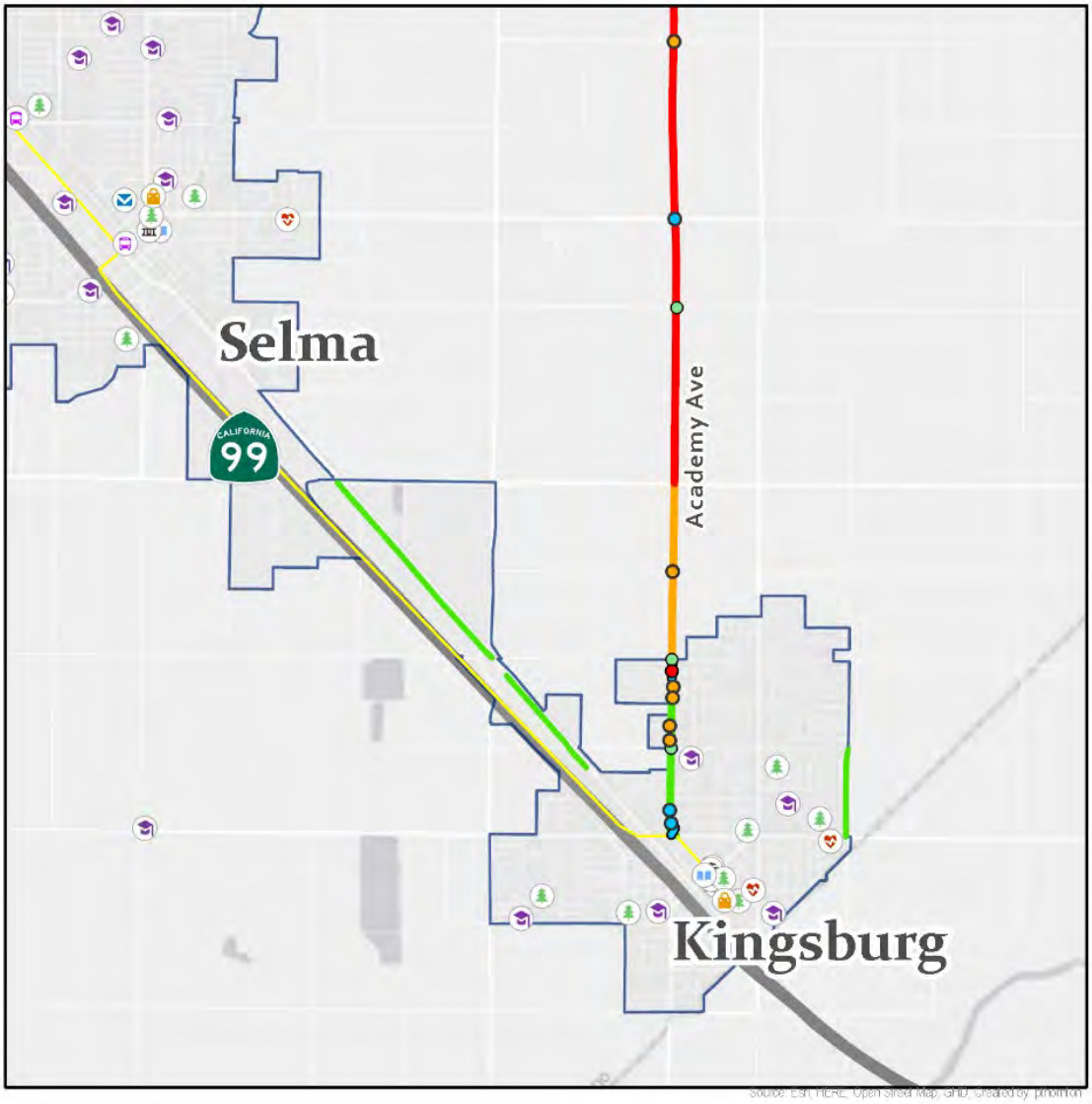
The majority of Manning Avenue in the City of Reedley is improved from LTS three or four to LTS one or two with the recommended improvements. A mixture of proposed Class II buffered bicycle lanes, Class IV bikeways and/or Class I shared-use facilities improve conditions along Manning Avenue. Proposed sidewalk will fill gaps in pedestrian infrastructure between concentrated points of interest. A segment of Manning Avenue entering the City from the west is improved to LTS three; however, there is an existing Class I path north of this segment, and existing sidewalk to the south of this segment.

Additionally, crossing improvements including new and improved crossing locations and crosswalk markings, and Rectangular Rapid Flashing Beacons (RRFB) or Pedestrian Hybrid Beacons (PHB) will reduce crossing stress for both bicyclists and pedestrians. Curb extensions and median refuge improvements will reduce crossing distances and make multi-lane streets easier to cross for pedestrians.

Together, these improvements will improve traffic stress and multimodal connectivity for both bicyclists and pedestrians in the City of Reedley by increasing separation from vehicle traffic, providing additional protected facilities along segments and at crossings, and reduce speeds with traffic calming.

Kingsburg

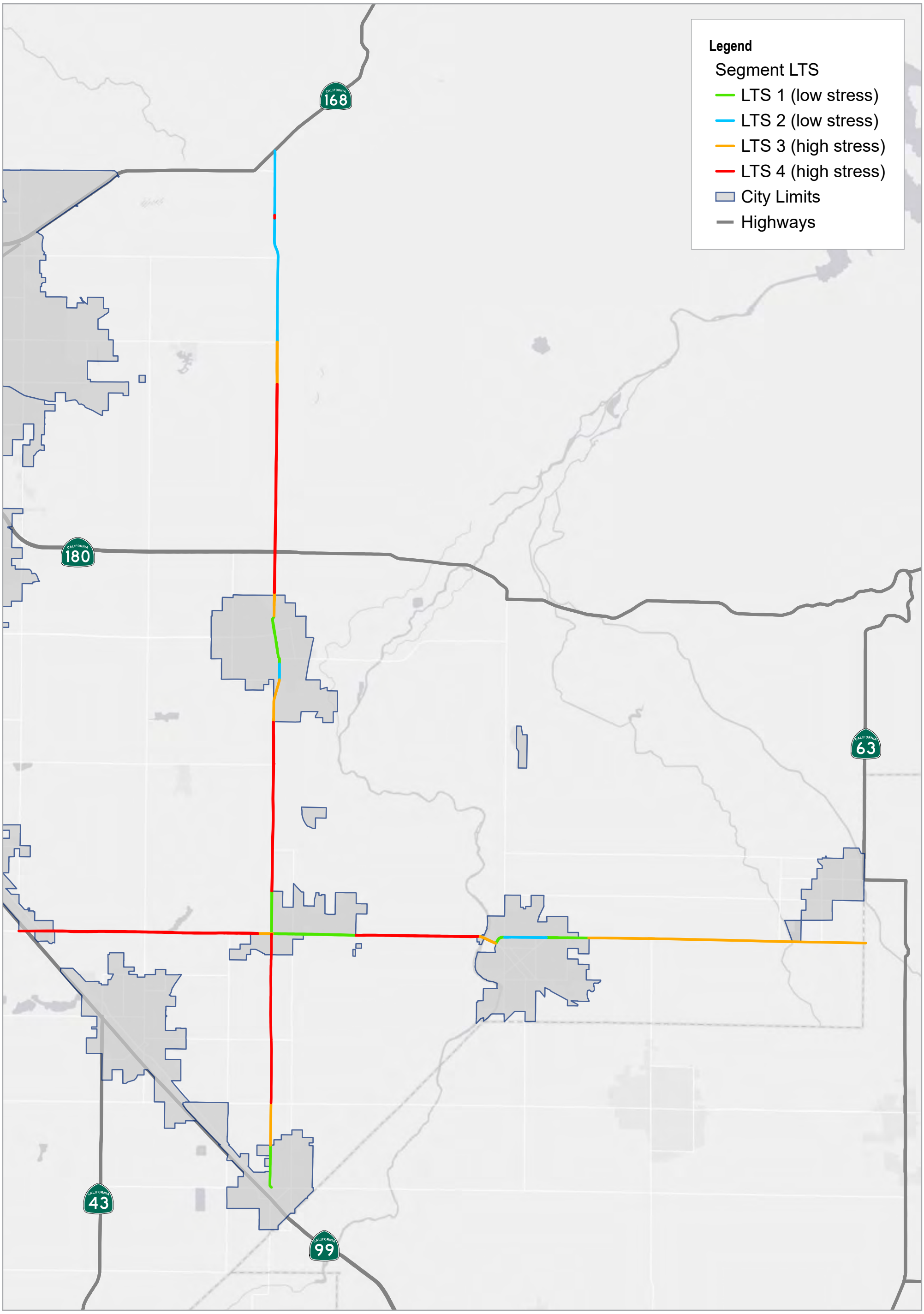
Figure 10-5. Multimodal Connectivity and Level of Traffic Stress - Kingsburg



The southern end of Academy Avenue runs north to south in the City of Kingsburg. Figure 10-5 presents the multimodal connectivity and level of traffic stress improvements associated with active transportation improvements along this segment of Academy Avenue within the City.

Points of interest in Kingsburg are more concentrated to the south of the study area segment, but residential land use and a few destinations such as parks and schools are located to the east. Recommendations to improve connectivity and traffic stress for this area include a Class I shared-use path along Academy Ave, and crossing improvements in several locations.

The class I shared use path provides low stress north-to south connectivity along the segment of Academy Avenue in Kingsburg with a path separated from vehicle traffic that connects to the low stress local streets of Kingsburg to the east. Coupled with crossing improvements at several intersections, the result is a low stress route that connects to Kingsburg destinations to the east of Academy Avenue and a more concentrated area of the City to the south of Academy Avenue's southern terminus.



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EASTSIDE TRANSPORTATION IMPROVEMENT CORRIDOR STUDY

GHD

Fresno Council of Governments
Eastside Transportation
Corridor Improvement Study

Bicycle LTS with Recommendations - Segments

Project No. 11210046
Revision No. -
Date JANUARY

Figure 10-6

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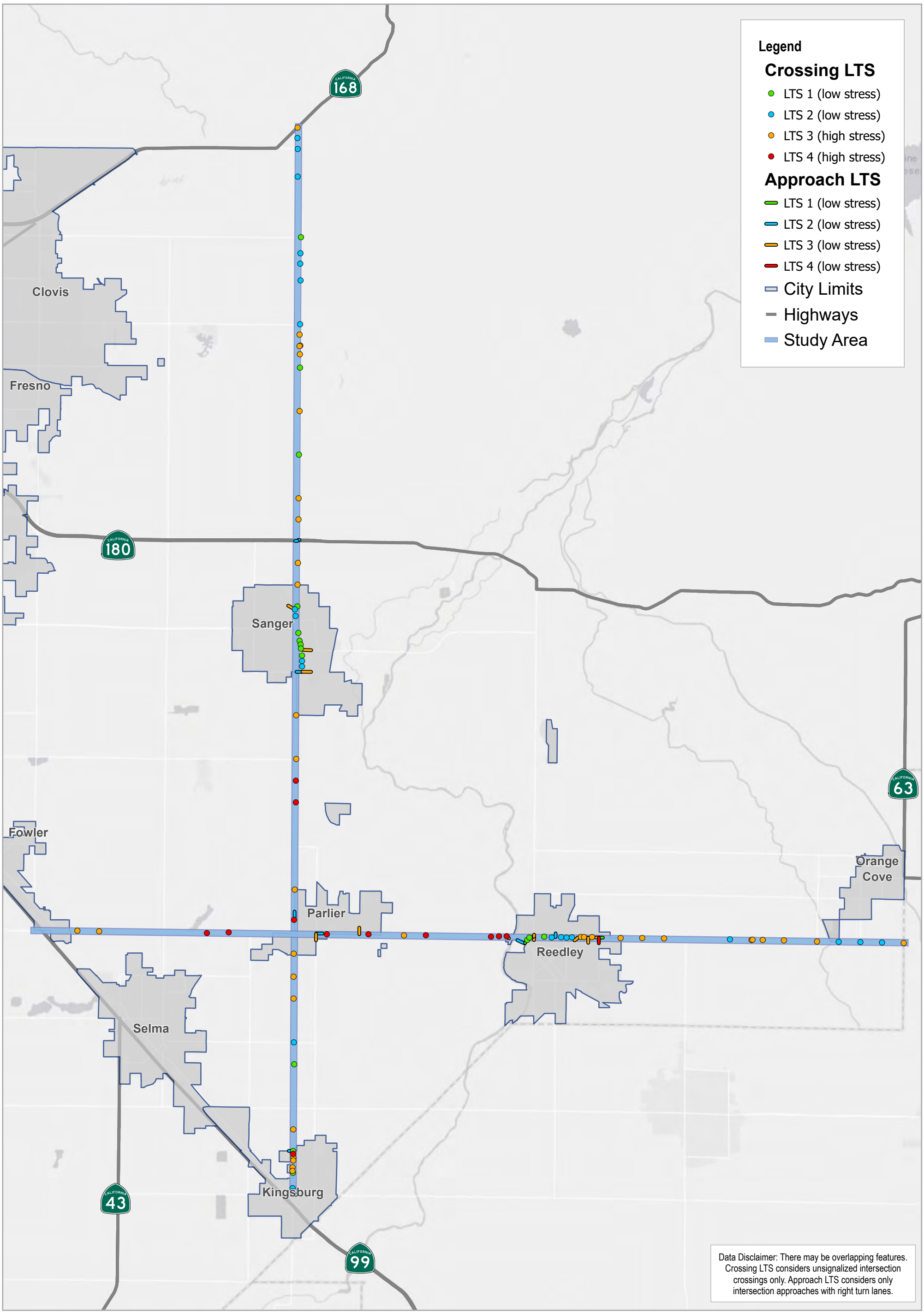

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EASTSIDE TRANSPORTATION IMPROVEMENT CORRIDOR STUDY

GHD

Fresno Council of Governments
Eastside Transportation
Corridor Study

Bicycle LTS with Recommendations - Intersection Approaches and Crossings

Project No. **11210046**
Revision No. **-**
Date **JANUARY 2021**

Figure 10-7

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Vehicle Operations

Unique 2045 (baseline) and 2045 ECTIS Scenario future year volume sets that reflect the AM/PM peak hour traffic conditions were developed to quantify vehicle operations. Intersection and roadway volumes for 2045 (Baseline) scenario, and 2045 ECTIS Improvement Scenario were forecasted using the Fresno COG Regional Travel Demand Forecast Model. These future year volume sets served as inputs to the VISSIM simulation discussed below.

Operational benefits associated with the 2045 ECTIS Improvement Scenario roadway network were quantified by changes to travel time delays and vehicle miles traveled (VMT). The ECTIS Scenario is anticipated to improve operations along both Manning and Academy Avenue Corridors with respect to all but one study segment.

VISSIM Micro-Simulation

This section presents the results of the VISSIM simulation baseline calibration analysis. Generation of future baseline (no-build) traffic forecasts for intersection operations are based on the Existing AM and PM specification counts using NCHRP 255 delta method, based on 2019 and 2035 model outputs from FCOG.

VISSIM micro-simulation software (developed by PTV, Inc.) was used to simulate the corridor operations under both baseline and future year's conditions. Before the Eastside Corridor Model could be used to determine the operational performance of proposed corridor improvements it was calibrated to emulate current conditions. Calibration was performed by modifying inputs after existing conditions were coded within the model. These modifications involved driver behaviors and lane utilization base on field and engineering judgement. Both AM and PM peak hours were validated based on several criteria per micro-simulation guidelines.

All VISSIM microsimulation runs were based on a minimum 10-minute seeding time, 60-minute analysis time (divided into four 15-minute intervals), and reflect an average of 5 multiple runs.

Validation Criteria

The following validation criteria were used to verify validation of the networks to existing conditions:

- Vehicle Throughput – Intersection Approaches within ±10%
- Vehicle Travel Times within ±10%

Validation Procedure

The existing network was validated by adjusting driver behavior, emergency stopping distance, lane change behavior, continuous vehicle routing and signal timing. Signal timing plan sets were provide by respective agencies and coded into the network. These parameters were adjusted until the travel times and vehicle throughput was within the ±10% threshold.

VISSIM Baseline Network Results

The VISSIM baseline network micro-simulation results were compared with field observation data. Summary performance measures were examined to verify the baseline simulation was calibrated to field conditions.

Corridor Travel Times

Due to the unavailability of National Performance Management Research Data Set (NPMRDS) data within the Eastside Corridor Model limits, travel times were derived from field travel time runs. Therefore, the following speed-based performance metrics for passenger and truck vehicles will not be performed:

- Buffer time
- Buffer Time Index
- Congestion and Operational Efficiency
- Travel Time Reliability
- Percent of Corridor Congested
- Percent of Corridor Reliable

Field Travel Times

The Academy Avenue corridor extends approximately 27 miles from State Route (SR) 168 near Clovis to Sierra Street in Kingsburg. Along this route, Academy Avenue passes through the cities of Parlier and Sanger, operating as a collector/arterial roadway. Manning Avenue corridor extends approximately 24 miles from Golden State Boulevard in southern city limits of Fowler to SR 63, south of the City of Orange Cove.

Field travel times (floating car) were performed during estimated AM and PM peak hour timeframes on March 2nd and March 3rd of 2020. Per corridor, one full cycle is defined as a round trip. Therefore, two-round trips were conducted per corridor for each AM and PM peak hours.

This data was summarized into eight segments (16 segments for one complete corridor) that a motorist would experience on an average day. To measure the effectiveness of travel times, a threshold of ±10% of the total floating car travel time is compared to the micro-simulation (VISSIM) total. The model is considered to be calibrated if the total travel time volume for the segments lies within ±10% the floating car travel time.

Table 10-4 through Table 10-7 presents the AM and PM peak hour field travel time data to the network travel times.

Table 10-4. Travel Time Comparison: Manning Ave AM Scenario

Manning Avenue - AM Peak Hour					
#	Segment Limits	Travel Distance (miles)	Floating Car (sec)	VISSIM (sec)	Difference
Eastbound Direction					
1	Golden State Blvd to McCall Ave	2.44	158	158	0%
2	McCall Ave to Academy Ave	2.97	209	206	2%
3	Academy Ave to Lac Jac Ave	4.00	282	286	-2%
4	Reed Ave to SR63	9.44	742	785	**-5%**
Westbound Direction					
5	SR 63 to Reed Ave	9.44	776	797	-3%
6	Lac Jac Ave to Academy Ave	4.00	343	332	3%
7	Academy Ave to McCall Ave	2.97	182	189	-4%
8	McCall Ave to Golden State Blvd	2.44	195	188	**3%**

Table 10-5. Travel Time Comparison: Manning Ave PM Scenario

Manning Avenue - PM Peak Hour					
#	Segment Limits	Travel Distance (miles)	Floating Car (sec)	VISSIM (sec)	Difference
Eastbound Direction					
1	Golden State Blvd to McCall Ave	2.44	172	180	-4%
2	McCall Ave to Academy Ave	2.97	192	193	-1%
3	Academy Ave to Lac Jac Ave	4.00	308	309	0%
4	Reed Ave to SR63	9.44	827	853	-3%
Westbound Direction					
5	SR 63 to Reed Ave	9.44	815	838	-3%
6	Lac Jac Ave to Academy Ave	4.00	302	304	-1%
7	Academy Ave to McCall Ave	2.97	200	200	0%
8	McCall Ave to Golden State Blvd	2.44	164	162	1%

Table 10-6. Travel Time Comparison: Academy Ave AM Scenario

Academy Avenue - AM Peak Hour					
#	Segment Limits	Travel Distance (miles)	Floating Car (sec)	VISSIM (sec)	Difference
Southbound Direction					
9	SR168 to SR180	9.48	651	660	-1%
10	SR180 to Manning Ave	9.07	726	727	0%
11	Manning Ave to Mt View Ave	4.01	308	325	-5%
12	Mt View Ave to Sierra St	2.00	200	202	-1%
Northbound Direction					
13	Sierra St to Mt View Ave	2.00	195	185	5%
14	Mt View Ave to Manning Ave	4.01	303	307	-1%
15	Manning Ave to SR180	9.07	729	727	0%
16	SR180 to SR168	9.48	638	647	-1%

Table 10-7. Travel Time Comparison: Academy Ave PM Scenario

Academy Avenue - PM Peak Hour					
#	Segment Limits	Distance Travel (miles)	Floating Car (sec)	VISSIM (sec)	Difference
Southbound Direction					
9	SR168 to SR180	9.48	678	663	2%
10	SR180 to Manning Ave	9.07	755	785	-4%
11	Manning Ave to Mt View Ave	4.01	301	317	-5%
12	Mt View Ave to Sierra St	2.00	231	216	7%
Northbound Direction					
13	Sierra St to Mt View Ave	2.00	212	206	3%
14	Mt View Ave to Manning Ave	4.01	325	337	-4%
15	Manning Ave to SR180	9.07	772	823	-6%
16	SR180 to SR168	9.48	642	653	-2%

Vehicle Throughput

Another validation criterion is vehicle throughput. This can be through a specific intersection or segment of corridor. To measure the effectiveness of throughput, a threshold of ±10% of the total intersection counts is compared to the micro-simulation total. The model is considered to be calibrated if the total volume for the intersections lies within ±10% the field count.

Table 10-8 presents the vehicle throughput for the key intersections.

Table 10-8. Key Intersections Throughput Comparison

#	Intersection	Intersection Total									
		AM Peak Hour				PM Peak Hour				Actual	
		-5%	Existing Count	VISSIM Count	5%	-5%	Existing Count	VISSIM Count	5%	AM	PM
1	SR 168/Academy Ave	488	514	520	540	543	572	585	601	1.2%	2.3%
2	Shaw Ave/Academy Ave	768	808	767	848	708	745	713	782	*-5.1%*	-4.3%
3	Ashlan Ave/Academy Ave	991	1,043	988	1,095	923	972	953	1,021	*-5.3%*	-2.0%
4	McKinley Ave/Academy Ave	1,012	1,065	1,015	1,118	885	932	881	979	-4.7%	*-5.5%*
5	SR 180/Academy Ave	2,032	2,139	2,079	2,246	2,355	2,479	2,387	2,603	-2.8%	-3.7%
6	Jensen Ave/Academy Ave	1,476	1,554	1,575	1,632	1,910	2,011	1,977	2,112	1.4%	-1.7%
7	Annadale Ave/Academy Ave	1,011	1,064	1,039	1,117	1,286	1,354	1,361	1,422	-2.3%	0.5%
8	North Ave/Academy Ave	1,042	1,097	1,129	1,152	1,339	1,409	1,463	1,479	2.9%	3.8%
9	Adams Ave/Academy Ave	846	890	866	935	1,067	1,123	1,132	1,179	-2.7%	0.8%
10	Manning Ave/Academy Ave	1,935	2,037	2,058	2,139	1,951	2,054	2,111	2,157	1.0%	2.8%
11	Rose Ave/Academy Ave	573	603	621	633	733	772	792	811	3.0%	2.6%
12	Mt View Ave/Academy Ave	1,055	1,111	1,127	1,167	1,113	1,172	1,166	1,231	1.4%	-0.5%
13	Kamm Ave/10th Ave (Academy Ave)	425	447	446	469	386	406	424	426	-0.2%	4.4%
14	Sierra St/10th Ave (Academy Ave)	1,372	1,444	1,472	1,516	1,112	1,170	1,150	1,229	1.9%	-1.7%
15	Manning Ave/Golden State Blvd	2,241	2,359	2,313	2,477	2,221	2,338	2,333	2,455	-1.9%	-0.2%
16	Manning Ave/McCall Ave	2,205	2,321	2,357	2,437	1,996	2,101	2,192	2,206	1.6%	4.3%
17	Manning Ave/Mendocino Ave	2,073	2,182	2,263	2,291	2,018	2,124	2,186	2,230	3.7%	2.9%
18	Manning Ave/Lac Jac Ave	2,018	2,124	2,224	2,230	1,787	1,881	1,936	1,975	4.7%	2.9%
19	Manning Ave/Reed Ave	1,875	1,974	2,057	2,073	1,818	1,914	1,964	2,010	4.2%	2.6%
20	Manning Ave/Frankwood Ave	1,713	1,803	1,784	1,893	1,750	1,842	1,827	1,934	-1.1%	-0.8%
21	Manning Ave/Buttonwillow Ave	1,608	1,693	1,650	1,778	1,663	1,751	1,745	1,839	-2.5%	-0.3%
22	Manning Ave/Alta Ave	1,047	1,102	1,068	1,157	1,126	1,185	1,196	1,244	-3.1%	0.9%
23	Manning Ave/Hill Ave	503	529	547	555	616	648	636	680	3.4%	-1.9%
24	Manning Ave/Hills Valley Rd	710	747	754	784	576	606	596	636	0.9%	-1.7%
25	Manning Ave/SR 63	239	252	253	265	245	258	256	271	0.4%	-0.8%

Future Conditions

The model is considered to be calibrated if the total travel time and vehicle throughput metrics fall within ±10% threshold. Meeting this metric, the application of the validated network is applied for the future and future with improvements scenarios. The measure of effectiveness for these scenarios will focus on total travel time for each corridor and compared against floating car, existing, future network and future network with improvements VISSIM outputs.

Travel Time Comparisons

Table 10-9 and Table 10-10 present the total travel times comparisons for each study corridor by orientation (direction) and by peak hour.

Table 10-9. Travel Time Comparisons: AM Scenario

Segment Limits	Floating Car	Exiting (VISSIM)	Future Network (VISSIM)	Future Network Improvements (VISSIM)
Manning Avenue - AM Scenarios				
Eastbound Direction				
Golden State Blvd to SR63	0:23:10	0:23:55	0:25:40	0:25:11
Westbound Direction				
SR 63 to Golden State Blvd	0:24:56	0:25:06	0:27:56	0:27:54
Academy Avenue - AM Scenarios				
Southbound Direction				
SR168 to Sierra St	0:31:24	0:31:54	0:35:59	0:33:51
Northbound Direction				
Sierra St to SR168	0:31:03	0:31:06	0:31:30	0:31:07

Table 10-10. Travel Time Comparisons: PM Scenario

Segment Limits	Floating Car	Exiting (VISSIM)	Future Network (VISSIM)	Future Network Improvements (VISSIM)
Manning Avenue - PM Scenarios				
Eastbound Direction				
Golden State Blvd to SR63	0:24:58	0:25:35	0:34:35	0:31:00
Westbound Direction				
SR 63 to Golden State Blvd	0:24:41	0:25:04	0:24:51	0:24:04
Academy Avenue - PM Scenarios				
Southbound Direction				
SR168 to Sierra St	0:32:44	0:33:01	0:34:13	0:34:31
Northbound Direction				
Sierra St to SR168	0:32:30	0:33:40	0:34:18	0:34:06

Measures of effectiveness for this model calibration are travel times and throughput. The key measure of effectiveness is corridor travel times. This measure of effectiveness is the primary focus of the model calibration effort. This measure shows that travel times are comparable to the data collected. The secondary criterion of vehicle throughput validation results shows a reasonable correspondence with validation count data set.

Vehicle Delay

Table 10-11 and Table 10-12 present the changes in vehicle delay resulting from the ECTIS Improvement Scenario roadway and operational improvements. As shown, corridor travel times are expected to increase from existing and 2045 (Baseline) conditions. Implementation of the ECTIS Improvement Scenario reduces travel time along both the Manning and Academy Avenue corridors compared to the 2045 (Baseline) conditions during both the AM and PM peak hours, aside from in the southbound direction of Academy Avenue during the PM peak hour, which an increase in delay of -0:00:18.

Table 10-11. Manning Ave Delay Reduction

Scenario	Manning Ave - Corridor Travel Time (min)							
AM Peak Hour	**Eastbound**				**Westbound**			
	Free Flow Travel	**Travel Time**	**Delay**	**Delay Reduction**	**Free Flow Travel**	**Travel Time**	**Delay**	**Delay Reduction**
Existing	0:23:10	0:23:55	0:00:45		0:24:56	0:25:06	0:00:10	
Year 2045 (Baseline)		0:25:40	0:02:30			0:27:56	0:03:00	
Year 2045 (Preferred Concept)		0:25:11	0:02:01	**0:00:29**		0:27:54	0:02:58	**0:00:02**
PM Peak Hour	**Eastbound**				**Westbound**			
	Free Flow Travel	**Travel Time**	**Delay**	**Delay Reduction**	**Free Flow Travel**	**Travel Time**	**Delay**	**Delay Reduction**
Existing	0:24:58	0:25:35	0:00:36		0:24:41	0:25:04	0:00:23	
Year 2045 (Baseline)		0:34:35	0:09:36			0:24:51	0:00:10	
Year 2045 (Preferred Concept)		0:31:00	0:06:01	**0:03:35**		0:24:04	-	**0:00:47**

Table 10-12. Academy Ave Delay Reduction

Scenario	Academy Ave - Corridor Travel Time (min)							
AM Peak Hour	Southbound				Northbound			
	Free Flow Travel	Travel Time	Delay	Delay Reduction	Free Flow Travel	Travel Time	Delay	Delay Reduction
Existing	0:31:24	0:31:54	0:00:30		0:31:03	0:31:06	0:00:02	
Year 2045 (Baseline)		0:35:59	0:04:35			0:31:30	0:00:27	
Year 2045 (Preferred Concept)		0:33:51	0:02:27	**0:02:08**		0:31:07	0:00:04	**0:00:23**
PM Peak Hour	Southbound				Northbound			
	Free Flow Travel	Travel Time	Delay	Delay Reduction	Free Flow Travel	Travel Time	Delay	Delay Reduction
Existing	0:32:44	0:33:01	0:00:18		0:32:30	0:33:40	0:01:09	
Year 2045 (Baseline)		0:34:13	0:01:29			0:34:18	0:01:47	
Year 2045 (Preferred Concept)		0:34:31	0:01:47	**-0:00:18**		0:34:06	0:01:36	**0:00:12**

Level of Service (LOS)

Intersection LOS

As previously discussed in Chapter 7, Table 7-9 presents intersection operations for Cumulative Year 2045 Conditions, which indicates the study intersection locations operating below acceptable LOS thresholds. Table 10-13 presents Cumulative Year 2045 Conditions for the deficient locations, as well as the mitigation measures developed to address the deficiencies of intersections forecasted to operate at unacceptable LOS in the Future Year 2045 Cumulative scenario. The delay and LOS reported in Table 10-13 reflect the worst case out of the AM and PM peak hours. Locations forecasted to be deficient are listed below:

- #1 – SR 168 / Academy Ave, (AWSC)
- #3 – Ashlan Ave / Academy Ave, (AWSC)
- #4 – McKinley Ave / Academy Ave, (AWSC)
- #5 – SR 180 / Academy Ave, (signal)
- #6 – Jensen Ave / Academy Ave, (signal)
- #9 – Adams Ave / Academy Ave, (ASWC)
- #10 – Manning Ave / Academy Ave, (signal)
- #14 – Sierra St / 10th Ave, (signal)
- #15 – Manning Ave / Golden State Blvd, (signal)
- #16 – Manning Ave / McCall Ave, (signal)
- #17 – Manning Ave / Mendocino Ave, (signal)
- #20 – Manning Ave / Frankwood Ave, (signal)
- #21 – Manning Ave / Buttonwillow Ave, (signal)

Table 10-13. Cumulative Year 2045 Conditions Mitigation Measures

#	Existing Conditions		Mitigation Measures		
	Control	Lane Geometrics	Control	Lane Geometrics	Delay/LOS
#1	OWSC	**EB existing approach includes:** • Shared Right/Thru movement	**Signal**	**<u>Widen</u> EB approach to include:** • Dedicated Right-turn movement with 100 ft. of storage length • Dedicated Thru movement	**7.5 / A**
		WB existing approach includes: • Shared Left/Thru movement		**<u>Widen</u> WB approach to include:** • Dedicated Left-turn movement with 100 ft. of storage length • Dedicated Thru movement	
		NB existing approach includes: • Shared Left/Right movement • Dedicated Right-turn movement		**<u>Widen</u> NB approach to include:** • Dedicated Left-turn movement with 90 ft. of storage length • Dedicated Right-turn movement	
#3	AWSC	**EB existing approach includes:** • Shared Left/Thru/Right movement	**Signal***	**No change to EB approach movement**	**10.9 / B**
		WB existing approach includes: • Shared Left/Thru/Right movement		**No change to WB approach movement**	
		NB existing approach includes: • Dedicated Left-turn movement • Dedicated Thru movement • Dedicated Thru/Right movement		**No change to NB approach movement**	
		SB existing approach includes: • Dedicated Left-turn movement • Dedicated Thru movement • Dedicated Thru/Right movement		**No change to SB approach movement**	
#4	AWSC	**EB existing approach includes:** • Shared Left/Thru/Right movement	**Signal***	**No change to EB approach movement**	**8.5 / A**
		WB existing approach includes: • Shared Left/Thru/Right movement		**No change to WB approach movement**	
		NB existing approach includes: • Dedicated Left-turn movement • Dedicated Thru movement • Dedicated Thru/Right movement		**No change to NB approach movement**	
		SB existing approach includes: • Dedicated Left-turn movement • Dedicated Thru movement • Dedicated Thru/Right movement		**No change to SB approach movement**	

#	Existing Conditions		Mitigation Measures		
	Control	Lane Geometrics	Control	Lane Geometrics	Delay/LOS
#5	Signal	**EB existing approach includes:** • Dedicated Left-turn movement • Dedicated two (2) Thru movements • Dedicated Right movement	**Signal***	**No change to EB approach movement**	**34.6 / C**
		WB existing approach includes: • Dedicated Left-turn movement • Dedicated two (2) Thru movements • Dedicated Right movement		**No change to WB approach movement**	
		NB existing approach includes: • Dedicated two (2) Left-turn movements • Dedicated Thru movement • Dedicated Thru/Right movement		**Widen NB existing approach to include:** • Dedicated two (2) Left-turn movements • Dedicated two (2) Thru movements • Dedicated Right-turn movement **Note:** Approximate width from curb to edge of pavement, 56 ft. (Google Earth). Redesign of median island could accommodate the dedicated Right-turn lane.	
		SB existing approach includes: • Dedicated two (2) Left-turn movements • Dedicated Thru movement • Dedicated Thru/Right movement		**Widen SB existing approach to include:** • Dedicated two (2) Left-turn movements • Dedicated two (2) Thru movements • Dedicated Right-turn movement **Note:** Approximate width from curb to edge of pavement, 56 ft. (Google Earth). Redesign of median island could accommodate the dedicated Right-turn lane.	
#6	Signal	**EB existing approach includes:** • Shared Left/Thru movement • Dedicated Right-turn movement	**Signal***	**Widen EB approach to include:** • Dedicated Left-turn movement with 120 ft. of storage length • Dedicated Thru movement • Dedicated Right-turn movement **Note:** Approximate width from curb to edge of pavement, 65 ft. (Google Earth). Redesign/restriping of intersection approach could accommodate the dedicated Left-turn lane.	**21.7 / C**
		WB existing approach includes: • Shared Left/Thru/Right movement		**No change to WB approach movement**	
		NB existing approach includes: • Dedicated Left-turn movement • Dedicated Thru movement • Dedicated Thru/Right movement		**No change to NB approach movement** **Note:** Due to Left-turn movement storage constraints, extension of storage length to meet 95th – percentile queue is not achievable. Further study would be needed.	
		SB existing approach includes: • Dedicated Left-turn movement • Dedicated Thru movement • Dedicated Thru/Right movement		**No change to SB approach movement**	

#	Existing Conditions		Mitigation Measures		
	Control	Lane Geometrics	Control	Lane Geometrics	Delay/LOS
#9	AWSC	**EB existing approach includes:** • Shared Left/Thru/Right movement	**Signal***	**No change to EB approach movement**	**11.0 / B**
		WB existing approach includes: • Shared Left/Thru/Right movement		**No change to WB approach movement**	
		NB existing approach includes: • Dedicated Left-turn movement • Dedicated Thru movement • Dedicated Thru/Right movement		**No change to NB approach movement**	
		SB existing approach includes: • Dedicated Left-turn movement • Dedicated Thru movement • Dedicated Thru/Right movement		**No change to SB approach movement**	
#10	Signal	**EB existing approach includes:** • Dedicated Left-turn movement • Dedicated Thru movement • Dedicated Thru/Right movement	**Signal***	**No change to EB approach movement**	**33.2 / C**
		WB existing approach includes: • Dedicated Left-turn movement • Dedicated Thru movement • Dedicated Thru/Right movement		**Widen WB approach to include:** • Dedicated Left-turn movement • Dedicated two (2) Thru movements • Dedicated Right-turn movement **Note:** Redesign of median island at Manning Ave/Madsen Ave (Parlier) could accommodate the dedicated Left-turn lane (Google Earth)	
		NB existing approach includes: • Dedicated Left-turn movement • Dedicated Thru movement • Dedicated Thru/Right movement		**No change to NB approach movement**	
		SB existing approach includes: • Dedicated Left-turn movement • Dedicated Thru movement • Dedicated Thru/Right movement		**Widen SB approach to include:** • Dedicated Left-turn movement extended to meet 95th – percentile queue	
#14	Signal	**EB existing approach includes:** • Dedicated Left-turn movement • Dedicated Thru movement • Dedicated Right-turn movement		**No change to EB approach movement**	**34.4 / C**
		WB existing approach includes: • Dedicated Left-turn movement • Dedicated Thru/Right movement		**Widen WB approach to include:** • Dedicated Left-turn movement • Dedicated two (2) Thru movements • Dedicated Right-turn movement	
		NB existing approach includes: • Dedicated Left-turn movement • Dedicated Thru/Right movement		**No change to NB approach movement**	
		SB existing approach includes: • Dedicated Left-turn movement • Dedicated Thru movement • Dedicated Right-turn movement		**No change to SB approach movement**	

#	Existing Conditions		Mitigation Measures		
	Control	Lane Geometrics	Control	Lane Geometrics	Delay/LOS
#15	Signal	**EB existing approach includes:** • Dedicated Left-turn movement • Dedicated two (2) Thru movements • Dedicated Right-turn movement	**Signal***	**<u>Widen</u> EB existing approach to include:** • Dedicated two (2) Left-turn movements • Dedicated two (2) Thru movements • Dedicated Right-turn movement **Note:** Cross-section width (curb/gutter to curb/gutter) is approximately 84 ft. (Google Earth). Redesign of intersection approach could accommodate dedicated Left-turn lane.	**73.6 / E**
		WB existing approach includes: • Dedicated Left-turn movement • Dedicated Thru movement • Dedicated Thru/Right movement		**<u>Widen</u> WB existing approach to include:** • Dedicated two (2) Left-turn movements • Dedicated two (2) Thru movements • Dedicated Right-turn movement **Note:** Cross-section width (back of shoulder to back of shoulder) is approximately 105 ft. (Google Earth). Redesign of intersection approach could accommodate dedicated Left-turn lanes and Thru lane.	
		NB existing approach includes: • Dedicated Left-turn movement • Dedicated two (2) Thru movements • Dedicated Right-turn movement (turning island)		**<u>Widen</u> NB existing approach to include:** • Dedicated two (2) Left-turn movements • Dedicated two (2) Thru movements • Dedicated Right-turn movement **Note:** Cross-section width (curb to back of shoulder) is approximately 110 ft. (Google Earth). Redesign of intersection approach could accommodate additional dedicated Left-turn lane and Right-turn lane.	
		SB existing approach includes: • Dedicated Left-turn movement • Dedicated two (2) Thru movements • Dedicated Right-turn movement (turning island)		**<u>Widen</u> SB existing approach to include:** • Dedicated two (2) Left-turn movements • Dedicated two (2) Thru movements • Dedicated Right-turn movement **Note:** Cross-section width (curb to back of shoulder) is approximately 110 ft. (Google Earth). Redesign of intersection approach could accommodate dedicated additional Left-turn lane and Right-turn lane.	

#	Existing Conditions		Mitigation Measures		
	Control	Lane Geometrics	Control	Lane Geometrics	Delay/LOS
#16	Signal	**EB existing approach includes:** • Dedicated Left-turn movement • Dedicated Thru movement • Dedicated Thru/Right movement	**Signal***	**<u>Widen</u> EB approach to include:** • Dedicated Left-turn movement with extended storage length to meet 95th – percentile queue • Dedicated two (2) Thru movements • Dedicated Right-turn movement with 120 ft. of storage length **Note:** Approximate width from curb to curb, 44 ft. (Google Earth). Redesign of median island could accommodate the dedicated Right-turn lane and extension of the Left-lane.	**37.9 / D**
		WB existing approach includes: • Dedicated Left-turn movement • Dedicated Thru movement • Dedicated Thru/Right movement		**<u>Widen</u> WB approach to include:** • Dedicated Left-turn movement with extended storage length to meet 95th – percentile queue • Dedicated two (2) Thru movements • Dedicated Right-turn movement with 120 ft. of storage length **Note:** Approximate width from curb to edge of pavement, 48 ft. (Google Earth). Redesign of median island could accommodate the dedicated Right-turn lane and extension of the Left-lane.	
		NB existing approach includes: • Dedicated Left-turn movement • Dedicated two (2) Thru movements • Dedicated Right-turn movement (turning island)		**<u>Widen</u> NB approach to include:** • Dedicated Left-turn movement with extended storage length to meet 95th – percentile queue • Dedicated Thru movement • Dedicated Right-turn movement with 120 ft. of storage length **Note:** Approximate width from curb to edge of pavement, 35 ft. (Google Earth). Redesign of median island could accommodate the dedicated Right-turn lane and extension of the Left-lane.	
		SB existing approach includes: • Dedicated Left-turn movement • Dedicated two (2) Thru movements • Dedicated Right-turn movement (turning island)		**<u>Widen</u> SB approach to include:** • Dedicated Left-turn movement with extended storage length to meet 95th – percentile queue • Dedicated two (2) Thru movements • Dedicated Right-turn movement with 100 ft. of storage length **Note:** Approximate width from curb to edge of pavement, 34 ft. (Google Earth). Redesign of median island could accommodate the dedicated Right-turn lane and extension of the Left-lane.	

#	Existing Conditions		Mitigation Measures		
	Control	Lane Geometrics	Control	Lane Geometrics	Delay/LOS
#17	Signal	**EB existing approach includes:** • Dedicated Left-turn movement • Dedicated Thru movement • Dedicated Thru/Right movement	**Signal***	**<u>Widen</u> EB approach to include:** • Dedicated Left-turn movement with extended storage length to meet 95th – percentile queue • Dedicated two (2) Thru movements • Dedicated Right-turn movement with 150 ft. of storage length **Note:** Approximate width from curb to curb, 44 ft. (Google Earth). Redesign of median island as constructed at Manning Ave/Madsen Ave (Parlier) could accommodate the dedicated Right-turn lane.	**33.2 / C**
		WB existing approach includes: • Dedicated Left-turn movement • Dedicated two (2) Thru movements • Dedicated Right-turn movement		**<u>Widen</u> EB approach to include:** • Dedicated Left-turn movement with extended storage lane to meet 95th – percentile queue • Dedicated two (2) Thru movements • Dedicated Right-turn movement with extended storage length **Note:** Redesign of median island could accommodate the extension of the Left-lane.	
		NB existing approach includes: • Dedicated Left-turn movement • Dedicated Thru/Right movement		**<u>Widen</u> EB approach to include:** • Dedicated Left-turn movement with extended storage length to meet 95th – percentile queue • Dedicated Thru movement • Dedicated Right-turn movement with 100 ft. of storage length **Note:** Approximate width from curb/gutter to edge of pavement line, 54 ft. (Google Earth). Redesign of median island could accommodate the dedicated Right-turn lane and extension of the Left-lane.	
		SB existing approach includes: • Dedicated Left-turn movement • Dedicated Thru movement • Dedicated Right-turn movement		**<u>Widen</u> EB approach to include:** • Dedicated Left-turn movement with extended storage lane to meet 95th – percentile queue • Dedicated Thru movement • Dedicated Right-turn movement with extended storage length **Note:** Redesign of median island could accommodate the extension of the Left-lane.	

#	Existing Conditions		Mitigation Measures		
	Control	Lane Geometrics	Control	Lane Geometrics	Delay/LOS
#20	Signal	**EB existing approach includes:** • Dedicated Left-turn movement • Dedicated Thru/Right movement	**Signal***	**<u>Widen</u> EB approach to include:** • Dedicated Left-turn movement with extended storage lane to meet 95th – percentile queue • Dedicated Thru movement • Dedicated Right-turn movement **Note:** Approximate width from curb/gutter to median striping, 36 ft. (Google Earth). Redesign/restriping of intersection approach could accommodate the dedicated Right-turn lane, extension of the Left-lane and converting existing Class II bike lane to Class III bike lane for the approach only.	**28.4 / C**
		WB existing approach includes: • Dedicated Left-turn movement • Dedicated Thru/Right movement		**<u>Widen</u> WB approach to include:** • Dedicated Left-turn movement with extended storage lane to meet 95th – percentile queue • Dedicated Thru movements • Dedicated Right-turn movement **Note:** Approximate width from curb/gutter to median striping, 36 ft. (Google Earth). Redesign/restriping of intersection approach could accommodate the dedicated Right-turn lane, extension of the Left-lane and converting existing Class II bike lane to Class III bike lane for the approach only.	
		NB existing approach includes: • Dedicated Left-turn movement • Dedicated Thru/Right movement		**<u>Widen</u> NB approach to include:** • Dedicated Left-turn movement • Dedicated Thru movement • Dedicated Right-turn movement **Note:** Cross-section width (curb/gutter to curb/gutter) is approximately 48 ft. (Google Earth). Redesign of intersection approach could accommodate dedicated Right-turn lane and extension of Left-turn lane.	
		SB existing approach includes: • Dedicated Left-turn movement • Dedicated Thru movement • Dedicated Right-turn movement		**No change to SB approach movement** **Note:** Due to Left-turn movement storage constraints, extension of storage length to meet 95th – percentile queue is not achievable. Further study would be needed.	

#	Existing Conditions		Mitigation Measures		
	Control	Lane Geometrics	Control	Lane Geometrics	Delay/LOS
#21	Signal	**EB existing approach includes:** • Dedicated Left-turn movement • Dedicated two (2) Thru movements • Dedicated Right-turn movement	**Signal***	**Widen EB approach to include:** • Dedicated Left-turn movement • Dedicated two (2) Thru movements • Dedicated Right-turn movement with extended storage length to meet 95th – percentile queue **Note:** Redesign/restriping of intersection approach could accommodate the extension of the Left-lane.	**23.6 / C**
		WB existing approach includes: • Dedicated Left-turn movement • Dedicated Thru movement • Dedicated Thru/Right movement		**Widen WB approach to include:** • Dedicated Left-turn movement, with extended storage lane to meet 95th – percentile queue • Dedicated Thru movement • Dedicated Thru/Right-turn movement **Note:** Redesign/restriping of intersection approach could accommodate the extension of the Left-lane.	
		NB existing approach includes: • Dedicated Left-turn movement • Dedicated Thru movement • Dedicated Right-turn movement		**Widen NB approach to include:** • Dedicated Left-turn movement with extended storage lane to meet 95th – percentile queue • Dedicated Thru movement • Dedicated Right-turn movement **Note:** Redesign/restriping of intersection approach could accommodate the extension of the Left-lane.	
		SB existing approach includes: • Dedicated Left-turn movement • Dedicated Thru movement • Dedicated Right-turn movement		**Widen SB approach to include:** • Dedicated Left-turn movement with extended storage lane to meet 95th – percentile queue • Dedicated two (2) Thru movements • Dedicated Right-turn movement	

** Optimized timing*

Roadway Segments LOS

Table 10-14 presents the Cumulative Year 2045 Conditions and mitigation measures to those study roadway segments that are operating below acceptable LOS thresholds. Roadway segments operating below acceptable thresholds include:

- Academy Ave Corridor, State Route 201 to Stroud Ave
- Academy Ave Corridor, Stroud Ave to Kamm Ave

Table 10-14. Roadway Segments Mitigation Measures (Cumulative Year 2045 Conditions)

Corridor	Existing Conditions:				Mitigation Conditions:	
	Direction	Limits	# of Lanes	LOS	# of Lanes	LOS
Academy	N – S	State Route 201 – Stroud	2	E	4	B
Academy	N – S	Stroud – Kamm	2	E	4	B

Vehicle Miles Traveled (VMT)

Daily vehicle miles traveled (VMT) for existing (2019) conditions were developed by estimating daily segment volumes using the existing (2019) traffic counts taken at study intersection locations. Daily VMT for Year 2045 Baseline and Year 2045 Cumulative conditions were forecasted based on the Existing AM and PM specification counts using NCHRP 255 delta method, based on 2019 and 2035 model outputs from the FCOG Travel Demand Model. Daily VMT for each scenario as well as the reduction due to induced bicycle demand associated with the ECTIS improvements are presented in Table 10-15. As shown, the recommended study improvements result in a reduction of 14,385 daily VMT within the study areas.

Table 10-15. Daily VMT

Scenario	Daily VMT
Existing Baseline	488,177
2045 (Baseline)	797,309
Reduction Type	Daily VMT Reduction
Bicycle Mode Shift	14,385
Total Reduction	**14,385**
2045 (with Improvements)	**782,924**

Air Quality

Air quality benefits were estimated using the SB 1 Emissions Calculator (or Cal-B/C) tool developed by the California Transportation Commission (CTC). All requisite on-road activity inputs (i.e. study corridor VMT) for this analysis were generated by the Fresno COG Regional Travel Demand Forecast Model and the NCHRP 552 bicycle mode shift analysis.

Health-based criteria pollutants and greenhouse gases associated with climate change (CO2 and CO2 equivalents) were quantified. Based on the on-road vehicle activity changes quantified, the SB 1 Emissions Calculator tool was used to calculate the change in these emissions as a result of the improvements recommended in this study, which are presented in Table 10-16.

Table 10-16. Air Quality Benefits - Emissions Reduction

Emissions Reduction	Total Over 20 years (Tons)	Average Annual (Tons)
CO Emissions Saved	1,095.98	54.80
CO2 Emissions Saved	331,213.96	16,560.70
NOX Emissions Saved	221.8077	11.0904
PM10 + PM2.5 Emissions Saved	2.8572	0.1429
SOX Emissions Saved	3.2214	0.1611
VOC Emissions Saved	-39.9710	-1.9985

Environmental Justice and Social Equity

Impacts of construction and benefit of use should be shared across the community regardless of ethnicity, economic situation, or physical ability because improvements developed with public funds are for everyone. Projects that could potentially affect low-income communities and communities of color, or that will provide benefits that favor wealthier communities, need to be offset by mitigating activities, or another less impactful solution should be pursued.

Figure 3-1 presents CalEnviroScreen 3.0 results for vulnerable communities within the Eastside Study area. Figure 3-2 presents low-income communities (per AB 1550) and disadvantaged communities (per SB 535). As shown, the project corridors connect several disadvantaged and low-income communities.

All the recommended improvement projects included in this study address regional corridor-wide needs. Given that the Manning Avenue and Academy Avenue corridors serve a significant number of disadvantaged or low-income and communities of color populations, all improvements promote equitable benefits.

Economic Development

This section looks at the future economic impact on the Fresno region from implementation of the study's projects by the various jurisdictions. While the other sections of the report monetize many quantifiable benefits such as improved safety and air quality, this section discusses the ways project implementation can strengthen the regional transportation system and enhance economic growth.

An economic impact analysis of the recommended improvements to the corridor was conducted in line with the Smart Mobility Framework. Outcomes are presented in terms of regional impacts for gross regional product (GRP), jobs, and personal income. To analyze these impacts a model of the economy, called "impact analysis for planning" or IMPLAN was deployed. This model examines the impact structure of each investment. In the case of construction projects, project expenditures are tracked through the supply chain, from the construction contractor and its employees (direct impacts), to its suppliers and to their employees and onward to further levels of suppliers, employees, and their suppliers (indirect impacts). It also enables the examination of the effects from all the associated income to employees and their household purchases (induced impacts).

This report analyzes the total economic impacts over the life recommended improvements. Since the timeline of implementation is uncertain, a year-by-year impact analysis could not be performed. In addition, some recommended improvement costs could not be estimated in this corridor level plan and so have not been included, indicating that the calculated impacts are conservative and will likely be higher. The estimated project investments total $62 million.

Methodology

To analyze the economic impacts of these investments we utilize a model of the economy, called "impact analysis for planning" or IMPLAN. This model can be understood as a general accounting system of transactions between industries, businesses, and consumers that estimates the range of economic

impacts. Using the IMPLAN modeling software we create complete and extremely detailed Social Accounting Matrices and Multiplier Models of the Fresno County economy that enables in-depth examination of the impacts of the projects. This model enables us to examine the impact structure of each investment. For example, in the case of a construction project, we can trace the project expenditures through the supply chain, from the construction contractor and its employees (direct impacts), to its suppliers and to their employees and onward to further levels of suppliers, employees, and their suppliers (indirect impacts). It also enables us to examine the effects from all the associated income to employees and their household purchases (induced impacts). The model thereby allows us to generate an estimate of how the original investment is multiplied through additional activity in the economy.

We note that not all needs in the various projects' supply chains will be able to be filled with Fresno County. For example, a construction company may need specialized equipment that is only available in another county, state or nation. It may also choose to acquire supplies from other areas if more competitive prices are offered elsewhere. The workers themselves may commute from outside the County, representing an import of labor. Spending that occurs outside of the County is a leakage from the system and reduces the local economic impact, so detailed data on business and consumer purchases are sometimes used to adjust the project multipliers in the IMPLAN model. Even with these necessary adjustments, it is important to remember that the underlying model depends on structural relationships developed from data at a particular moment. As firms enter or exit the County's economy, they may change those structures. Similarly, new technologies and changes in resource endowments can transform the local economic structure. Those changes are typically gradual, but during periods of technological or structural change they can contribute to significant differences in estimated multipliers for models created from one year to the next. We assume that all initial project spending occurs within Fresno County and then allow the model to estimate the leakage. In the case of the Fresno region, this leakage is minor and does not significantly impact the conclusions.

In addition to the trade flows of goods and services, the model incorporates estimates of workers who commute from other counties. This accounts for out-of-county workers whose household spending is mostly close to their residences rather than in their place of employment. Because supply chains and worker profiles differ across industries, it is important to allocate projects to specific industries. Most of the improvement recommendations in this study are construction related and thus all projects' initial investments are in employment sector 54, construction of new highways/streets. The employment estimates are measured on a job count basis for wage-and-salary workers and for self-proprietors regardless of the number of hours worked and are reported on an annual basis reflecting the number of full-time and part-time jobs generated annually.

Project Impacts

The full range of economic contribution from spending associated with the Eastside plan's investments, known as the Total Effect, is the sum of the direct, indirect, and induced effects:

- **Direct Effects** are the changes in sales (output), value (value-added), wages (personal income), and jobs (employment) directly supported by the plan's investments.

- I**ndirect Effects** represent the iterative impacts of inter-industry transactions as supplying industries respond to demand from the sector(s) where the initial expenditures occurred. An example of an indirect impact would be sales from a cement company suppling a construction firm directly funded by the projects.
- **Induced Effects** reflect the expenditures made by recipients of wages in the direct and indirect industries. Examples of induced impacts include employees' expenditures on items such as retail purchases, housing, food, education, banking, and insurance.

The direct economic impact on the Fresno County economy of the $62 million initial investment in projects are estimated through our model to generate about 286 direct jobs and $19.8 million in direct labor income over the planning horizon. When considering indirect and induced impacts, the initial investment produces supports a total of 474 full-time equivalent jobs, nearly $30 million in labor income and close to $53 million of value added gross regional product, for a total economic effect of $1 billion, for a total multiplier effect of 1.57. The impact details are shown in Table 10-17.

Table 10-17. Economic Impact Summary

Impact Type	Employment (Jobs)	Labor Income	Total Value Added	Output
Direct Effect	286.4	$19,823,253.0	$34,124,399.9	$63,193,439.2
Indirect Effect	72.0	$4,464,898.7	$8,272,034.2	$18,016,922.1
Induced Effect	115.3	$5,509,590.7	$10,428,902.9	$17,826,064.5
Total Effect	473.6	$29,797,742.4	$52,825,337.0	$99,036,425.8

While the main beneficiaries of increased job opportunities will be construction workers, some job increases due to increased spending by construction workers will include restaurants, real estate firms, hospitals, truck transportation, wholesale goods, and auto repair firms.

Finally, as it enhances accessibility, these investments should benefit the County's overall quality of life. Recent studies of these long-term impacts in Southern California suggest that the competitive impacts could be more than double the project construction and operation impacts alone.

We recognize that these transportation investments are more significant than just their project-level associated impacts, as these infrastructure investments may also enhance the corridors' and region's economic competitiveness. These are long-term benefits that will endure beyond the projects' life. The many long-term benefits from this sort of investment are, among others:

- Reduced travel times because of investments alleviating congestion.
- Expanded labor markets across the County, and the region so that labor may move more efficiently through a variety of transit modes.
- Enhanced competitiveness and efficiency of the County's goods movement system.

Therefore, despite the value and importance of the projects' immediate impacts, focusing on those alone omits potential effects from enhancing the region's attractiveness as a busines location, including viability for corporate headquarters and growing high-wage job opportunities because of increased

connectivity. Benefits may also include supporting the region's travel and tourism industry. In the case of Fresno County, and particularly the job profile of the study corridor, large employers and job centers are primarily in the agricultural and manufacturing sectors, with wider regional employment in finance, health care, and education. With the former, facilitation of goods movement and potential conflicts and congestion attributable to a mix of truck, car, and non-motorized travel would be important to access – while the latter would suggest alleviating commute traffic and providing alternatives to solo car travel would be paramount.

This more detailed analysis of the economic benefit of network and operational improvements in the corridor are beyond the scope of this study. This qualitative discussion of anticipated future benefits is a starting point for future, more detailed analyses using economic multipliers and secondary data for jobs and output by employment sector, transportation reliance factors, and calculated employment capacity as this data is developed for potential future funding opportunities or specific project level analyses. Application and discussion of these economic multipliers will be essential to expand the discussion beyond the benefits of the initial investment in infrastructure that we present here. A detailed discussion of methodology and impact detail is included in the appendix.

Plan/Policy Consistency

In sorting and selecting a preferred corridor concept for the ETCIS, both quantitative and qualitative measures were considered and used. The Benefit/Cost Analysis quantified and compared metrics associated with traffic operations, safety, emissions, and cost characteristics to help narrow and focus the selection to the most beneficial improvements to corridor circulation and safety. In addition to these quantitative metrics, qualitative measures, although often less objective, can provide further insights into the desirability and functionality of proposed improvements. Per the Smart Mobility Framework process, the following qualitative factors were also considered when evaluating and selecting the preferred alternative. These factors included:

- Plan Consistency
- Policy Consistency
- Community Acceptance (based on the community engagement process)
- Environmental/Institutional Sensitivity (per the adaptation assessment)
- Social Equity (consideration of low income and minority population concentrations relative to the location of anticipated improvement impacts and benefits)

Plan Consistency

Transportation plans from the regional, county, and state levels were reviewed for their relevance to this project. The plans and policies that were determined to be related to this study are summarized in Chapter 6.

The proposed package of recommendations was found consistent with the regional, county and state level plan documents. Of key significance, the multimodal improvements are consistent with:

- The Fresno Council of Government Regional Transportation Plan and Sustainable Community Strategy, which emphasizes congestion management, environmental justice, and goods movement planning
- The Fresno County Regional Active Transportation Plan, which aims to create a network of safe and attractive trails, sidewalks, and bikeways that connect Fresno County residents to key destinations, especially local schools and parks, as well as create a network of regional bikeways that allows bicyclists to safely ride between cities and other regional destinations
- State plans for state routes where they intersect the Manning and Academy corridors

Policy Consistency

Recognizing the importance of the Manning and Academy corridors to both regional and local circulation, the involved agencies have been and are aligned in establishing policies that further the improvement of the corridor to enhance traffic operations, capacity, safety and multimodal opportunities and reduce environmental impacts.

Similar to the assessment made regarding Plan Consistency, the ETCIS recommendation package was found consistent with all policies established by the involved agencies.

Community Support

The ETCIS planning process included a robust public outreach effort, which is described in detail in Chapter 8. The public outreach process involved workshops (in-person and virtual), a project website with an interactive map for feedback, and public presentations on existing conditions and preliminary recommendations. Throughout the process, the public has been invited and encouraged to participate in identifying corridor solutions for Academy Avenue and Manning Avenue. The recommendation package reflects community support for mobility and safety improvements along the corridors.

11. Benefit Monetization Assessment

This chapter summarizes the monetary benefits associated with the performance metrics analyses presented in Chapter 10.

Improvement Costs

Unit Cost Assumptions

Planning level unit cost assumptions were used to develop project cost estimates and are presented for motorized improvements in Table 11-1 and for bicycle and pedestrian improvements in Table 11-2.

Cost estimates were developed based on recent local project costs. Estimates include assumed costs for mobilization, traffic control, earthwork, signs, pavement delineation and markings, utility coordination, grading and erosion control. Estimates also include 30 percent soft costs including engineering design (15 percent), administration (3 percent), and construction management (12 percent). A 15 percent contingency is also included in the cost estimate.

Unit cost estimates for this project are in 2020 dollars, do not include cost escalation, and were rounded to the nearest $100. At the planning level, cost assumptions do not consider project-specific or location specific factors that may affect actual costs, including acquisition of right-or-way or road widening. For some projects, actual costs may differ from the planning level estimates. Signal timing/phase adjustments are assumed to be staff time only. If additional infrastructure or equipment is needed, that would be an additional cost.

The appropriate unit cost is multiplied by the length or quantity of the improvement to develop a planning-level project cost estimate. For linear projects, the unit cost method uses a single functional unit (mile or linear foot) that serves as a multiplier. Spot improvements are multiplied by the quantity of the facility needed at that particular location.

Table 11-1. Estimated Unit Costs for Motorized Recommendations

Improvement	Unit	Estimated Unit Cost	Notes
Intersection Lighting	EA	$350,000	Includes all lighting, cabinets, and connections
Roadway Segment Lighting	MI	$1,000,000	Assumes lights every 200 feet, single direction
Single-lane roundabout	EA	$2,500,000	Includes all bike/pedestrian facilities and curbs
Two-lane roundabout	EA	$4,500,000	Includes all bike/pedestrian facilities and curbs
Signs	EA	$500	Stop, Advanced Intersection Ahead, Reduced Speed Ahead, etc.
Signs with retroreflective borders	EA	$600	
Retroreflective border back plates for signals	EA	$200	
Pavement Markings	EA	$1500	STOP AHEAD, SIGNAL AHEAD, etc.
Standard Signal	EA	$400,000	Includes all lighting, cabinets, and connections
Signal with protected turn-phase	EA	$600,000	Includes all lighting, cabinets, connections, and approach roadway work
Advanced Intersection Warning Signs with Flashing Beacons	EA	$5,000	Assumes solar
Advanced Dilemma Zone Detection	EA	$20,000	Includes all equipment/wiring
Turn-lane	EA	$100,000	Assumes 90’ bay taper, with 210’ storage; includes curb island and striping
Pavements High Friction Surface Treatment	MI	$200,000	Per 12’ Lane
Transverse Rumble Strips	EA	$1,000	Assumes 12’ lane
Transverse Rumble Striping	EA	$500	Assumes 12’ lane
Radar Feedback Sign	EA	$7,500	Speed limit sign with "Your Speed" radar feedback sign, assumes solar
High Reflectivity Striping with Raised Pavement Markings	LF	$10	Includes thermoplastic traffic stripe (enhanced wet night visibility) with raised pavement markings

Note: The cost of construction/reconfiguration is too variable to include cost estimates for RCUT or MUT

Table 11-2. Estimated Unit Costs for Active Transportation Recommendations

Improvement	Unit	Estimated Unit Cost	Notes
Class I Shared Use Path	MI	$1,000,000	Assumes 12’ wide path and minor grading
Class II Bicycle Lanes	MI	$75,000	Includes signing and striping on both sides of street, no roadway widening
Class II Buffered Bicycle Lanes	MI	$175,000	Includes signing and striping on both sides of street, no roadway widening
Class III Bicycle Route	MI	$10,000	Includes signing on both sides of street
Class III Bicycle Boulevard	MI	$75,000	Assumes speed tables, sharrows, and curb extensions in addition to signing
Class IV Separated Bikeway	MI	$750,000	Includes signing and striping for a one- or two-way facility with small curb separation, no roadway widening
Sidewalk	LF	$130	Assumes 6’ wide sidewalk with curb and gutter
Transverse Marked Crosswalk	EA	$450	White or yellow
High Visibility Marked Crosswalk	EA	$1,800	White or yellow
Advance Stop or Yield Line	EA	$750	Includes sign and pavement marking
Curb Striping	LF	$7.50	
Curb Ramp	EA	$10,000	
Curb Extension	EA	$4,500	Includes two (one for each corner)
Pedestrian Refuge Island	EA	$3,000	Assume two 6’ by 4’ islands
Rectangular Rapid Flashing Beacon (RRFB)	EA	$75,000	Solar assembly, two units
Signalized Midblock Crossing	EA	$250,000	Solar assembly, two units
Crosswalk Lighting	EA	$45,000	Includes one light; for most crosswalks assume two lights are needed, or three lights for wide streets or where a median refuge is provided
Signs	EA	$600	
Green Conflict Markings	EA	$3,000	Assume 6’ by 50’, including a white edge line
Pedestrian Hybrid Beacon	EA	$100,000	Solar assembly, two units, includes signage and crossing markings

Comprehensive Monetized Benefit Assessment

Monetized Safety Benefits

Table 11-1 presents safety countermeasure monetized benefits estimated over a five-year span. The collision reduction benefit was monetized using the KABCO injury scale, and the collision costs assigned to each severity in the Highway Safety Manual.

Table 11-3. Monetized Benefit of Safety Countermeasures

Improvement Category	Corridor	Locations	Collisions Reduced		
			Fatal	Injury	PDO
Motorized Improvements	Motorized Improvement Subtotal		$32,071,200	$13,746,000	$1,406,000
	Academy	Intersections	$8,017,800	$4,503,000	$266,400
		Segments	$8,017,800	$1,738,000	$133,200
	Manning	Intersections	-	$3,318,000	$355,200
		Segments	$16,035,600	$4,187,000	$651,200
Bicycle and Pedestrian Improvements	Bike/Pedestrian Improvement Subtotal		$4,008,900	$2,844,000	-
	Academy	Intersections	-	$553,000	-
		Segments	$4,008,900	$1,185,000	-
	Manning	Intersections	-	$79,000	-
		Segments	-	$1,027,000	-
Total per Severity			**$36,080,100**	**$16,590,000**	**$1,406,000**
				Grand Total	**$54,076,100**

Monetized Bicycle Mode Shift Benefits

Monetized Induced Bicycle Demand Benefits

NCHRP Report 552 presents guidance on translating the demand and benefits research to a benefit cost analysis approach for bicycle facility investments[16]. The methodology results in annual monetized benefits associated with mobility, health, recreation, and decreased auto use expected to result from new bicycle facilities. Based on the sketch planning method presented in NCHRP Report 552, and using the estimated population and induced demand estimates presented in Chapter 10, the annual mobility, health, recreation, and decreased auto use benefits expected to results from the proposed bicycle facilities are estimated and reported as monetized benefits at high, moderate and low levels. Each of the anticipated benefits associated with the induced bicycle demand estimated to result from the facilities proposed in The ETCIS are described in the following sections.

[16] NCHRP Report 552, Chapter 4

Mobility Benefits

Mobility benefits represent the time cost associated with shift to given bicycle facility type for the total number of commute trips over a commute year for new and existing bicyclist commuters[17]. The mobility benefits consider the estimated existing and induced demand and reflects the annualized time in dollars that a new or existing bicyclist commuter is willing to spend to access the new facility. The estimated mobility benefits associated with the facilities proposed in The ECTIS are presented in Table 11-4.

Table 11-4: Mobility Benefits Summary - All Facilities

	Separated Facilities	Class II Facilities	All Facilities
Existing Bicyclist Commuters	707	1258	1965
Total New Bicyclist Commuters	214	376	590
Value of Time[1]	$13.65	$13.65	$13.65
Weeks per Year	47	47	47
Day per Week	5	5	5
Trips	2	2	2
Number Minutes Commuter Willing to Spend to Access Facility[2]	20.38	18.02	Specific to facility
Per Trip Benefit[3]	$4.64	$ 4.10	Specific to facility
Annual Mobility Benefit Per Facility Type[4]	**$2,006,980**	**$3,148,372**	**$5,155,353**

Notes:

1. 2016 Caltrans Economic Vehicle Operation Cost Parameters

2. NCHRP Report 552 Appendix D

3. Number Minutes Commuter Willing to Spend to Access Facility x (Value of Time/60)

4. Number Minutes Commuter Willing to Spend to Access Facility x (Value of Time/60) x (existing bicycle commuters + new bicycle commuters) x 47 commute weeks per year x 5 commute days per week x 2 commute trips per day

Health Benefits

Health benefits represent the cost savings from physical activity benefits associated with induced demand anticipated to result from the proposed bicycle facilities. The annual health benefit is calculated by multiplying the annual per capita cost savings by the total number of new Bicyclists anticipated with the proposed bicycle facilities. Annual health benefits are presented in Table 11-5.

[17] NCHRP Report 552, Chapter 4; NCHRP Report 552 Appendix D.

Table 11-5. Health Benefits Summary - All Facilities

	Separated Facilities	Class II Facilities	All Facilities
Total New Bicyclists, High	1027	1808	2835
Total New Bicyclists, Moderate	702	1236	1938
Total New Bicyclists, Low	569	1003	1572
Annual Per Capita Cost Savings from Physical Activity[1]	$128	$128	$128
Annual Health Benefits[2]			
Annual Health Benefit, High	**$131,456**	**$231,424**	**$362,880**
Annual Health Benefit, Moderate	$89,856	$158,208	$248,064
Annual Health Benefit, Low	$72,832	$128,384	$201,216

Notes:

1. NCHRP Report 552, Appendix E; Reflects the median value of 10 studies on health-related annual per capita cost savings for physical activity associated with induced bicycle use total new Bicyclists x $128 (annual per capita cost savings from physical activity)

2. NCHRP Report 552, Chapter 4; Appendix E.

Recreation Benefits

Recreation benefits represent the cost savings related to recreational activity for new Bicyclists induced by the new bicycle facilities. The cost of a typical day of recreation, valued at $10 for 1 hour of recreation activity, is based on a variety of outdoor recreational activities. The average adult cycling days, for example, includes roughly 40 minutes of cycling, in addition to some preparation and clean up time, which is consistent.[18] To calculate annualized health benefits, the number of new commuters is subtracted from the number of new bicyclists and multiplied by the typical recreation day cost. The number of new commuters is subtracted from the number of new bicyclists, because the value of the facility to new commuters is already accounted for in the mobility benefit calculated previously. Anticipated recreation benefits associated with induced demand resulting from the proposed facilities is shown in Table 11-6.

[18] NCHRP Report 552, Appendix G

Table 11-6. Recreation Benefits Summary - All Facilities

	Separated Facilities	Class II Facilities	All Facilities
Total New Bicyclists, High	1027	1808	2835
Total New Bicyclists, Moderate	702	1236	1938
Total New Bicyclists, Low	569	1003	1572
Total New Bicyclist Commuters, 2400m	214	376	590
New Recreation Bicyclists [1]			
Total New Recreation Bicyclists, High	813	1432	2245
Total New Recreation Bicyclists, Moderate	488	860	1348
Total New Recreation Bicyclists, Low	355	627	982
Value of an Hour of Recreation	$10	$10	$10
Annual Recreation Benefit, High	**$2,967,450**	**$5,226,800**	**$8,194,250**
Annual Recreation Benefit, Moderate	$1,781,200	$3,139,000	$4,920,200
Annual Recreation Benefit, Low	$1,295,750	$2,288,550	$3,584,300

Notes:

1. Total number of new Bicyclists – total number of new bicyclist commuters

2. Cost of "typical" recreation day, valued at $10 x 365 x (total new Bicyclists – total new commuters)

Decreased Auto Use Benefits

Decreased auto use benefits include the benefits associated with user cost savings, reduced congestion and reduced air pollution. This benefit is calculated based on the benefit per mile associated with vehicle to bicycle mode shift as a function of location and time of day, with congestion savings ranging from zero to five cents per mile and pollution savings ranging from one to five cents per mile depending on conditions.[19] The low end is used for small town and/or rural areas, which is the value used for the analysis in this study. The overall savings per mile is estimated at 1 cent for small town/rural geographies.

To calculate the annual decreased auto use benefit, the number of new commuters is multiplied by the average round trip length, savings per mile, 47 weeks per year, 5 days per week, and 2 trips per day. These benefits are presented in Table 11-7.

[19] Documented in NCHRP Report 552 Appendix G

Table 11-7. Decreased Auto Use Benefits Summary - All Facilities

	Separated Facilities	Class II Facilities	All Facilities
Total New Commuters	214	376	590
Net Benefit Per Mile, Small Town/Rural [1]	$ 0.01	$0.01	$0.01
Average Trip Length[2]	12.20	12.20	12.20
Weeks per Year	47	47	47
Days a Week	5	5	5
Annual Decreased Auto Use Benefit[3]	**$12,243**	**$21,561**	**$33,803**

Notes:

1. NCHRP Report 552, Appendix G

2. 2017 National Household Transportation Survey (NHTS) Average trip length by Urban/Rural Indicator for average of Small Town, Suburban and Rural and 2010 Census division classification "Pacific"

3. New commuters x trip length x 47 weeks per year x 5 days per week x 2 trips per day

Vehicle Miles Traveled (VMT) Reduction

In addition to the monetized benefits associated with decreased auto use, these benefits can also be described in terms of VMT reduction. The estimated VMT reduction can be utilized as an input to calculate air quality benefits using other methods, as well as provides another metric to use as a lens to view decreased auto use benefits associated with bicycle mode shift. VMT reduction benefits are shown in Table 11-8.

Table 11-8. VMT Reduction Benefits – All Facilities

	Separated Facilities	Class II Facilities	All Facilities
New Commuters	214	376	590
Daily Commute Trips [1]	427	752	1,179
Annual Commute Trips [2]	100,349	176,729	277,078
Average Trip Length [3]	12.20	12.20	12.20
Daily VMT [4]	**5,210**	**9,175**	**14,385**
Annual VMT [5]	**1,224,259**	**2,156,088**	**3,380,347**

Notes:

[1] Number of daily commuter x 2 commute trips per day

[2] Number of daily commute trips x 365 days per year

[3] 2017 National Household Transportation Survey (NHTS) Average trip length by Urban/Rural Indicator for average of Small Town, Suburban and Rural and 2010 Census division classification "Pacific"

[4] Daily commute trips x average trip length

[5] Annual commute trips x average trip length

Summary of Monetized Induced Demand Benefits

Annual Benefits

Table 11-9 presents a combined summary of the annualized benefits associated with the two facility types proposed across the study area, representing the estimated mobility, health, recreation, and decreased auto use benefits associated with the proposed bicycle facilities discussed in previous sections. For the purposes of this analysis, the high estimate is used due to the conservative population estimates used, which reflects 2018 population and does not account for future land use growth across the study area. As seen, the total anticipated benefits associated with the proposed bicycle facilities range from $8,974,672 to $13,746,286.

Life Cycle Benefits

Additionally, the annualized benefits described in Table 11-9 should be adjusted to account for the life cycle of the proposed facilities, which is assumed to be a 20-year life cycle. Assuming a 20-year life span, and incorporating a four percent discount rate or P/A Factor to reflect the present worth of future dollars[20], the adjusted benefit is estimated at $191,759,853 for the life cycle of the proposed improvements.

Table 11-9. Total Induced Demand Benefits for All Facilities

Bicycle Facility Benefits	Separated Facilities	Class II Facilities	All Facilities
Annual Mobility Benefit, Off-Street and On-Street Facilities	$2,006,980	$3,148,372	$5,155,353
Annual Health Benefit			
High Estimate	$131,456	$231,424	$362,880
Moderate Estimate	$89,856	$158,208	$ 248,064
Low Estimate	$72,832	$128,384	$ 201,216
Annual Recreation Benefit			
High Estimate	$2,967,450	$5,226,800	$8,194,250
Moderate Estimate	$1,781,200	$3,139,000	$4,920,200
Low Estimate	$1,295,750	$2,288,550	$3,584,300
Annual Decreased Auto Use Benefit	$12,243	$21,561	$33,803
Total Annual Benefit, High	$5,118,129	$8,628,157	$13,746,286
Total Annual Benefit, Moderate	$3,890,279	$6,467,141	$10,357,420
Total Annual Benefit, Low	$3,387,805	$5,586,867	$8,974,672
20-Year Life Cycle Benefit[21]	**$71,397,584**	**$120,362,269**	**$191,759,853**

[20] Consistent with Caltrans Economic Parameters for Transportation Economics B/C Analysis

[21] Based total annual high estimate annualized to a 20-year life cycle using a 4% discount rate

Monetized Vehicle Operations Benefits

Monetization of vehicle operations benefits was calculated for savings directly and indirectly benefiting society associated with delay along the corridor. This monetization has been annualized and is based on 208 weekdays over one year, and is reported for both the northbound and southbound directions for the AM and PM peak hours. The results of this analysis are presented in Table 11-10.

Table 11-10. Delay Time Reduction - Life Cycle Monetized Benefit

Scenario	Delay Reduction Benefit	
Manning Avenue	**Eastbound**	**Westbound**
AM Peak Hour	$103,563.26	$1,853.10
PM Peak Period	$192,947.71	$41,706.73
Total		**$340,070.79**
Academy Avenue	**Northbound**	**Southbound**
AM Peak Hour	$10,276.31	$60,284.33
PM Peak Period	$6,525.39	-$9,661.98
Total		**$67,424.04**
Total (Both)		**$407,494.83**

Monetized Air Quality Benefits

The recommended vehicle operations and active transportation improvements are associated with air quality benefits, which were quantified in terms of reduction in emissions and pollutants, then monetized to an annual average and annualized over 20 years. The results of this analysis are presented in Table 11-11. As seen, the average annual benefit is valued at $679,782, while this benefit over a 20-year life cycle is valued at $13,595,640.

Table 11-11. Air Quality - Monetized Benefits

Emissions Reduction	Average Annual	Total Over 20 Years
CO Emissions Saved	$2,978.53	$59,570.50
CO2 Emissions Saved	$540,652.74	$10,813,054.85
NOX Emissions Saved	$123,487.61	$2,469,752.29
PM10 + PM2.5 Emissions Saved	$7,396.31	$147,926.20
SOX Emissions Saved	$6,490.48	$129,809.66
VOC Emissions Saved	-$1,223.66	-$24,473.24
Total Monetized Reduction Benefit	**$679,782.01**	**$13,595,640.26**

Overall Benefit Cost Summary

A summary of the quantitative benefits that were monetized for the recommended improvements are presented in Table 11-12. The comprehensive benefit-cost for all improvements proposed within the study are presented in Table 11-13. When monetized to a 20-year life cycle, the benefit-cost (or B/C) of the ECTIS Improvements is 5.5

Table 11-12. Monetized Benefits Summary

Benefit Type	Annual Benefit	Life Cycle Benefit
Safety - Crash Reduction	$54,076,100	$108,152,200
Induced Bicycle Demand (Except Air Quality Benefit)	$13,712,483	$191,288,297
Vehicle Delay Reduction	$407,495	$814,989
Air Quality / Emissions Benefit	$679,782	$13,595,640
Economic Benefit	-	$99,036,425
Total	**$68,875,859**	**$412,887,553**

Table 11-13. Comprehensive Benefit-Cost Summary

Total Project Life Cycle Cost	Total Project Life Cycle Benefit
$63,759,446	$412,887,553
Total B/C[22]	**6.48**

[22] Some costs are not included as the cost estimate of the improvement was identified as "Varies" in the planning-level cost estimates.

12. Implementation

This Plan provides a comprehensive vision for changes to the Academy Avenue and manning Avenue to improve mobility and safety. The Plan provides recommendations for infrastructure improvements for each corridor, spanning Fresno County as well as portions of the Cities of Clovis, Sanger, Parlier, Kingsburg, Fowler, Selma, Reedley, and Orange Cove. Accordingly, implementation of the recommendations would be under the purview of each agency for the section of corridor within its bounds. An agency may choose to prioritize recommendations presented within this Plan according to local needs, and guided by local policies and priorities. Agencies may choose to plan implementation of adjoining improvements together to maximize benefit, and may also pursue improvements individually as funding allows. This Plan was formulated to provide a set of improvements that are beneficial each in their own right, and may be pursued piecemeal. Over time as additional improvements are implemented, the overall benefit will grow.

This chapter is intended to provide an overall sense of tools for implementing the recommendations within this Plan. These tools include obtaining funding to construct improvements, as well as incorporating improvements into maintenance programs.

Funding

A variety of funding sources exist. Many are limited to new construction, though some may also offer funds for maintenance of existing facilities.

Local and Regional Programs

Local and Regional Tax Measures

Many local and county governments propose tax measures to their constituents from time to time to fund important infrastructure improvements. Tax measures may be tightly defined, supporting a specific type of improvement or location, or may be more general, depending on the needs of the agency. These funds, when approved, are collected over time and are used towards the purpose outlined in the measure, often for goals such as to reduce traffic congestion, improve public transit, fix local streets and roads, implement bike path and trail upgrades, repair sidewalks, and improve good movement corridors.

Impact Fees

Local agencies with areas of developing land can implement impact fees, which help manage the impact of new development on transportation facilities. These fees are established and managed according to adopted policies, directly linking the development to the impact and associated cost via a “nexus” calculation.

State and Federal Programs

Active Transportation Program (ATP)

The ATP was created by SB 99 to encourage increased use of active modes of transportation, such as walking and biking. ATP consolidated various transportation programs into a single program and was originally funded at about $123 million a year from a combination of state and federal funds. Senate Bill 1 (SB 1) directed an additional $100 million annually to the ATP (see SB 1 – Road Repair and Accountability Act, below). The goals of the ATP include, but are not limited to, increasing the proportion of trips accomplished by walking and biking, increasing the safety and mobility of non-motorized users, advancing efforts of regional agencies to achieve greenhouse gas (GHG) reduction goals, enhancing public health, and providing a broad spectrum of projects to benefit many types of users including disadvantaged communities. Application cycles occur approximately every two years, typically in late spring or summer.

Affordable Housing and Sustainable Communities Program (AHSC)

The Affordable Housing Sustainable Communities (AHSC) Program funds land-use, housing, transportation, and land preservation projects to support infill and compact development that reduce GHG emissions. The program assists project areas by providing grants and/or loans, or any combination thereof, that will achieve GHG emissions reductions and benefit Disadvantaged Communities through increasing accessibility of affordable housing, employment centers, and key destinations via low-carbon transportation resulting in fewer vehicle miles traveled through shortened or reduced trip length or mode shift from single occupancy vehicle use to transit, bicycling, or walking. The three Project Area types include:

- Transit Oriented Development Project Areas
- Integrated Connectivity Project Areas
- Rural Innovation Project Areas

SB-1 Road Repair and Accountability Act

The “Road Repair and Accountability Act” of 2017 (SB 1) invests $54 billion over a decade to repair roads, improve traffic safety, and expand public transit systems across California, with funds split equally between state and local investments. SB 1 directs $100 million annually to the ATP to fund infrastructure projects, program implementation, and plan development to increase bicycling and walking.

Surface Transportation Block Grant Program (STBG)

The Surface Transportation Block Grant program (STBG) provides flexible funding that may be used by states and localities for projects to preserve and improve the conditions and performance on any federal-aid highway, bridge, and tunnel projects on any public road; pedestrian and bicycle infrastructure; and transit capital projects including intercity bus terminals.

Highway Safety Improvement Program (HSIP)

The Highway Safety Improvement Program (HSIP) is a core Federal-aid program with the purpose to achieve a significant reduction in traffic fatalities and serious injuries on all public roads, including non-State-owned roads and roads on tribal land. The HSIP requires a data-driven, strategic approach to improving highway safety on all public roads with a focus on performance.

Local Highway Bridge Program (HBP)

The Local Highway Bridge Program (HBP) replaces or rehabilitates public highway bridges over waterways, other topographical barriers, other highways, or railroads when the State and the Federal Highway Administration (FHWA) determine that a bridge is significantly important and qualifies under the HBP program guidelines. Reimbursable scopes of work include replacement, rehabilitation, painting, scour countermeasures, and preventative maintenance activities.

Sustainable Transportation Planning Grants

Caltrans Sustainable Transportation Planning Grants are available to communities for planning, study, and design work to identify and evaluate projects, including conducting outreach or improving pilot projects. Communities are typically required to provide an 11.47 percent local match, with staff time or in-kind donations both eligible to be used towards the match.

Office of Traffic Safety Grants

Office of Traffic Safety (OTS) Grants are supported by federal funding. They can be used to establish new traffic safety programs, expand ongoing programs, or address deficiencies in current programs. Eligible grantees include government agencies, state colleges and universities, local agencies, school districts, fire departments, and public emergency services providers. Grant funding cannot replace existing program expenditures, nor can traffic safety funds be used for program maintenance, research, rehabilitation, or construction. Grants are awarded on a competitive basis, and priority is given to agencies with the greatest need. Evaluation criteria to assess need include potential traffic safety impact, collision statistics and rankings, seriousness of problems, and performance on past OTS grants.

Maintenance

Routine maintenance, repair, and upgrade projects can be a low-cost way to implement recommendations in this Plan. When the County or a City is planning to conduct maintenance, repairs, or update the Academy or Manning Corridors, the agency can review the recommendations within this Plan and determine if any of the desired recommendations can be incorporated into the current project without significant additional cost. Typically, improvements such as striping and signage changes can be incorporated at very low cost. This is an especially helpful method for adding dedicated bicycle facilities along a roadway.