Reverse Triangle Transportation Area Plan

Final Plan

July 2021

REVERSE TRIANGLE
TRANSPORTATION AREA PLAN

Acknowledgments

This plan was prepared for

Fresno Council of Governments — Fresno COG

City of Fresno — City of Fresno

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Executive Summary

This Executive Summary provides an overview of the following ***Reverse Triangle Transportation Area Plan (RTTAP)*** and highlights the resulting transportation improvement recommendations for the area. This plan is organized into eight chapters. Upon review of past planning documents and establishment of evaluation performance metrics (Chapter 2), an extensive public outreach effort (Chapter 3) and a thorough assessment of existing conditions was conducted (Chapter 4). These combined efforts led to the identification and evaluation of a focused group of transportation improvement opportunities (Chapter 5). A list of transportation improvements and strategies for the RTTAP Study Area were identified (Chapter 6) and evaluated for benefits and costs (Chapters 7 and 8). The RTTAP document itself and its appendices should be referenced for additional detail on methodology and findings.

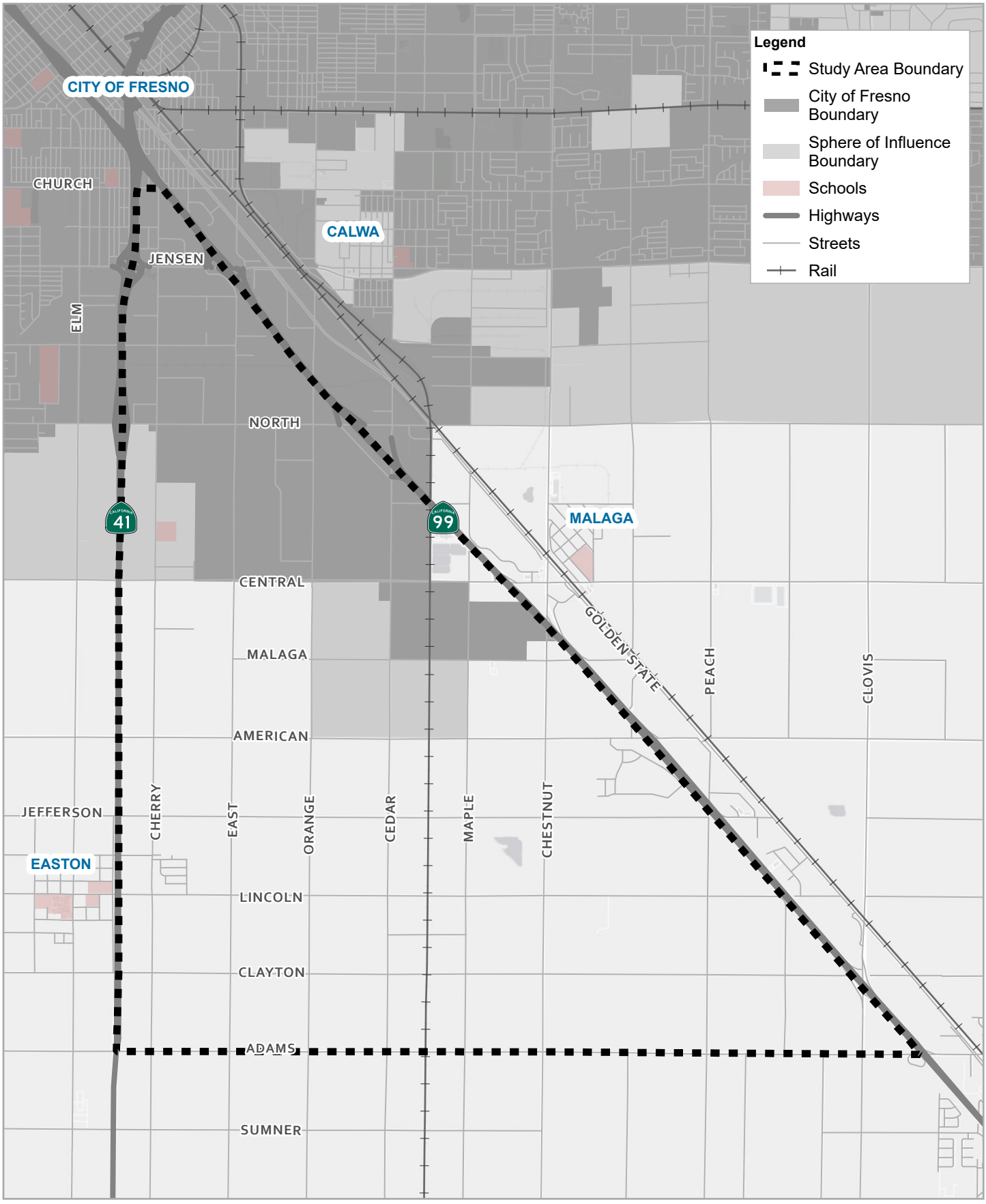
Introduction

In 2018, Fresno Council of Governments (FCOG), in partnership with the City of Fresno and County of Fresno, received a Caltrans grant to explore opportunities to improve access and mitigate potential negative effects from planned industrial development within the RTTAP Study Area. Since that time, a specific plan process was initiated in a portion of the plan area called the South Central Specific Plan. Because that plan is not yet adopted, the RTTAP relies upon the most recently adopted plans for the area, which are the City of Fresno General Plan and the Fresno County General Plan for land use assumptions. The RTTAP Study Area, as shown in Figure ES-1, is located within central Fresno County and includes approximately 9,500 acres of developed and undeveloped land within both the City of Fresno and county jurisdictions. The RTTAP Study Area includes transportation facilities between and connecting to the State Route (SR) 99 and SR 41 corridors from Church Avenue to the north and Adams Avenue to the south.

Smart and equitable transportation planning within the Reverse Triangle area will set the stage for future growth opportunities for the Fresno region. With improved access to be provided by the Caltrans-initiated SR 99 interchange upgrades within the RTTAP Study Area, this plan serves as a crucial step to achieving a comprehensive and integrated circulation network within and to the city. Existing development is concentrated in the northern portion of the RTTAP Study Area (north of North Avenue), but recent additions to the area, including Amazon and ULTA distribution centers, show a trend to continue industrial expansion southward.

Although the RTTAP Study Area is predominately industrial in character, ensuring safe and accessible multimodal connections to existing residential communities and local schools is an essential component of this plan, especially considering the intensity of truck travel within the area. A significant portion of the RTTAP Study Area remains rural farmland with accompanying single-family homes, which are largely clustered into small subdivisions within the unincorporated County south of Central Avenue. In addition, residents from surrounding neighborhoods travel within the Study Area to reach destinations such as employment centers, schools, and retail. The RTTAP Study Area and the neighboring areas have populations that could be considered disadvantaged communities based on a multitude of statewide metrics including income and poverty status, minority status, exposure to pollutants, and vehicle access (Figure ES-2). California Senate Bill (SB) 535 and Assembly Bill (AB) 1550 aim to ensure that investments in transportation projects aim to improve public health, quality of life, and economic opportunity in California's most burdened communities, while reducing criteria pollutants that can negatively contribute to climate change. The RTTAP aims to mitigate potential negative effects from planned industrial development to these communities within the Study Area.

The RTTAP therefore identifies transportation infrastructure improvements and mobility service programs and strategies to ensure that future anticipated growth within the Study Area will provide opportunities to improve connectivity, accessibility, and quality of life of the existing communities.



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REVERSE TRIANGLE
TRANSPORTATION AREA PLAN

FRESNO COUNCIL OF GOVERNMENTS

REVERSE TRAINAGLE TRANSPORTATION AREA PLAN

RTTAP STUDY AREA

Project No. 11192258
Revision No. -
Date JULY 2021

FIGURE ES-1

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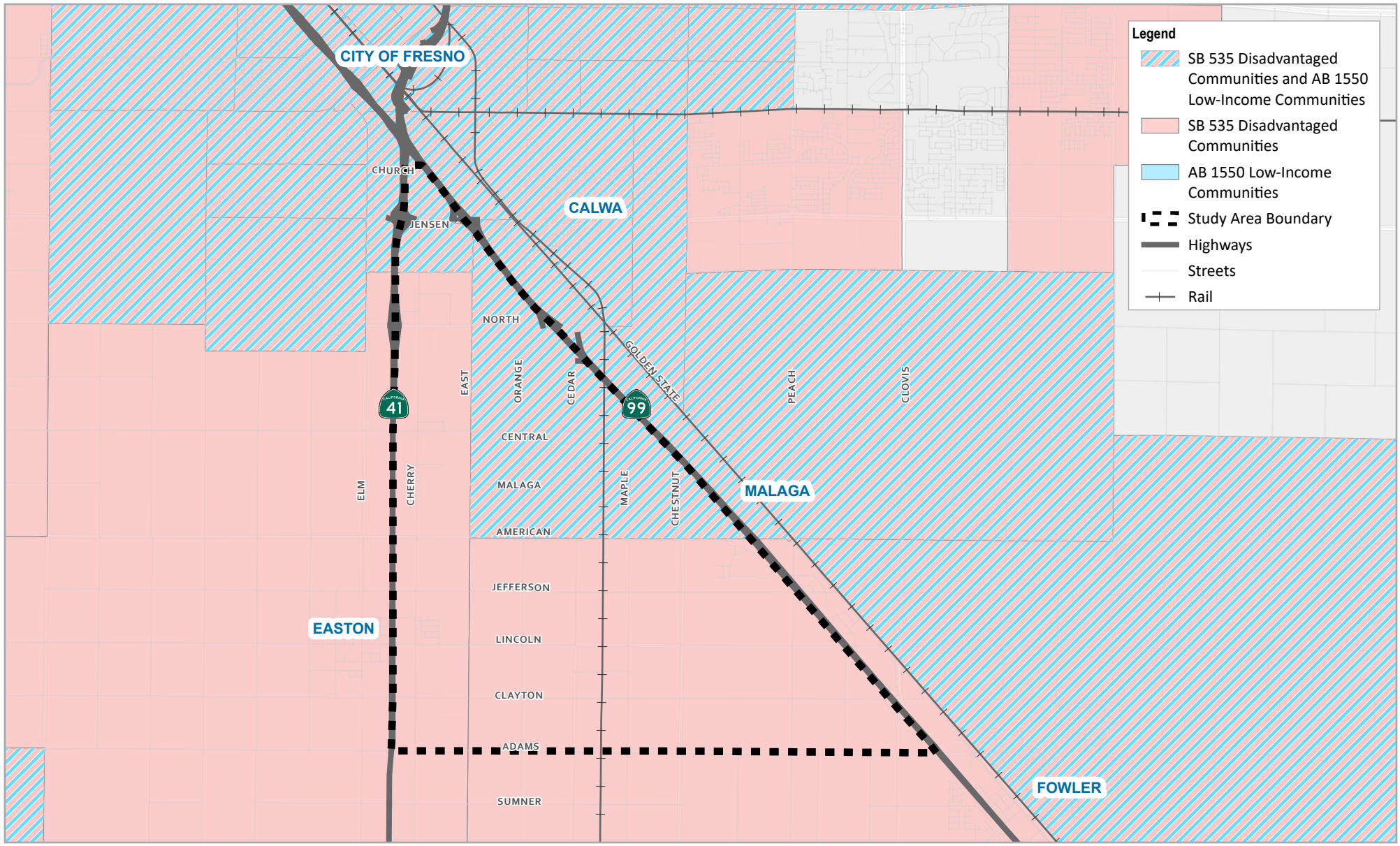

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REVERSE TRIANGLE
TRANSPORTATION AREA PLAN

FRESNO COUNCIL OF GOVERNMENTS

REVERSE TRIANGLE TRANSPORTATION AREA PLAN

DISADVANTAGED & LOW-INCOME COMMUNITIES

Project No. **11192258**
Revision No. **-**
Date **JULY 2021**

FIGURE ES-2

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Plan Objective

The RTTAP identifies transportation improvements, programs, and strategies with multi-jurisdictional support and community engagement that achieve the following objectives:

- Provide an circulation network that prioritizes the health and safety of the community by creating appropriate transitions between new development and existing uses, including residential communities and schools.
- Mitigate air quality and congestion impacts by encouraging mode shares away from single occupant vehicles to active modes via bicycle and pedestrian improvements and public transportation services (consistent with Caltrans Deputy Directive DD-64-R2 and the FCOG policies for implementation of “Complete Streets”).
- Implement strategies to mitigate negative impacts to existing disadvantaged communities (per CalEnviroScreen metrics) related air quality, congestion, and safety due to the industrialization of the RTTAP Study Area.
- Improve connectivity and access for disadvantaged populations (per SB 535 and AB 1550 metrics) by ensuring that individuals can access basic amenities and key destinations related to employment, health, or personal trips.
- Identify roadway and intersection improvements that are consistent with local and regional plans to support continued growth and improve quality of life for residents, employees, and visitors of the RTTAP Study Area.

In line with these objectives, a variety of improvements and strategies were developed for the following categories:

- **Intersection operational improvements** to address existing and future deficiencies related to vehicular delay.
- **Multimodal and safety improvements** for roadways and intersections along major corridors to improve connectivity and safety for bicycle, pedestrian, vehicular, truck, and transit travel.
- **Transit and travel demand management (TDM) strategies** to provide efficient transportation choices that result in reducing traffic congestion, pollution, and commuting stress.

The RTTAP inventories known planned and programmed corridor improvements and existing mobility programs and strategies identified in prior planning efforts and makes additional recommendations that are feasible, equitable, cost-effective, and have community support. Vehicular (automobile and truck) circulation, multimodal and safety improvements, and transit and travel demand management (TDM) services were key focus areas of the RTTAP. Requisite technical information consistent with State and Federal grant program guidelines and implementation phasing of the multimodal improvement package were also key elements of the RTTAP. The preferred multimodal package of improvements could serve to systematically guide future key corridor programming decisions within the planning area over a 20-year timeframe based on available funding. This planning document serves to provide the City of Fresno and Fresno County with community-led options to mitigate potential negative effects from planned industrial development within the RTTAP Study Area.

Plan Approach

The RTTAP examines the existing and future operational and safety performance of Reverse Triangle area and provides improvement recommendations using the Caltrans Smart Mobility Framework approach, a performance-based analysis used to evaluate transportation infrastructure improvements. The Smart Mobility Framework is premised on six key objectives: Location Efficiency; Reliable Mobility; Health and Safety; Environmental Stewardship; Social Equity; and, Robust Economy. The Smart Mobility Framework process is consistent with both the 2018 Comprehensive Multimodal Corridor Plan Guidelines and the SB 1 Solutions for Congested Corridors Program Guidelines from the California Transportation Commission (CTC). The objectives were evaluated using both qualitative and quantitative metrics to inform the overall performance of the RTTAP improvement recommendations.

The RTTAP builds on a solid foundation of plans, policy documents, and community outreach efforts already completed for the Study Area. Future multimodal improvements include planned projects identified in existing mobility plans, such as the local and regional active transportation plans. Other multimodal improvements include the "Rails to Trails" project, which is a proposed shared-use trail (City of Fresno ATP) along the existing railroad track alignment south of Annadale Avenue, providing an east-west connection from Cherry Avenue to Golden State Boulevard.

RTTAP Multimodal Improvements

The RTTAP identifies multimodal improvements to the major east-west and north-south corridors and their respective intersections necessary to accommodate continued growth while balancing industrial and local community mobility needs.

RTTAP Major Transportation Facilities

Existing east-west roadways are spaced approximately 1-mile apart and include the following: Church Avenue, Jensen Avenue, North Avenue, Central Avenue, American Avenue, Lincoln Avenue, and Adams Avenue. Existing north-south roadways are spaced approximately ½-mile apart and include the following: Cherry Avenue, East avenue, Orange Avenue, Cedar Avenue, and Chestnut Avenue. Improvement recommendations for major corridors providing direct access to the RTTAP Study Area were also evaluated, such as Elm Avenue. The following is a list of the major transportation corridors within the RTTAP Study Area:

- Church Avenue
- Jensen Avenue
- North Avenue
- Central Avenue
- American Avenue
- Lincoln Avenue
- Adams Avenue
- Cherry Avenue
- East Avenue
- Orange Avenue
- Cedar Avenue
- Chestnut Avenue

The following categories were utilized to identify improvement opportunities for the RTTAP Study Area roadways and intersections, which are described in further detail in Chapter 5. The comprehensive list of improvement projects and locations is provided in Chapter 6, and the projects are evaluated in Chapter 7 and monetized benefits are presented in Chapter 8.

Operational Improvements

Intersection operational improvements are identified to address existing and future deficiencies related to vehicular delay along RTTAP Study Area roadways.. These improvements were determined based on future operational analysis using Year 2042 volume forecasts from the Fresno COG ABM model and are consistent with the City of Fresno General Plan (2014) planned roadway improvements. In general, **cumulative traffic operating conditions indicate that study intersections generally meet current LOS thresholds within the RTTAP Study Area.** Deficiencies noted were shown primarily along SR 99 interchange off/on ramps and along Hwy 41. Recommended improvements at these intersections include changes to lane geometries which could be accommodated by re-striping or widening of intersection approaches to accommodate additional left/right turn lanes, converting existing intersection control to a signalized control, and optimizing signalized intersections.

Additionally, **Caltrans is working on several interchange studies along SR 99** within the Study Area limits that will identify recommended improvements at the following interchanges: North Avenue and American Avenue. Additional information is forthcoming and will be available in future publications.

No additional intersection or roadway improvements were identified to address capacity or operational deficiencies along the major corridors within the RTTAP Study Area. **However, the RTTAP provides updated roadway improvement standards for enhanced roadway cross-sections as well as multimodal improvements at intersections within the Study Area to address existing and future issues related to accessibility, connectivity, and safety** as discussed in the following paragraphs. These improvements do not include widening roadways to accommodate additional travel lanes.

Multimodal Improvements

Roadway and intersection multimodal improvements include a variety of facility types that improve accessibility, comfort level of travel, and safety for bicyclists and pedestrians by improving visibility, slowing vehicular traffic, and increasing separation between motorists and non-motorists with painted or physical buffers. Roadway and intersection improvements are recommended for the RTTAP Study Area's major transportation corridors based on factors including planned number of travel lanes, planned two-way left-turn lanes, and anticipated bicycle and pedestrian activity associated with existing and future development. *Example images of improvement types are provided for Buffered Class II Bicycle Lanes, Bicycle Approaches at Intersections, and Pedestrian Crossings with Bulb-Outs and Curb Ramps (see Chapter 5 for a comprehensive list of improvements).*

Roadway Improvements

Buffered Class II Bicycle Lanes

Roadway improvement standards identify cross-sections for varying roadway classifications. Cross-sections refer to the basic elements or features of a roadway within the right-of-way width, such as width and number of travel lanes, bicycle lanes, sidewalk, landscaping, etc. RTTAP-specific roadway improvements standards were development in coordination with FCOG, the City, and County to identify opportunities for enhanced bicycle and pedestrian street features while balancing requirements for vehicular and truck travel lanes and turn lanes. RTTAP cross-sections and recommended improvement locations are described in further detail in Chapter 5 and Chapter 6, respectively, and are presented in illustrative form on **Figure ES-3**. *Note: These improvement standards are not intended to supersede current City of Fresno or Fresno County roadway classifications.*

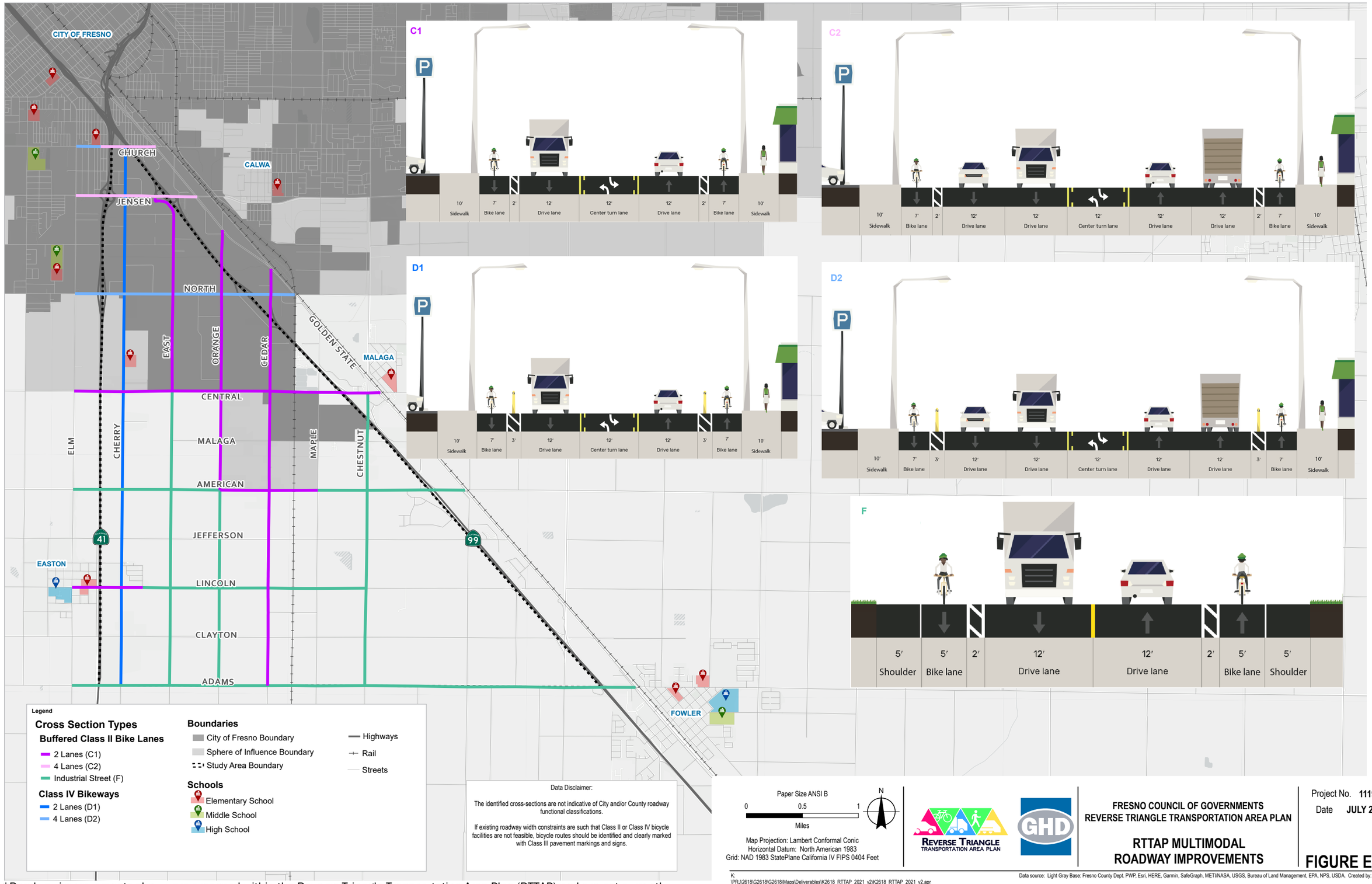
Intersection Improvements

Bicycle Approach with Conflict Markings

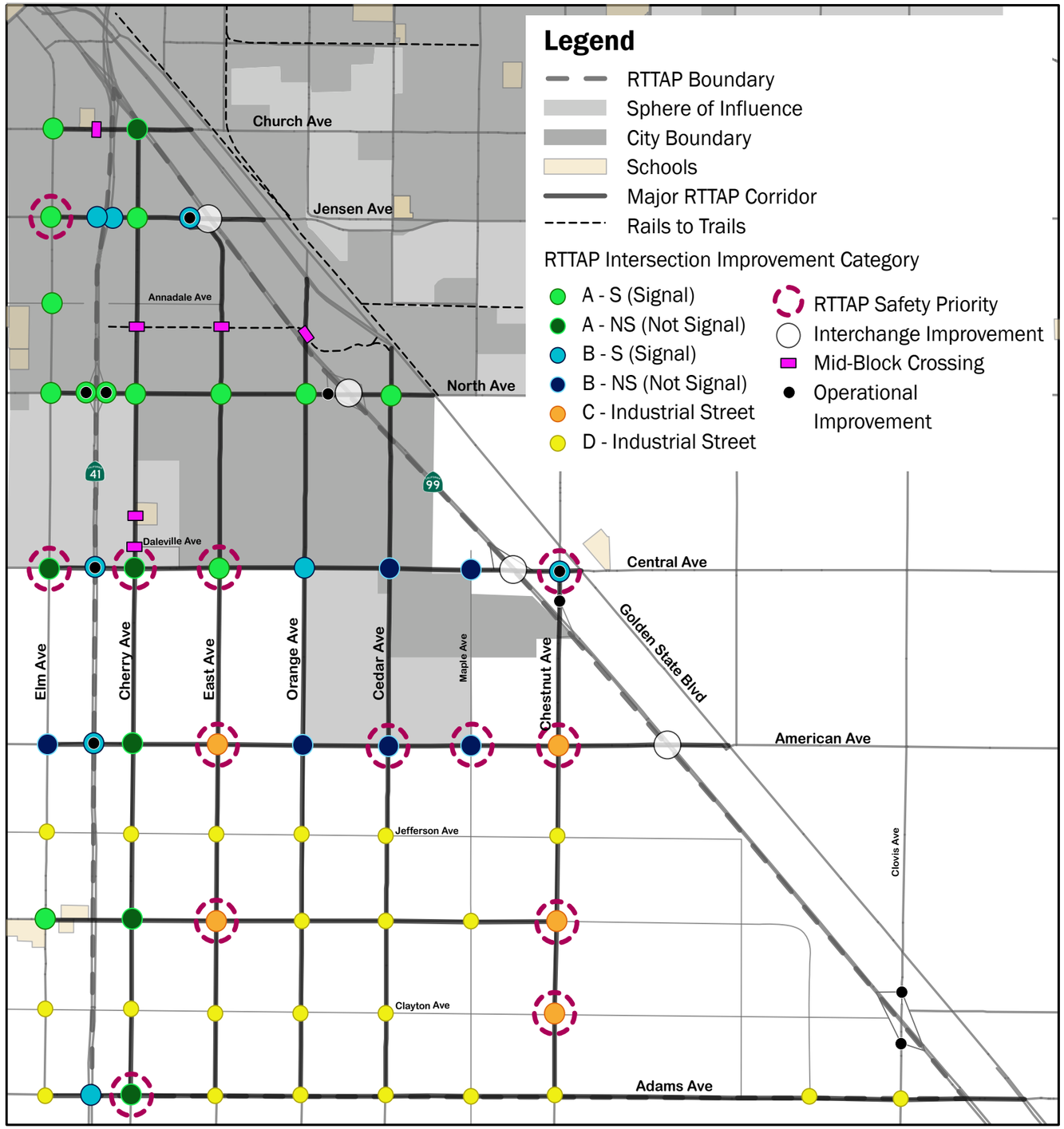
Intersection improvements are identified for intersections within the RTTAP Study Area at locations where two major transportation corridors intersect, as well as where major corridors intersect Maple Avenue, Jefferson Avenue, and Clayton Avenue. Intersection improvements were determined based on corresponding roadway improvement projects, anticipated multimodal activity, and crash history analysis.

Bulb-Out Example in Fresno

Multimodal intersection improvements include safety and visibility measures aimed at providing clear boundaries between motorists and bicyclists and pedestrians at these high-conflict areas, as well as alerting motorists of various traffic control types as they approach the intersection. Intersection improvements are grouped into categories for both signalized ("S") and unsignalized (or "not signal", "NS") intersections. Priority locations for multimodal and safety improvements were determined based on crash analysis for the RTTAP Study Area. RTTAP intersection improvement categories and recommended improvement locations are described in further detail in Chapter 5 and Chapter 6, respectively, and are presented in illustrative form on **Figure ES-4.**



*Roadway improvements shown are proposed within the Reverse Triangle Transportation Area Plan (RTTAP) and are not currently planned by the City of Fresno or Fresno County.



*Intersection improvements shown are proposed within the Reverse Triangle Transportation Area Plan (RTTAP) and are not currently planned by the City of Fresno or Fresno County. Intersection traffic control type (i.e., traffic signal or stop-control) are based on existing conditions. Additional "Operational Improvements" (shown on the map) are discussed in detail in the RTTAP document, and may involved changes to traffic control type. Caltrans-initiated interchange improvements are also shown.
Note: The intersection of Cherry Avenue at Central Avenue is currently planned to be signalized within the City of Fresno transportation fee program.

Intersection Improvement Category	
A - S	**Comprehensive Multimodal/Safety Improvements - Signalized Intersection** Along enhanced primary multimodal routes (with sidewalks and Class IV Bikeways) and/or near schools.
A - NS	**Comprehensive Multimodal/Safety Improvements - Unsignalized Intersection** Along enhanced primary multimodal routes (with sidewalks and Class IV Bikeways) and/or near schools.
B - S	**Multimodal/Safety Improvements - Signalized Intersection** Locations along multimodal routes (with sidewalks and Buffered Class II Bike Lanes).
B - NS	**Multimodal/Safety Improvements - Unsignalized Intersection** Locations along multimodal routes (with sidewalks and Buffered Class II Bike Lanes).
C	**Priority Industrial Street Bicycle/Safety Improvements - Unsignalized Intersection** Locations along Industrial Streets with bicycle lanes and considered a safety priority for vehicular travel.
D	**Industrial Street Safety Improvements - Unsignalized Intersection** Locations along Industrial Streets with bicycle lanes.

Note: Priority locations determined based on evaluation of crash data (2012-2017) for both multimodal and vehicular crashes that occurred at or near intersections along the major RTTAP transportation corridors.

Type	Improvement	Intersection Improvement Category					
		A - S	A - NS	B - S	B - NS	C	D
Bicycle	Bicycle Box (at Signal)	X	n/a		n/a	n/a	n/a
	Bicycle Detection/Actuation (at Signal)	X	n/a		n/a	n/a	n/a
	Conflict Area Markings (at Intersection Crossings/Approaches	X	X	X	X	X	
Pedestrian	Ped Countdown Signal Heads	X	n/a	X	n/a	n/a	n/a
	Leading Pedestrian Interval (LPI) at Signal	X	n/a	X	n/a	n/a	n/a
	Median Refuge Island at Stop-Controlled Intersection	n/a	X	n/a			
	Curb Extensions (Bulb-outs)	X	X	X	X		
	Curb Ramps	X	X	X	X		
	High Visibility Crosswalks	X	X	X	X		
Additional Safety Measures	Add/Improve Intersection Lighting	X	X	X	X	X	X
	Intersection Advance Warning Signs	X	X	X	X	X	
	Flashing Beacon at Stop-Controlled Intersection	n/a	X	n/a	X	X	
	Install Turn Lane	n/a	X	n/a	X	X	
	Conduct Traffic Signal Warrant Analysis	n/a	X	n/a	X	X	
	Conduct Multi-Way Stop Warrant Analysis	n/a	X	n/a	X	X	

Note 1: Improvements in this list do not preclude the need to meet warrants prior to installation of new traffic control devices. Analysis conducted as part of this study determined the need for vehicular operational improvements at specified locations (see Figure 3). Additional traffic control improvements to address vehicular, bicyclist, and pedestrian safety should be evaluated using methodology presented in the MUTCD.

Note 2: At existing built-out intersections, improvements should be evaluated for relative feasibility on a case-by-case basis.

Note 3: Additional modifications to existing traffic signals and stop-controlled intersections, including restriping projects, curb return modifications, and traffic signal modifications, are assumed at all intersections.

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REVERSE TRIANGLE TRANSPORTATION AREA PLAN

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FRESNO COUNCIL OF GOVERNMENTS
REVERSE TRIANGLE TRANSPORTATION AREA PLAN

RTTAP MULTIMODAL INTERSECTION IMPROVEMENTS

Project No. 11192258
Date JULY 2021

FIGURE ES-4

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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

Safety improvements

The abovementioned multimodal improvements can assist in improving corridor safety for bicyclists and pedestrians primarily by improving traveler visibility (i.e., via pavement conflict markings, bulb-outs, and high visibility pedestrian crossings) and increasing separation between motorists and non-motorists (i.e., separated bikeways, buffered bike lanes, and sidewalk improvements). Additional safety improvements address vehicular movements (such as turns) by providing two-way left-turn lanes on the majority of RTTAP Study Area corridors where turns into and out of industrial sites and employment centers are anticipated. On industrial streets within the County, roadway cross-sections should be improved with paved shoulders for the purposes of providing additional effective turning radii at intersections and emergency stopping space for vehicles.

Additional safety improvements were recommended for the safety priority intersections and roadway segments that were identified as safety priorities based on either the frequency of crashes, crash severity, or history of bicycle or pedestrian crashes. Safety improvements are evaluated in terms of their relative crash reduction potential for roadway segments and intersections based on Caltrans's *Local Roadway Safety Manual* (Section 4.2) countermeasures.

Transit and Transportation Demand Management (TDM)

Southwestern Fresno is serviced by Fresno Area Express (FAX) and Fresno County Rural Transit Agency (FCRTA); however, the RTTAP Study Area is currently only serviced by FAX routes 34 and 38 along Jensen Avenue, Cherry Avenue, and Church Avenue in the northernmost portion of the Study Area. Additional routes provide service to areas west, east, and north of the Study Area. FCRTA provides public transit service from rural communities to the City of Fresno, including the Coalinga Intercity Transit Route through the community of Easton and the Southeast Transit Route through the community of Fowler. The area is also served by Fresno County EOC through Social Services funding, including overnight hours of door-to-door transit for CalWorks clients working at major employers who operate overnight shifts, when other transit options are not available.

As described in the Fresno COG draft FY 2020/21 Unmet Transit Needs Assessment, FAX has identified the lack of transit service to the North Pointe Business Park as an unmet transit need that is reasonable to meet. Specifically, FAX plans to evaluate and implement transit service options in calendar year 2022 to major employment centers in the project area.

Transit and TDM Strategies

Transit and transportation demand management (TDM) strategies should aim to ensure that individuals can access basic amenities and key destinations related to employment, health, or personal trips. Due to the rural character of much of the RTTAP Study Area, ensuring adequate transportation services to these rural areas is a critical component of this plan. In addition, large employment sites within the RTTAP Study Area, especially within the City of Fresno, create a need to address commute trips. Of total persons employed within the RTTAP Study Area, 99 percent commute from outside of the Study Area boundary. As such, transit service and TDM programs should aim to provide efficient transportation choices that result in reducing traffic congestion, pollution, and commuting stress.

The following goals drive strategies for transit service and TDM programs to improve connectivity and access to the RTTAP Study Area and surrounding areas, with a specific focus on disadvantaged communities:

- **Mitigate Air Quality and Congestion Impacts:** Travel demand is better managed by increasing/encouraging mode shares away from single occupant vehicles to active modes. The RTTAP roadway and intersection multimodal improvements presented in this plan will link individuals to transit and/or TDM services.

- **Improve Connectivity and Access for Disadvantaged Populations:** Implementing the multimodal and safety improvements presented within the RTTAP will promote increased access and connectivity for priority populations. Priority populations are defined by the California Air Resources Board (CARB) as disadvantaged communities, low-income communities, and low-income households, who are especially vulnerable to the impacts of climate change.

To address existing transit needs in the RTTAP Study Area, FAX is currently working on developing short and long-term transit options to serve the major job centers and industrial uses within the area. The following strategies should be considered in coordination with the current AB 617 and South Central Specific Plan planning efforts to improve connectivity and access to the RTTAP Study Area and surrounding areas. These strategies correspond to specific areas within the RTTAP Study Area, and include route extension/addition, transportation demand management (TDM) programs, mobility-as-a-service, programs, and safe-routes-to-school programs.

- **Expand Transit Service:** Consider opportunities to expand FAX fixed route and shuttle-based transit service in the RTTAP Study Area with consideration to anticipated increases in commute trips.
  - *FAX Fixed Route*: Evaluate fixed route service to provide effective and efficient transit service to the major employment areas within the Study Area. Alternative alignments would need to consider: existing road conditions, stop placement and preferred stop locations, ADA accessibility of preferred stop locations, route length, service frequencies, hours of operation, opportunities for transfers to other FAX routes, ridership estimates, operating costs, and sustainable funding sources.
    - Based on the analysis, implement an initial fixed route transit service in calendar year 2022, consisting of either an entirely new FAX route or an extension of an existing FAX route.
    - Monitor land use intensification and road improvements along the initial route over time to determine whether the initial transit service can be refined.
    - Seek a sustainable funding source to continue service operations into the long term.
  - *FAX Commuter Shuttle*: Explore a direct, non-stop, freeway-based commuter shuttle service from Courthouse Park in Downtown Fresno directly to employment areas in the North Pointe Business Park, with hours of operation based shift schedules of major employers three to four times per day, depending upon the season. The commuter shuttle service would travel along either SR-41 or SR-99 for the most direct access and fastest travel times possible. Identify a sustainable funding source to continue service operations into the long term. Shuttle service could start within the next several years, pending funding availability.
- **Public-facing TDM Programs:** Promote existing TDM programs led by Fresno COG and other public agencies including ridesharing programs, carpool and vanpool programs, and demand-response services, such as:
  - Fresno COG “Valleyrides” Ridesharing
  - Carpool Incentive Program
  - Commuter Vanpool Program
  - Agricultural Worker Vanpool Program
  - Senior Taxi Scrip Program
- **Employer-based TDM Programs:** Per San Joaquin Valley Air Pollution Control District, the employer-based trip reduction Rule 9410 (December 17, 2009) requires employers with at least 100 eligible employees at a

worksite to implement programs to reduce vehicle miles traveled (VMT) from private vehicles used by employees to commute to and from their worksites. Employers should promote the education, information, and promotion of the above mentioned TDM programs, including the proposed FAX commuter shuttle service described above.

- **Mobility-As-A-Service:** Provide additional access and connectivity for underserved populations. Strategies to improve connectivity and access include on-demand shuttles to connect individuals to desired destinations. FCRTA recently initiated a community-based shared mobility program" "REV-UP" (rural electric vehicle utilization project) aimed at providing additional mobility services for residents in rural Fresno County.
- **Safe-Routes-To-School:** Encourage school-related trips currently made via car to be made via active modes. Multimodal and safety improvements proposed within the RTTAP plan will provide Class IV protected bikeways and sidewalk along Cherry Avenue, and buffered Class II bike lanes and sidewalk along Lincoln Avenue east/west of SR 41.
- **Connectivity Enhancement:** The bicycle and pedestrian facilities presented in the RTTAP plan should connect to transit route stops to accommodate "first mile" and "last mile" travel (travel between modes to a final destination). In addition, existing and future bus stops should be improved to comply with ADA design standards to ensure ADA-accessible bus stops and comfortable bus shelters.

Truck Re-routing

During public workshops, discussion of truck route designations and possible truck re-routing were brought to the attention of the stakeholders. Benefits of potential truck re-routing, especially along primarily residential corridors and near schools, could play a role in reducing air pollution and improving quality of life for the community. Nearly the entire area identified in this study is also part of the Assembly Bill (AB) 617 Community Air Protection Program. AB 617 aims to direct programs to reduce exposure in communities most impacted by air pollution. The City of Fresno has initiated an AB 617 truck re-route study which includes the RTTAP Study Area to address this need.

The community was selected in the first round in 2017 recognizing the severe air quality problems they face affecting the community's health and overall quality of life. This process included developing a Community Air Monitoring Plan (CAMP) where monitors will be placed throughout the South Central Fresno area boundary to gain a real time understanding of sources and levels of hazardous pollution that residents are exposed to. Additionally, the community also developed a Community Emissions Reduction Plan ("CERP") that is currently awaiting final approval from the California Air Resources Board. This process represents a groundbreaking effort by residents, advocates, and businesses to establish quantifiable emission reduction targets and advance regulatory, enforcement and incentive strategies to reduce exposure to hazardous air emissions by sensitive receptors in several South Fresno neighborhoods.

Public Outreach

The fundamental premise of the Smart Mobility Framework is to ensure that planning or programming decisions for transportation improvements are performance based, transparent, and address sustainable outcomes and objectives. As such, public input was a key component in the development of the RTTAP. The RTTAP outreach effort was robust in its focus on reaching the diverse communities. This outreach effort included four community workshops, a Staff Working Group comprised of all the partner agencies, and a robust online public engagement campaign including an interactive mapping tool. The mapping tool was made available on the project website beginning in early November 2019 and remained "live" through June 2021. The public outreach effort is described in Chapter 3 of this report.

Performance Assessment

The performance metrics selected to evaluate components of the RTTAP preferred multimodal 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. Requisite metrics include bicycle level of traffic stress scores; bicycle mode share; vehicular delay reduction; vehicular travel time; crash reduction benefit; health cost savings; network vulnerability and return on investment.

Community Health & Wellbeing Assessment

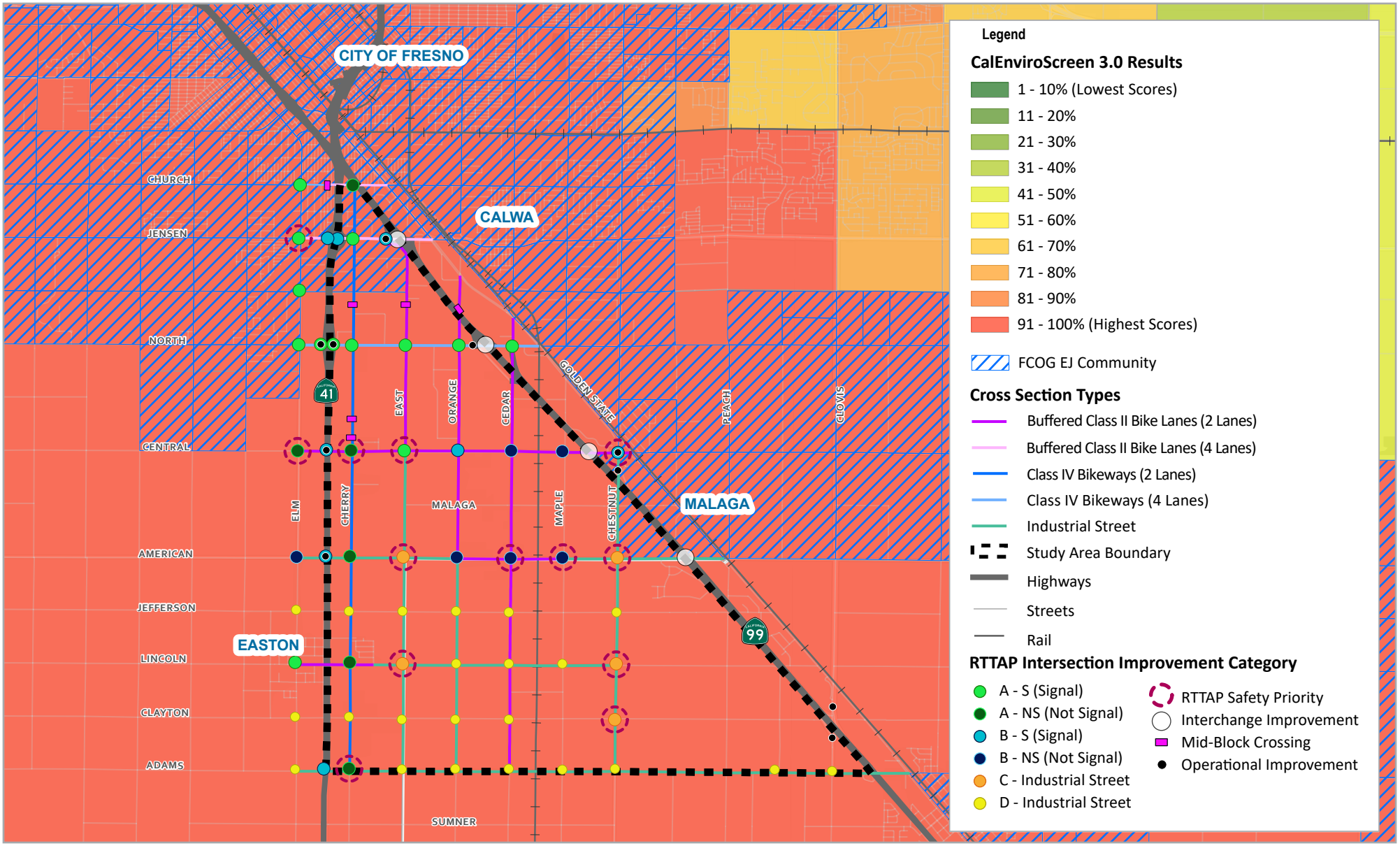
The CalEnviroScreen 3.0 results show that RTTAP Study Area and its nearby communities are among the census tracts that are the most environmentally burdened in the entire State. The entirety of the Study Area and much of the surrounding communities are within the 95th to 100th percentile range for environmental burden. The RTTAP recommended multimodal improvements that can improve air quality by contributing to a reduction in emissions from automobiles polluting the area. Vehicular operations improvements will result in reduced vehicle delay, which could contribute to a reduction in the emissions and pollutants contributing to poor air quality. Less vehicle delay means a reduction in the emissions and pollutants that are associated with congestion. Figure ES-5 shows the CalEnviroScreen 3.0 results in relation to the recommended RTTAP transportation improvements to roadways and intersections.

By providing a well-connected, safe, and attractive multimodal transportation network, the number of vehicles on the road can be reduced because of the mode shift from vehicle to active modes (such as walking and cycling) anticipated to be associated with the proposed facilities. Areas that are walkable and bikeable can reduce the number of vehicle trips that would have otherwise been taken by car in the absence of improvements, resulting in less vehicle emissions. Moreover, in conjunction with bicycle and pedestrian improvements, strategy recommendations to extend transit service to new areas within the Study Area, as well as supporting the development of transportation demand management programs throughout the area, could further reduce the number of vehicle trips and the mobile source emissions that result. In addition to potential air quality benefits, the recommended improvements will support a more livable, safe, and healthy environment for the disadvantaged populations who use the transportation system every day. Ensuring safe and comfortable bicycle and pedestrian facilities (considered “low stress” facilities) will increase the comfort and connectivity of the multimodal transportation system to further encourage walking and cycling.

Social Equity Assessment

All of the RTTAP Study Area is considered disadvantaged based on environmental burden or income, per SB 535 and AB 1550. Additionally, much of the population the Study Area serves lives in a household with no access to a vehicle, which provides challenges for individuals accessing employment, education, or basic services. As discussed previously, the percent of the population living within the Study Area that do not have access to a vehicle is roughly 15 percent in the Study Area’s northernmost Census Tract. However, this figure is even higher in the Census Tracts north of the Study Area – as high as 50 percent for some of the Census Tracts. Moreover, between 23 and 38 percent of the adult population in the Census Tracts covering the Study Area have limited English ability, providing further challenges for these populations.

Due to this lack of equitable access and disadvantaged status, the need for both economic revitalization and the prioritization of improvements that reduce environmental burdens disproportionately impacting disadvantaged communities is fundamental to future prosperity, environmental justice and social equity in the RTTAP Study Area. Given that the RTTAP Study Area facilities serve and are expected to benefit a significant number of disadvantaged populations, particularly those who work in service and agriculture-based industries, all improvements recommended in this Study promote a social equity perspective. Figure ES-6 shows the SB 535 and AB 1550 results in relation to the recommended RTTAP transportation improvements to roadways and intersections.



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REVERSE TRIANGLE
TRANSPORTATION AREA PLAN

FRESNO COUNCIL OF GOVERNMENTS

REVERSE TRIANGLE TRANSPORTATION AREA PLAN

CALENVIROSCREEN RESULTS & FCOG EJ COMMUNITIES

Project No. **11192258**
Revision No. **-**
Date **MAY 2021**

FIGURE ES-5

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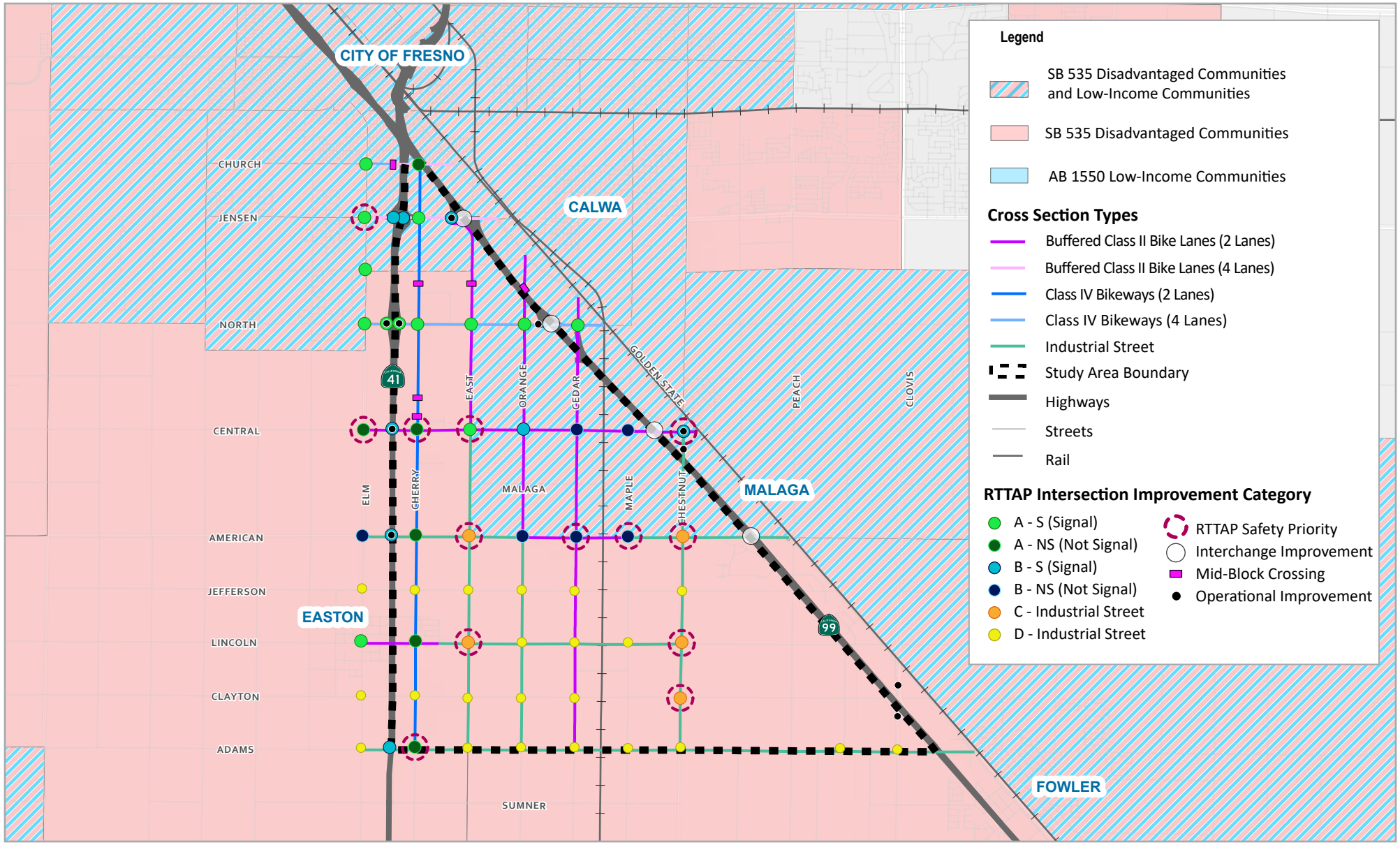
Data source: Light Gray Base: Fresno County Dept. PWP, Esri, HERE, Garmin, SafeGraph, METI/NASA, USGS, Bureau of Land Management, EPA, NPS, USDA; Environmental Justice Data: Fresno COG; CalEnviroScreen Results: . Created by: pthornton



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REVERSE TRIANGLE
TRANSPORTATION AREA PLAN

FRESNO COUNCIL OF GOVERNMENTS

REVERSE TRIANGLE TRANSPORTATION AREA PLAN

DISADVANTAGED & LOW-INCOME COMMUNITIES

Project No. **11192258**
Revision No. **-**
Date **MAY 2021**

FIGURE ES-6

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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; Priority Population Data: CA ARB. Created by: pthornton

Benefit Monetization

The benefits associated with the performance assessment analyses were monetized based on the societal and economic cost information from the Caltrans 2018 Economic Parameters and the Local Roadway Safety manual (2020) cost for crashes. Monetized benefit categories include the following:

- **Multimodal Induced Demand Benefit**: Includes dollar cost savings from bicycle facility improvements associated with reduced vehicle miles travelled, health costs, and value of time savings.
- **Safety Benefit:** Includes dollar cost savings associated with reduction in fatal and injury crashes at priority roadway and intersections determined based on historical crash data.
- **Vehicular Delay Reduction Benefit:** Includes dollar cost savings associated with vehicle hours of delay reduction from intersection operational improvements.
- **Economic Impacts from Plan Investments:** Includes economic benefits from spending associated with the RTTAP improvement investments, and includes direct, indirect, and induced benefits.

All quantified benefits were annualized and projected to reflect a 20-year design year condition (i.e., life-cycle costs). The total estimated monetized benefits related to induced demand, safety improvements, and vehicular delay reduction are $309 million; however, other monetized benefits could be estimated. The total preliminary costs for the proposed infrastructure roadway improvements are $348.5 million and intersection improvements are $28 million. Preliminary cost estimates were note estimated for other programs or strategies recommended within this plan. The total calculated economic benefit associated with the RTTAP recommendation improvement costs could result in over $500 million over the life of the plan implementation.

Table of Contents

Appendices provided under separate cover:

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1 - Introduction

In 2018, Fresno Council of Governments (FCOG), in partnership with the City of Fresno and County of Fresno, received a Caltrans grant to explore opportunities to improve access and mitigate potential negative effects from planned industrial development within the RTTAP Study Area. Since that time, a specific plan process was initiated in a portion of the plan area called the South Central Specific Plan. Because that plan is not yet adopted, the RTTAP relies upon the most recently adopted plans for the area, which are the City of Fresno General Plan and the Fresno County General Plan for land use assumptions. The RTTAP Study Area, as shown in Figure ES-1, is located within central Fresno County and includes approximately 9,500 acres of developed and undeveloped land within both the City of Fresno and county jurisdictions. The RTTAP Study Area includes transportation facilities between and connecting to the State Route (SR) 99 and SR 41 corridors from Church Avenue to the north and Adams Avenue to the south.

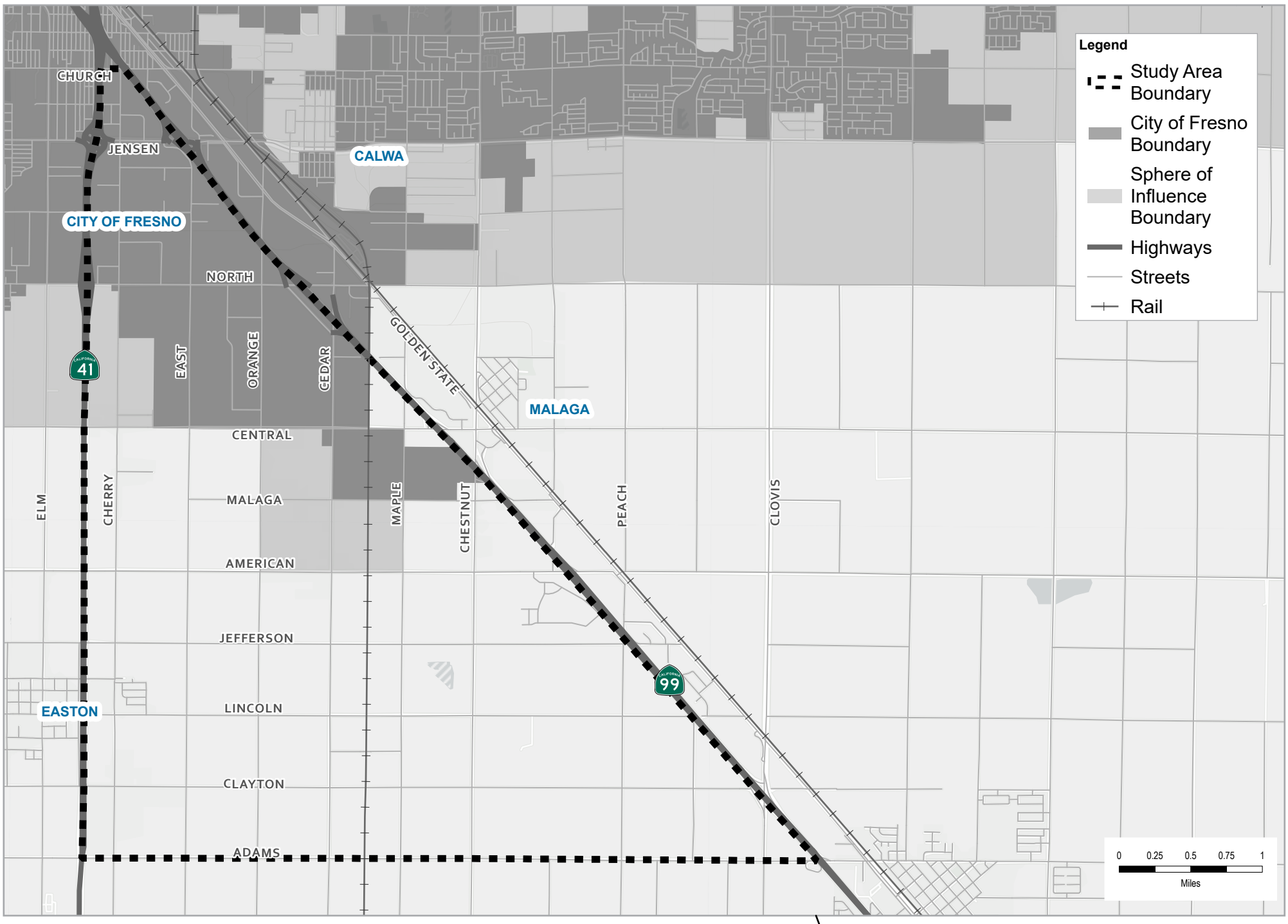
Smart and equitable transportation planning within the Reverse Triangle area will set the stage for future growth opportunities for the Fresno region. With improved access to be provided by the Caltrans-initiated SR 99 interchange upgrades within the RTTAP Study Area, this plan serves as a crucial step to achieving a comprehensive and integrated circulation network within and to the city. Existing development is concentrated in the northern portion of the RTTAP Study Area (north of North Avenue), but recent additions to the area, including Amazon and ULTA distribution centers, show a trend to continue industrial expansion southward.

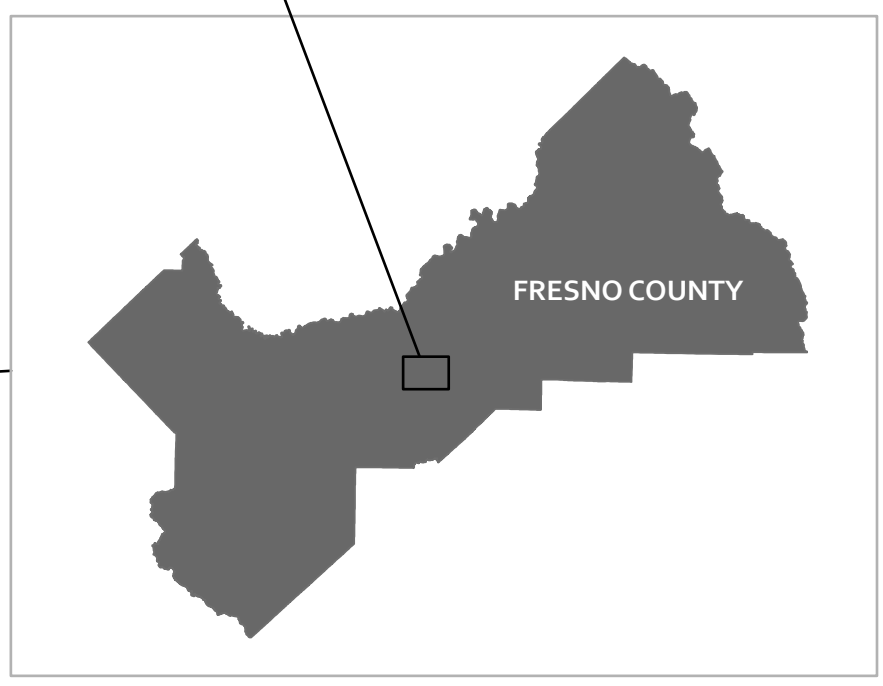
Although the RTTAP Study Area is predominately industrial in character, ensuring safe and accessible multimodal connections to existing residential communities and local schools is an essential component of this plan, especially considering the intensity of truck travel within the area. A significant portion of the RTTAP Study Area remains rural farmland with accompanying single-family homes, which are largely clustered into small subdivisions within the unincorporated County south of Central Avenue. In addition, residents from surrounding neighborhoods travel within the Study Area to reach destinations such as employment centers, schools, and retail. The RTTAP Study Area and the neighboring areas have populations that could be considered disadvantaged communities based on a multitude of statewide metrics including income and poverty status, minority status, exposure to pollutants, and vehicle access (Figure ES-2). California Senate Bill (SB) 535 and Assembly Bill (AB) 1550 aim to ensure that investments in transportation projects aim to improve public health, quality of life, and economic opportunity in California's most burdened communities, while reducing criteria pollutants that can negatively contribute to climate change. The RTTAP aims to mitigate potential negative effects from planned industrial development to these communities within the Study Area.

The RTTAP therefore identifies transportation infrastructure improvements and mobility service programs and strategies to ensure that future anticipated growth within the Study Area will provide opportunities to improve connectivity, accessibility, and quality of life of the existing communities.

Background

For many decades, the land use within the RTTAP has been planned and zoned for light and heavy industrial uses to support the City's economic development and job creation goals. There are also small pockets of residential development that are scattered around small- and mid-sized farming operations and corridors, such as Cherry Avenue, American Avenue, Lincoln Avenue, among others. Communities, such as Malaga and Easton are located outside of and adjacent to the RTTAP that have a direct impact on transportation movement throughout the Study Area. On Adams Avenue, the community of Oleander also has pockets of residential use that fall within the RTTAP Study Area.





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REVERSE TRIANGLE
TRANSPORTATION AREA PLAN

FRESNO COUNCIL OF GOVERNMENTS
REVERSE TRIANGLE TRANSPORTATION AREA PLAN

REGIONAL CONTEXT

Project No. **11192258**
Revision No. **-**
Date **JULY 2021**

FIGURE 1

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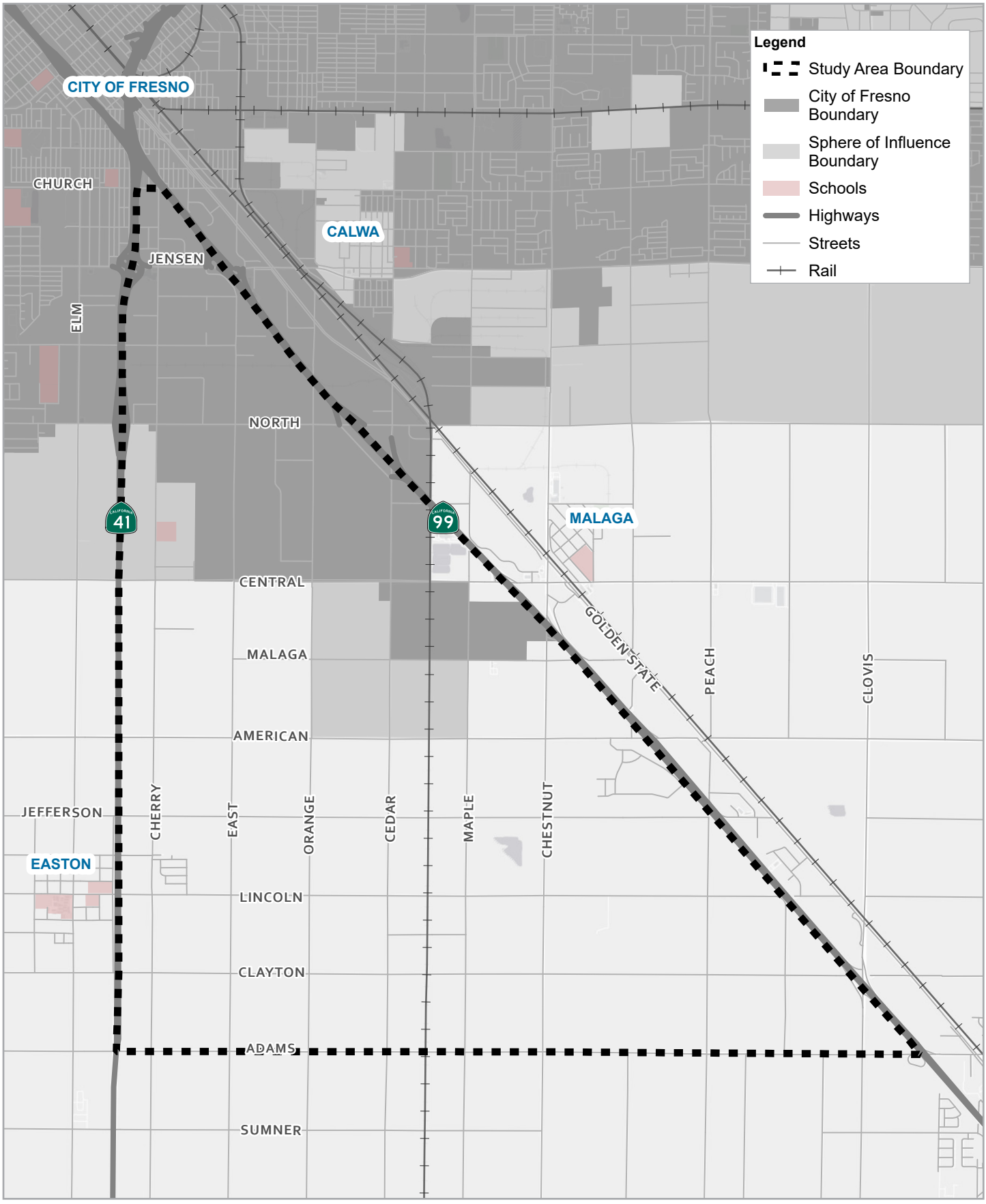

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REVERSE TRIANGLE
TRANSPORTATION AREA PLAN

FRESNO COUNCIL OF GOVERNMENTS

REVERSE TRAINAGLE TRANSPORTATION AREA PLAN

RTTAP STUDY AREA

Project No. 11192258
Revision No. -
Date JULY 2021

FIGURE 2

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During development of this document, the City of Fresno was conducting a specific plan process in the same area, called the South Central Specific Plan (SCSP), which was previously known as the South Industrial Priority Area (SIPA) Specific Plan. The SCSP identified a range of alternative land uses that fell within the RTTAP, however no agreed-upon land use plan for the area was available at the time of this writing.

Therefore, future land uses within and adjacent to RTTAP were assumed to be those of the City and County General Plans. These plans designate a majority of light and heavy industrial areas, with a small amount of land dedicated to public uses, such as schools and ponding basins.

Plan Objective

The RTTAP identifies transportation improvements, programs, and strategies with multi-jurisdictional support and community engagement that achieve the following objectives:

- Provide an circulation network that prioritizes the health and safety of the community by creating appropriate transitions between new development and existing uses, including residential communities and schools.
- Mitigate air quality and congestion impacts by encouraging mode shares away from single occupant vehicles to active modes via bicycle and pedestrian improvements and public transportation services (consistent with Caltrans Deputy Directive DD-64-R2 and the FCOG policies for implementation of “Complete Streets”).
- Implement strategies to mitigate negative impacts to existing disadvantaged communities (per CalEnviroScreen metrics) related air quality, congestion, and safety due to the industrialization of the RTTAP Study Area.
- Improve connectivity and access for disadvantaged populations (per SB 535 and AB 1550 metrics) by ensuring that individuals can access basic amenities and key destinations related to employment, health, or personal trips.
- Identify roadway and intersection improvements that are consistent with local and regional plans to support continued growth and improve quality of life for residents, employees, and visitors of the RTTAP Study Area.

In line with these objectives, a variety of improvements and strategies were developed for the following categories:

- **Intersection operational improvements** to address existing and future deficiencies related to vehicular delay.
- **Multimodal and safety improvements** for roadways and intersections along major corridors to improve connectivity and safety for bicycle, pedestrian, vehicular, truck, and transit travel.
- **Transit and travel demand management (TDM) strategies** to provide efficient transportation choices that result in reducing traffic congestion, pollution, and commuting stress.

The RTTAP inventories known planned and programmed corridor improvements and existing mobility programs and strategies identified in prior planning efforts and makes additional recommendations that are feasible, equitable, cost-effective, and have community support. Vehicular (automobile and truck) circulation, multimodal and safety improvements, and transit and travel demand management (TDM) services were key focus areas of the RTTAP. Requisite technical information consistent with State and Federal grant program guidelines and implementation phasing of the multimodal improvement package were also key elements of the RTTAP. The preferred multimodal package of improvements could serve to systematically guide future key corridor programming decisions within the planning area over a 20-year timeframe based on available funding. This planning document serves to provide the City of Fresno and Fresno County with community-led options to mitigate potential negative effects from planned industrial development within the RTTAP Study Area.

Plan Approach

The RTTAP examines the existing and future operational and safety performance of Reverse Triangle area and provides improvement recommendations using the Caltrans Smart Mobility Framework approach, a performance-based analysis used to evaluate transportation infrastructure improvements. The Smart Mobility Framework is premised on six key objectives: Location Efficiency; Reliable Mobility; Health and Safety; Environmental Stewardship; Social Equity; and, Robust Economy. The Smart Mobility Framework process is consistent with both the 2018 Comprehensive Multimodal Corridor Plan Guidelines and the SB 1 Solutions for Congested Corridors Program Guidelines from the California Transportation Commission (CTC). The objectives were evaluated using both qualitative and quantitative metrics to inform the overall performance of the RTTAP improvement recommendations. The performance metrics selected to evaluate the RTTAP are described in Chapter 2 of this report.

Public Outreach Overview

An effective community engagement program creates confidence in the planning process, promotes broad-based understanding, and reflects the interests and needs of the community. Successful implementation of the improvements recommended in this plan will require cooperation between Fresno COG, City of Fresno, Fresno County, Caltrans and the community as a whole.

The fundamental premise of the Smart Mobility Framework is to ensure that planning or programming decisions for transportation improvements are performance based, transparent, and address sustainable outcomes and objectives. As such, public input was a key component in the development of the RTTAP. The RTTAP outreach effort was robust in its focus on reaching the diverse communities. This outreach effort included two community workshops, a Staff Working Group comprising of all the partner agencies, and a robust online public engagement campaign including an interactive mapping tool. The mapping tool was made available on the project website beginning in early November 2019 and remained “live” through June 2021. The input received helped inform the preferred RTTAP multimodal improvement package.

The RTTAP public outreach efforts are more fully described in Chapter 3 of this report, and include the following:

- **Community Workshops**
  - **November 19, 2019**
  - **April 23, 2020**
  - **May 5, 2021**
  - **June 10, 2021**
- **Staff Working Group, including:**
  - **Fresno COG**
  - **City of Fresno**
  - **Fresno County**
  - **Caltrans District 6**
- **Stakeholder Committee**
- **Project Logo Branding and Project Information Cards**
- **Online Engagement/Interactive Mapping Tool**

2 – Planning Guidance and Metrics

In providing an overall framework and planning guidance for the preparation of this RTTAP, an understanding of past transportation related planning studies was needed as well as the performance criteria for establishing a transportation plan that meets mobility needs, is fundable and implementable. For this planning effort, the Caltrans *Smart Mobility Framework 2010,* as described in the following pages was utilized. It is consistent with both the *2018 Comprehensive Multimodal Corridor Plan Guidelines* and the *SB 1 Solutions for Congested Corridors Program Guidelines* from the California Transportation Commission (CTC).

Planning Context

This section describes past transportation related planning studies as they relate to the RTTAP Study Area as well as the City of Fresno and Fresno County planning areas as a whole.

City and County General Plans

During development of this document, the City of Fresno was conducting a specific plan process in the same area, called the South Central Specific Plan (SCSP), which was previously known as the South Industrial Priority Area (SIPA) Specific Plan. The SCSP identified a range of alternative land uses that fell within the RTTAP, however no agreed-upon land use plan for the area was available at the time of this writing.

Therefore, future land uses within and adjacent to RTTAP were assumed to be those of the City and County General Plans. These plans designate a majority of light and heavy industrial areas, with a small amount of land dedicated to public uses, such as schools and ponding basins.

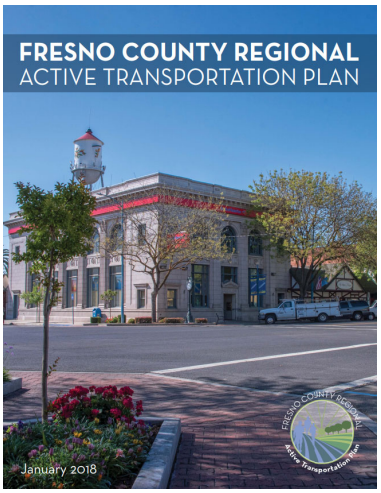
City of Fresno Active Transportation Plan (2016)

The Fresno Active Transportation Plan (ATP) is a comprehensive guide outlining the vision for active transportation in the City of Fresno, and a roadmap for achieving that vision. The ATP envisions a complete, safe, and comfortable network of trails, sidewalks, and bikeways that serves all residents of Fresno. This plan seeks to achieve the following goals:

- Equitably improve the safety and perceived safety of walking and bicycling in Fresno
- Increase walking and bicycling trips in Fresno by creating user-friendly facilities
- Improve the geographic equity of access to walking and bicycling facilities in Fresno
- Fill key gaps in Fresno's walking and bicycling networks.

To achieve these goals, the ATP proposes a long-term, comprehensive network of citywide bikeways, trails, and sidewalks that connect all parts of Fresno. Since this build-out network will take many years to complete, the ATP also identifies a priority network of connected bikeways and priority pedestrian areas to focus the City's efforts in the near-term. These priority networks provide links to key destinations, support existing and future walking and biking activity areas, and equitably serve neighborhoods throughout the City.

Fresno County Regional Active Transportation Plan (2018)



Funded by Fresno COG, the Fresno County Regional Active Transportation Plan (ATP) is a comprehensive guide outlining the vision for biking, walking, and other human-powered transportation in Fresno County and a roadmap for achieving that vision. The ATP envisions a complete, safe, and comfortable network of trails, sidewalks, and bikeways that serves all who live and work in the region. This plan seeks to achieve the following goals:

• Create a network of safe and attractive trails, sidewalks, and bikeways that connect Fresno County residents to key destinations, especially local schools, parks, and transit;

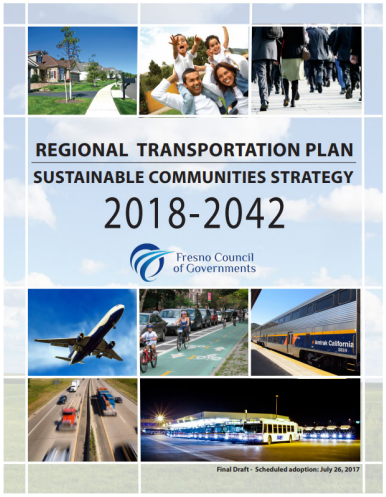
• Create a network of regional bikeways that allows bicyclists to safely ride between cities and other regional destinations;

• Increase walking and bicycling trips in the region by creating user-friendly facilities; and

• Increase safety by creating bicycle facilities and improving crosswalks and sidewalks for pedestrians.

To achieve these goals, the ATP proposes a comprehensive network of citywide bikeways trails, and sidewalks; crossing improvements at key intersections; and locations for recommended bicycle parking. At build out, the recommended network would add 248 miles of Class I Bikeways (bike paths); 1,591 miles of Class II Bikeways (bike lanes); 59 miles of Class III Bikeways (bike routes); 11 miles of Class IV Separated Bikeways, and 89 miles of sidewalks.

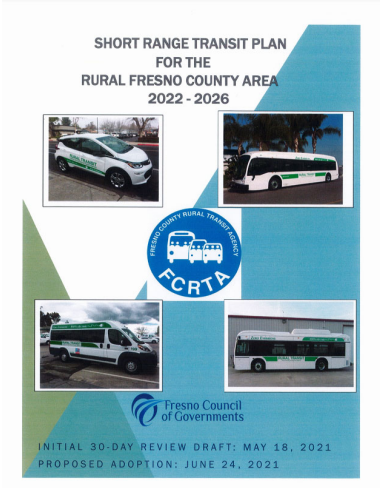
Regional Transportation Plan – Sustainable Communities Strategy (2018-2042)



Regional Transportation Plans address the mobility needed to keep regions moving and connect its communities. Fresno COG's 2018 Regional Transportation Plan (RTP) charts the long-range vision of Regional Transportation through the year 2042. As Fresno addresses new requirements for reducing greenhouse gas emissions, it has been and will remain Fresno COG's goal to partnership with communities throughout the region, providing transportation choices that encourage and cultivate thriving economies and cultural richness. This RTP identifies existing and future transportation related needs, while considering all modes of travel, analyzing alternative solutions, and identifying what can be completed with anticipated available funding for the over 3,000 projects and multiple programs included within it.

Fresno Clovis Metropolitan Area (FCMA) Short Range Transit Plan (2022-2026)

The FCMA Short-Range Transit Plan (SRTP), FY 2022-2026, is the biennial update to the operating plan and the capital program. The purpose of this SRTP is to promote a comprehensive, coordinated, and continuous planning process for transit service in the Fresno-Clovis Metropolitan Area (FCMA) over a five-year planning horizon. This plan proposes specific recommendations for implementing the long-range objectives of Fresno County's Regional Transportation Plan and will guide the provision of transit services in the FCMA over the next five years. The Plan is also used to develop transit capital programming documents that are the basis for State and Federal funding decisions. The SRTP provides both the Federal Transit Administration (FTA) and the Fresno Council of Governments (Fresno COG) with the detailed planning justification for awarding operating and capital grants to FAX. This SRTP was developed through an analysis of existing needs and available services and provides an evaluation of projected needs and funding availability for the next five years.



Short Range Transit Plan for the Rural Fresno County Area (2018-2022).

The Short Range Transit Plan (SRTP) for the Rural Fresno County Area has been developed by the Fresno Council of Governments (Fresno COG) 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). Fixed-route intra-city services is provided to serve the Fresno Clovis Metropolitan Area (FCMA) along the following corridors:

- Firebaugh-Mendota-Kerman;
- Kingsburg-Selma-Fowler;
- Orange Cove-Reedley-Parlier-Sanger; and,
- Coalinga-Huron-Riverdale-Caruthers-Easton.

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. The Smart Mobility Framework process is consistent with both the 2018 Comprehensive Multimodal Corridor Plan Guidelines and the SB 1 Solutions for Congested Corridors Program Guidelines from the California Transportation Commission (CTC).

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. In an effort to recommend improvements that aim to achieve a balanced and safe mobility system for the RTTAP Study Area, Smart Mobility objectives have been implemented to guide the planning process and transportation improvement project recommendations. The Smart Mobility Framework is premised on the following six key objectives:

- Location Efficiency
- Reliable Mobility
- Health and Safety
- Environmental Stewardship
- Social Equity
- Robust Economy

Performance Metrics

Performance metrics were selected to evaluate existing and future conditions to determine the potential benefits associated with preferred RTTAP multimodal improvement package. The performance metrics 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. Requisite metrics include bicycle level of traffic stress scores; bicycle mode shift; vehicular delay reduction; vehicular travel time; crash reduction; health cost savings; vehicle emissions reduction; network vulnerability and sustainability; equitable distribution of benefits/impacts; return on investment, and "value of time" metrics including recreational activity and mobility benefit, as shown in Table 1.

Table 1 – Smart Mobility Objectives and Performance Metrics

Smart Mobility Objective	Analysis Purpose	RTTAP Performance Metric
Location Efficiency	Bicycle Connectivity	Bicycle Level of Traffic Stress
	Multimodal Facility Access	Bicycle Mode Share (# New Trips)
Reliable Mobility	Roadway Operations	Delay Reduction (Motorized/Non-Motorized)
	Roadway Service Quality	Vehicular Travel Time
Health and Safety	Safety	Crash Reduction (Roadways & Intersections)
	Health	Health Cost Savings (per Capita)
Environmental Stewardship	Air Quality	Vehicle Emissions Reduction
	Adaptation	Network Vulnerability & Sustainability
Social Equity	Social Equity	Equitable Distribution of Benefits/Impacts
Robust Economy	Economic Development	Return on Investment
All	Community Livability	Recreational Activity (Value of Time)
		Mobility Benefit (Value of Time)

These performance metrics were used to establish an existing conditions baseline to inform an initial needs-assessment and were subsequently used to analyze future conditions with and without the RTTAP transportation improvement projects. Results from these analyses were used to establish the benefits associated with the preferred RTTAP multimodal improvement package (as presented in Chapter 6 of this plan). The performance metric methodologies employed to evaluate existing and future conditions are described in Appendix A.

Many of these performance metrics do not have established standards but were analyzed to better understand the existing and future operational characteristics the RTTAP and inform benefit/cost assessments for recommended transportation improvement projects. 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 vehicular delay, collision reduction, mode shift, and vehicle miles of travel reduction can be monetized and were incorporated into a benefit-cost analysis. 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.

Data Collection/Retrieval

Performance measures require data. The following data sources were tapped to collect/retrieve data needed to operationalize the performance measures used for the RTTAP.

Longitudinal Employment-Housing Dynamic (LEHD) Origin-Destination Data

Longitudinal Employer–Household Dynamics (LEHD) data is primarily based on Unemployment Insurance (UI) earnings data and the Quarterly Census of Employment and Wages (QCEW), and censuses and surveys. Firm and worker information are combined to create job level quarterly earnings history data, data on where workers live and work, and data on firm characteristics, such as industry**.** The most recent available LEHD data (2018) was utilized**.**

National Performance Monitoring Research Data Set (Speed Data)

Per and the National Performance Management Measures Final Rule, the preferred data for complying with the National Highway Performance Program is the National Performance Management Research Data Set (NPMRDS) from FHWA. The NPMRDS provides average speed data (five-minute averaging time) for federally defined roadway segments designated as part of the National Highway System (NHS).

NPMRDS data for January through December 2018 (12-months) was downloaded for analysis[1]. Given the desire to reflect annual average weekday conditions, the data was filtered to isolate average weekday conditions - Tues-Thurs AM/PM peak periods for passenger vehicles and heavy-duty truck vehicles separately. The AM/PM peak hours between 7:30 AM to 8:30 AM and 4:00 PM and 5:00 PM were analyzed for both passenger vehicles and truck.

Traffic Counts

AM/PM peak hour intersection turn movement counts utilized in the RTTAP were a combination of existing counts sourced from planning agencies including the City of Fresno, County of Fresno and Caltrans. New traffic counts were performed in May 2019 specifically to update or augment the existing traffic count data. The project area includes 40 intersections and 8 road segments listed below.

[1] The National Performance Measurement Rule recommends using 12 months of data to reflect a “true” annual average.

Intersections

1. Jensen Ave / Hwy 99 NB Off-Ramp (East Ave)
2. Jensen Ave / Hwy 99 SB Off-Ramp (East Ave)
3. North Ave / Hwy 99 SB Off-Ramp (Parkway Dr)
4. North Ave / Hwy 99 SB On-Ramp
5. North Ave / Cedar Ave
6. Cedar Ave / Hwy 99 NB Off-Ramp
7. Cedar Ave / Hwy 99 SB Off-Ramp / Parkway Dr
8. Central Ave / Hwy 99 SB Off-Ramp
9. Central Ave / Hwy 99 NB On-Ramp
10. Central Ave / Chestnut Ave
11. Chestnut Ave / Hwy 99 NB Off-Ramp
12. Chestnut Ave / Hwy 99 SB On-Ramp
13. American Ave / Hwy 99 SB Off-Ramp
14. American Ave / Hwy 99NB On-Ramp
15. Clovis Ave / Hwy 99 NB Off-Ramp (northbound)
16. Clovis Ave / Hwy 99 NB On-Ramp
17. Clovis Ave / Hwy 99 SB On-Ramp / Clayton Ave
18. Clayton Ave / Hwy 99 SB Off-Ramp
19. Adams Ave / Hwy 99 NB On-Ramp
20. Adams Ave / Hwy 99 SB Off-Ramp
21. Jensen Ave / Hwy 41 NB Off-Ramp
22. Jensen Ave / Hwy 41 SB Off-Ramp
23. North Ave / Hwy 41 NB Off-Ramp
24. North Ave / Hwy 41 SB Off-Ramp
25. Central Ave / Hwy 41 NB/SB Off-Ramps
26. American Ave / Hwy 41 NB/SB Off-Ramps
27. Adams Ave / Hwy 41 NB/SB Off-Ramps
28. North Ave / East Ave
29. North Ave / Orange Ave
30. Central Ave / Cherry Ave
31. Central Ave / East Ave
32. Central Ave / Orange Ave
33. Central Ave / Cedar Ave
34. Central Ave / Maple
35. Malaga Ave / Maple Ave
36. American Ave / Cherry Ave
37. American Ave / Cedar Ave
38. Lincoln Ave / Cherry Ave
39. Lincoln Ave / Peach Ave
40. Adams Ave / Cedar Ave

Roadway Segments:

1. Cherry Ave b/w Central Ave & North Ave
2. American Ave b/w SR41 & Cherry Ave
3. Orange Ave b/w American Ave & Jefferson Ave
4. Maple Ave b/w American Ave & Jefferson Ave
5. Cedar Ave b/w Central Ave & Malaga Ave
6. Central Ave b/w Cedar Ave & Maple Ave
7. American Ave b/w Cedar Ave and Maple Ave
8. Adams Ave e/o Maple Ave

The source of the RTTAP daily segment counts was the County of Fresno. These counts were collected within the previous three (3) years.

Transit Ridership Data

Transit ridership data was provided by Fresno Area Express (FAX) and Fresno County Rural Transit Agency (FCRTA). This data was found in their respective Short Range Transit Plans (SRTP).

Crash Data

Crash data was obtained from the Statewide Integrated Traffic Records System (SWITRS) for the years between 2012 and 2017 for both intersections and roadway locations. Transportation Injury Mapping System (TIMS) data was also accessed for the same period to cross reference the injury and fatality collision data in SWITRS.

Infrastructure Costs

Planning-level costs for infrastructure recommendations were obtained from existing planning studies and regional transportation planning documents. Where costs were unavailable through these sources, costs were estimated based on industry standard planning level procedures.

Societal Costs

The benefits associated with the performance assessment analyses were monetized based on the societal and economic cost information from the Caltrans 2018 Economic Parameters and the Local Roadway Safety manual (2020) cost for crashes.

On-line Mapping Resources

On-line mapping tools such as Climate Change Vulnerability (Caltrans District 6), LEHD, and CalEnviroScreen 3.0 were utilized to inform examinations for adaptation, travel pattern and environmental justice respectively.

Analysis Tool Development

Fresno COG Regional Travel Demand Forecast Model

The Fresno COG Activity-Based Model (ABM) is an analysis tool that gives Fresno COG the capability to generate technical information pertinent to the understanding of travel behavior and transportation network performance within and around the RTTAP Study Area boundary based on future lane use as provided in the General Plan. This information is critical to the development, updating and monitoring of Fresno COG's transportation capital improvement program, analysis of specific transportation projects and programs, as well as the transportation strategies and policies of its member agencies including the City of Fresno and the County of Fresno. The Fresno COG ABM yields future volume sets (i.e., roadway segment volumes and intersection turn movements) to inform operational analyses that determine whether a given road segment or intersection will operate acceptably in the future.

The most recent version of the Fresno COG ABM model including a 2019 Baseline and 2042 out-year was utilized for the RTTAP. The model projects approximately 47 percent growth in AM and 50 percent growth in the PM peak hour traffic levels by 2042, with 1.17 percent and 1.26 percent annual growth, respectively. Future (2042) volume forecasts were developed by applying AM and PM peak hour model growth rates to existing (2019) counts.

Synchro 10

Synchro is a macroscopic analysis and optimization software application. Synchro supports the Highway Capacity Manual's (HCM) 6th Edition, 2010 and 2000 for signalized intersections, unsignalized intersections and roundabouts. Synchro also implements the Intersection Capacity Utilization (ICU) method for determining intersection capacity. Synchro's signal optimization routine allows the user to weight specific phases, thus providing users more options when developing signal timing plans. This software applications were used to analyze existing and forecasted intersection operations for the RTTAP.

3 - Public Outreach

A targeted public outreach program was created to gauge public attitude for the RTTAP. Outreach efforts included both traditional and non-traditional venues for gathering community input**.** These outreach efforts, starting with the Community Workshops, are more fully described in the following sections. The input received through these various channels helped inform and guide analysis and the RTTAP planning process.

It should be noted that the RTTAP, for the most part, is a non-controversial project as it seeks to improve all transportation modes of travel within the Study Area. The RTTAP does *not* recommend land use or zoning changes, thereby focusing on improvements that improve traffic operations (as needed), traffic control, addition of bike lanes, sidewalks, trails and transit service areas. As a result, public outreach responses were less than what would typically occur in projects that involve new or proposed land uses. Regardless, the community members that participated were able to air their transportation-related issues and identify potential solutions.

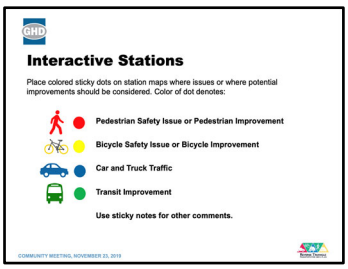
Community Workshops

Four public workshops were held during the course of the plan's development on November 23, 2019, March 9, 2020, May 5, 2021, and June 10, 2021. The first two meeting were held in person. The third and fourth workshops were supplemented with on-line virtual workshops that emulated all materials presented at the traditional workshops. This allowed the results of the workshops to be appropriately merged and summarized together. Presentation materials including all input/responses from the public workshops are provided in Appendix B.

Workshop #1

The first public workshop was held on Saturday, November 23, 2019, at Washington Union High School to introduce the project to the public, inform the public how to stay actively engaged during its development and to gather feedback from the community on existing transportation issues and potential solutions. The workshop set-up included a project overview presentation, interactive mapping station, map exhibit stations (both background maps and project area section maps), and a final click polling activity to gain input from attendees.

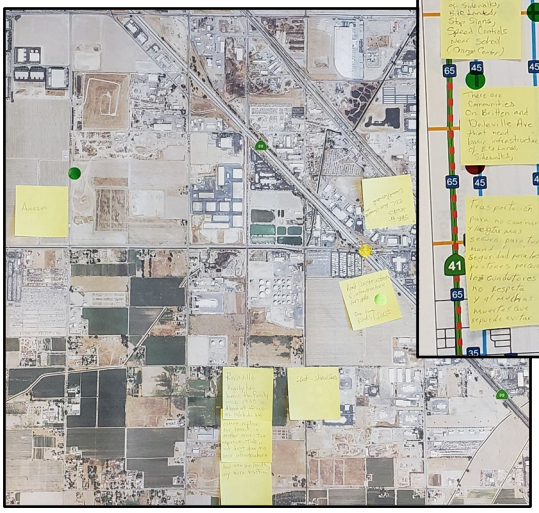
The workshop was promoted via press release to local media, through flyers, postcards, and project cards; on various social media outlets; and by email blasts to residents and project area employers.

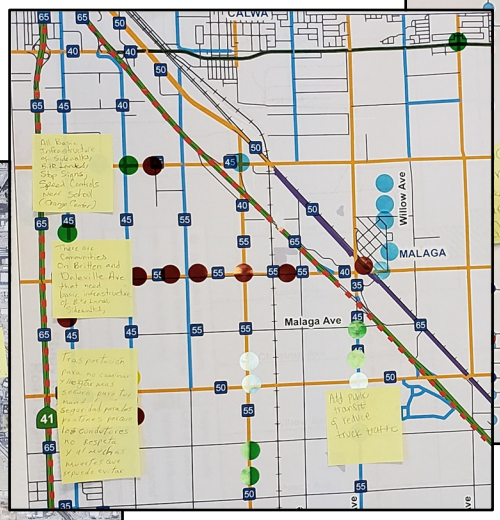


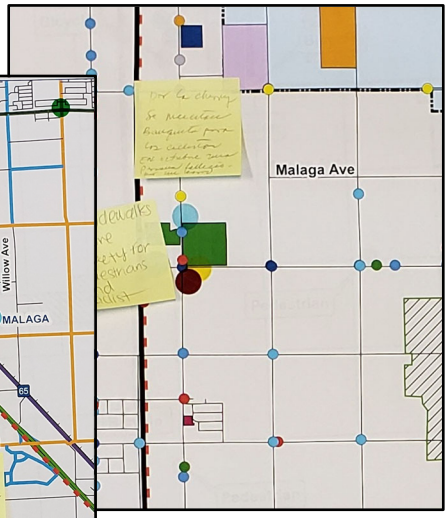
Of the individuals on the workshop sign-in sheet, approximately 20 were active participants and answered the polling section of the presentation.

Many comments were generated from the polling responses, comment card, and on the project related maps presented at the workstations. These comments ranged from roadway widening recommendations to need for transit improvements, safety issues related to heavy duty trucks, recommending pedestrian safety improvements, adding bike lanes, to reducing speed limits.

Most respondents reported that driving was their most frequent mode traveled within the RTTAP Study Area. Few people said they walk or bicycle on the corridor currently, citing concerns about safety and a lack of dedicated paths. Transit on the corridor is not commonly used by attendees, due to concerns about lack of services and excessive travel time (compared to driving).







Workshop attendees rated improving safety for people walking and driving as their highest priority in the RTTAP, followed by improving safety for transit and then people bicycling. Most that choose not to walk cited safety concerns or lack of designated paths. Similarly, the reason most often cited for not biking was fear for safety, followed by lack of paths/connections. A summary of Workshop #1 is provided in Appendix B.

Workshop #2

This workshop, held within the RTTAP Study Area at Orange Center Elementary School, included a project overview presentation, interactive mapping station, map exhibit stations (both background maps and project area section maps), and a final click polling activity to gain input from attendees. The workshop was promoted via press release to local media, through flyers, postcards, and project cards; on various social media outlets; and by email blasts to previous attendees and project area employers.

Of the 20 individuals on the workshop sign-in sheet, approximately 13 were active participants and answered the polling section of the presentation. In general, many of the same concerns brought forth

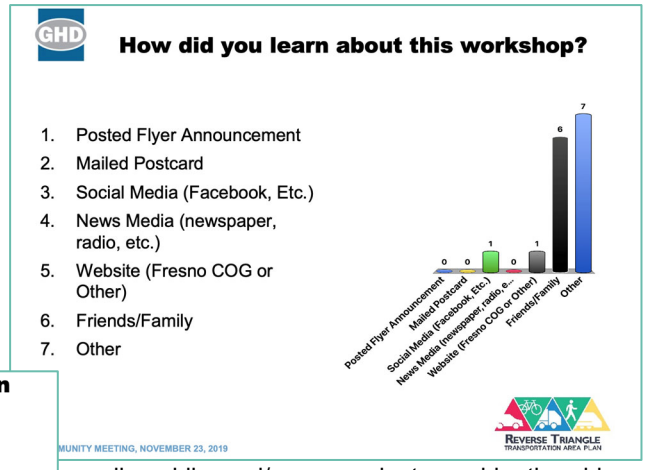
during Workshop #1 were reiterated. However, additional comments were generated related to specific “wants” or “improvements” identified by the participants. For example, comments were received about location of new fire station within RTTAP Study Area to shorten response times, specific locations to reduce speeds, cross walks near Cherry Avenue Auction, excessive congestion on Cherry Avenue during swap meet events, including transit services near existing schools, location of new sidewalks, and completing bike network (everywhere).

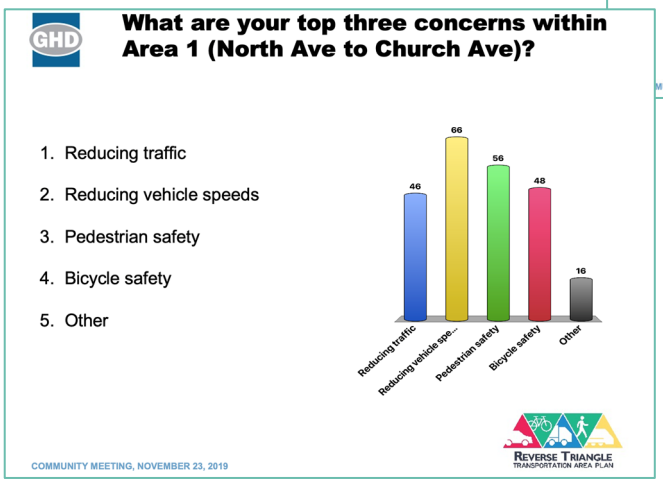
Additionally, Hmong residents in attendance indicated that they were not familiar with public transportation and do not speak English. They stated that they were uncertain about bus schedules and costs. A member of our group from the City of Fresno collected their contact information.

Attendees were polled at Workshops #1 and #2.

Key Findings from Workshop Polling (both workshops):

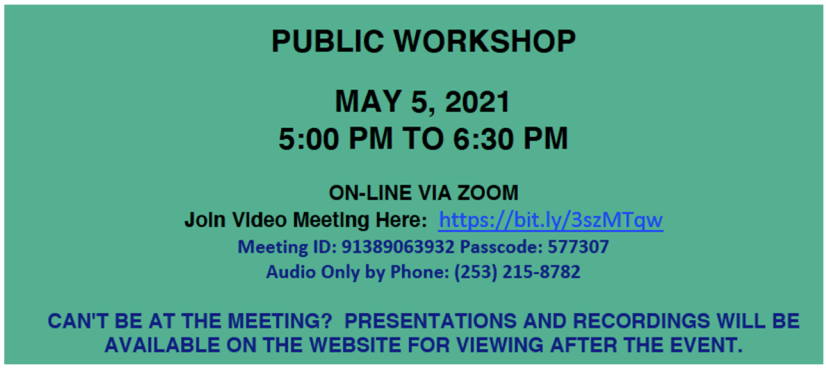
- Most participants found out about the workshop from friends/family or through other means
- Good representation of all age groups
- The majority of respondents did not live or work in the Study Area.
- While there is some support for pedestrian and bicycle improvements, survey responses indicate that many destinations are too far to walk, or bike and/or respondents would rather drive
- When asked for their top two safety concerns, respondents cited pedestrian, auto, and bike safety as their top two concerns
- Speed reduction and traffic congestion are the top two concerns in all three sub-areas polled
- Top three needs participants identified in the Study Area are roadway improvements to reduce speeds, sidewalks, and bike lanes and/or separated paths.





Workshop #3

Workshop promotion efforts included multiple email blasts to area employers, project area stakeholders, previous workshop participants, and those individuals opting in for communication on the project website. The workshop announcement was also posted on the Fresno COG and project websites, by press release to local media, and though social media. The outreach team followed up the emails with phone calls to stakeholders and employers. In addition, the project team provided printed copies of workshop flyers and proposed improvement maps/drawings to Leadership Council for Justice and Accountability for in-person outreach in the project area. Materials were provided in Spanish and the Leadership Council team included Hmong speakers to explain exhibits and provide meeting information to the Hmong community. Exhibits of the proposed improvements were uploaded to the project website to provide a preview of the maps and drawings prior to the meeting – each exhibit included an explanation of the drawing in both English and Spanish and a comment box.



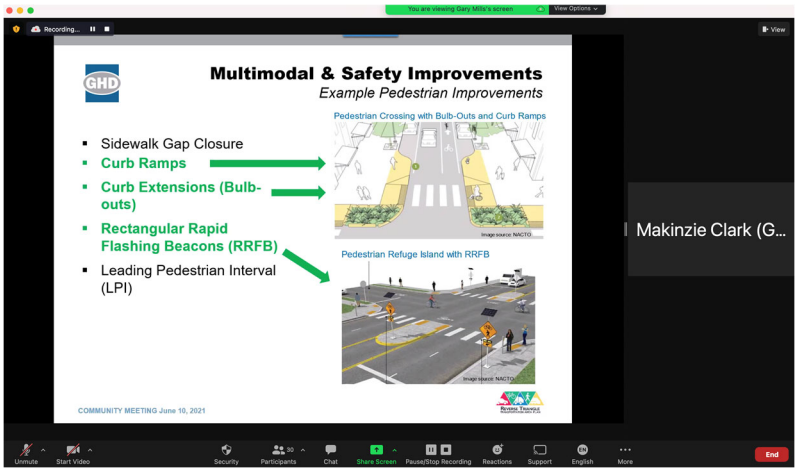
Approximately 20 to 22 people representing state/local agency stakeholders and members of the public attended the virtual meeting. The workshop included a presentation by GHD reviewing the purpose, need, and goals of plan. This was followed by an overview of the transportation improvements proposed for the plan area and the connection of the improvements to previous workshop comments and concerns by project area residents and employers. Simultaneous translation was provided to participants from English to both Spanish and Hmong. Workshop participants typed questions in the chat and/or used the "raise hand" function in Zoom to provide comments on the varying aspects of the proposed improvements or ask questions of the project team.

Comments from participants included suggestions for configuration of the bicycle infrastructure, questions as to whether traffic from the Cherry Avenue auction had been considered in the proposed improvements, and concern that the location of housing in the project area wasn't shown on the maps of the proposed improvements. There were also general concerns that resident concerns for safety around schools due particularly to truck traffic were not being taken into consideration. Multiple participants expressed that the plan and proposed improvements cannot adequately consider other on-going studies that are not yet complete.

Once complete, the workshop presentation in both English and Spanish was uploaded to the project website to provide opportunities for those not able to attend the live workshop to review the information presented.

Workshop #4

This final project workshop was provided after the draft report was released to give stakeholders and members of the public an additional opportunity to review proposed improvements in the context of the full draft report. Comments from Workshop 3 were taken into account, as well as concerns that environmental justice communities had not been explicitly considered when proposed improvements were developed. The workshops were again promoted through multiple email blasts, the project website, social media postings, and press releases.



The workshop presentation was similar to the May 5 workshop, except that additional information on environmental justice communities in the project area was provided, as well as an explanation of how previous workshop comments were addressed in the draft plan. Approximately 20 to 25 state/local project stakeholders and members of the public virtually attended the workshop. And, similar to the previous workshop, simultaneous interpretation was provided in both Spanish and Hmong.

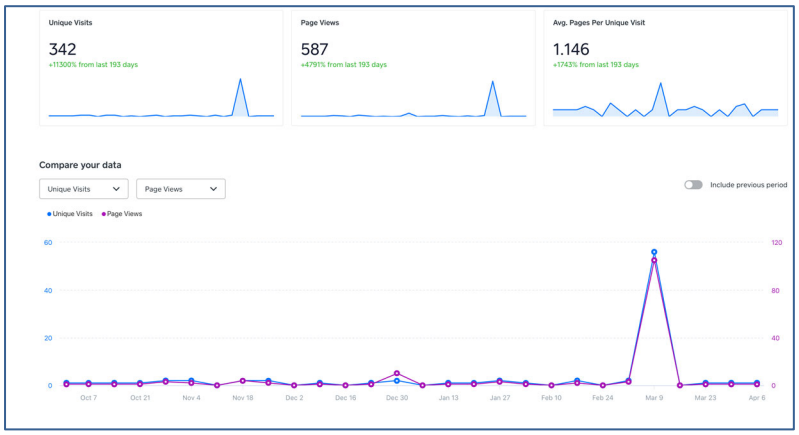
Comments from workshop participants included further suggestions for configuration of bicycle improvements, concerns that recommended improvements do not address the problem of current and projected increases in truck

traffic serving project area industrial development, concerns surrounding Cherry Avenue Auction, and the need for the project to be delayed to allow the South Central Specific Plan process and a planned truck reroute study to be completed.

Besides the comments received at the May 5 and June 10 workshops, comments were provided via the project website, through direct contact with the GHD project manager, and by formal comment letter provided by Leadership Council for Justice and Accountability. Workshop comments/questions were responded to live during the virtual meetings and, to the extent possible, have been incorporated into the final document. The website comments are listed in the table below; the formal letter and a response are included as an attachment to this memorandum.

Virtual Workshop:

Website Analytics (October 22-April 10): 342 Unique Visitors with 587 webpage views. The virtual survey and workshop exhibits were added to the website approximately one week after the workshop. To date no virtual survey responses or comments have been received.

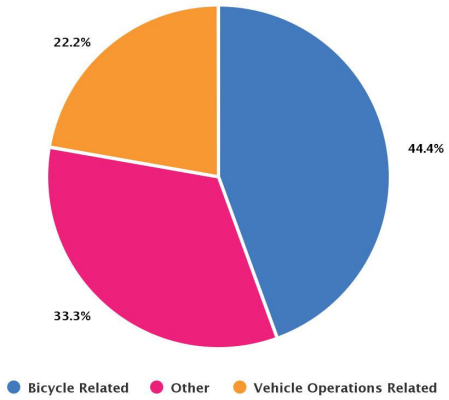


Interactive Mapping Tool (Social Pinpoint)

Summary: The interactive map tool has been live on the project website since the week prior to the November 23 workshop. Description and graphics in the mapping tool mirror the maps displayed on the website with some additional information to clarify map feature locations.

Through April 1, the mapping tool has produced 157 total visits with 56 unique users; 13 of those users left comments. Comments received were broadly categorized as bicycle related, traffic operations related, or other and are summarized in the graphic above.

Three of the comments identified bicycle accident locations. The remaining six comments are related to lack of street lighting, need for sidewalks, wider streets, funding for trees, speed of trucks and hazardous unpaved county roads.



Staff Working Group

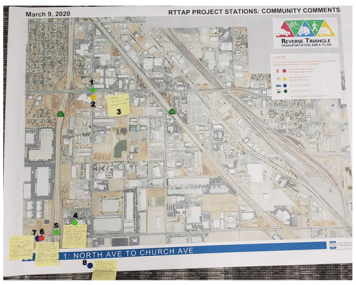
A staff working group was convened to guide development of this Plan and ensure consistency with the goals and complementary planning efforts of partner agencies in the region. Members included representatives from the following agencies:

- Fresno COG
- City of Fresno
- Fresno County
- Caltrans District 6
- Leadership Counsel for Justice and Accountability

Each of these agencies were a key partner in implementing the recommendations in this Plan. The group met a total of nine times throughout the plan's development (monthly) to provide guidance and oversight on the process and review draft deliverables and documents at key milestones.

Media

Various forms of social media were used for posting announcements of outreach events including Facebook, Twitter and Next Door. Public announcements of outreach events were also made on various news and radio media outlets. A mailing list of interested community members was also developed to share project updates and information about outreach opportunities. Project partners and stakeholders were also encouraged to use their existing social media platforms to share information about the project and outreach opportunities.



Project Logo Branding and Project Information Cards

To distinguish the RTTAP planning effort from other on-going planning activities by Fresno COG and partnering agencies, a Project Logo was developed. This branding was placed on all project deliverables and products.

REVERSE TRIANGLE
TRANSPORTATION AREA PLAN

In addition, a Project Information Card was also developed to encourage the use of online engagement by the public particularly the use of the interactive mapping tool on the project website (see below). The Project Information Card was printed in both English and Spanish (back-to-back) and provided the RTTAP project website URL.

Online Engagement

To support and supplement public engagement activities, a project website was developed, available at https://fresnocogreversetriangleplan.mysocialpinpoint.com/home

The website was used to share information about outreach events, host online versions of the community workshops, and gather feedback on draft project deliverables. Over the course of the project study period, the website was visited 259 times by 198 unique website visitors. One survey was completed through the virtual workshop, and ten comments were left through the comment form available on the site. Most input was received through the interactive mapping tool described below.

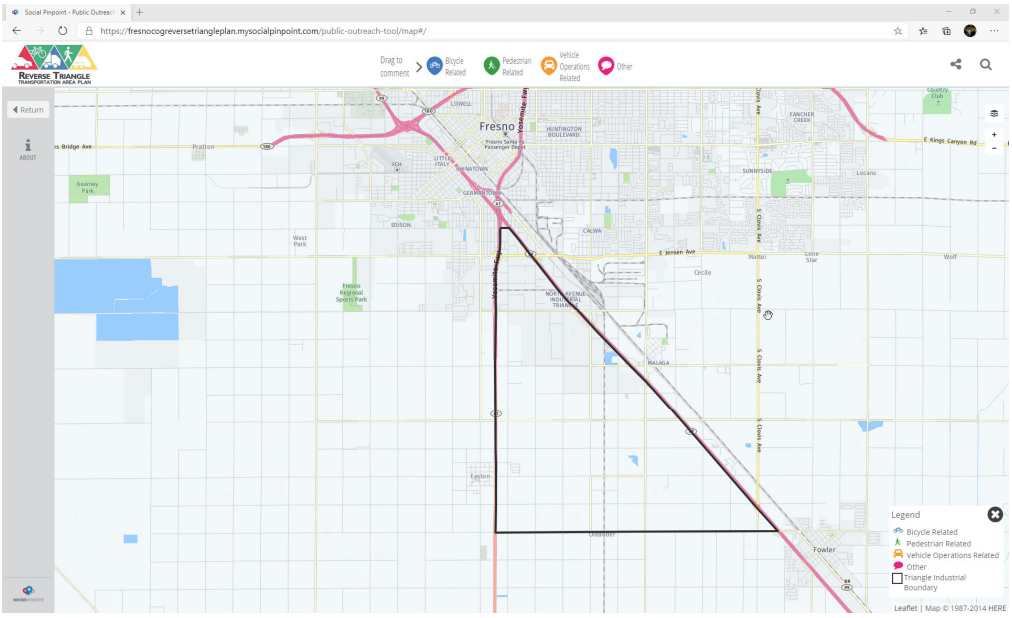
Interactive Mapping Tool

To supplement in-person engagement and gather additional feedback, an online interactive mapping tool was developed through the engagement platform Social Pinpoint. The mapping tool was made available on the project website beginning in early September 2019 and remained "live" through June 2021.

Typically, on-line mapping tools are used to solicit public input on where issues and needs are located by allowing geo-referenced pin-drops and comments to be placed on a map. The on-line mapping tool to show candidate improvement concepts (shown as separate map layers the user could toggle on or off) and provide input on whether they could support the improvement concept and why via a dialogue comment box. This approach allowed the RTTAP to present potential corridor improvement concepts to the public.

The mapping tool, offered in over 70 languages, presented graphical renditions of candidate corridor improvements and allowed the community to comment on the various options. Users were also able to leave location-specific comments on needs and issues.

Between September 2019 and April 2021, the website was visited 1,451 times by 550 unique users. Seventeen general comments were left and 186 targeted survey responses on the various improvement concepts were provided by the public.



Public input on the various improvement concepts examined as part of the RTTAP are summarized in the Corridor Solutions section of the plan. This input served to facilitate along with the technical analyses the ultimate selection of improvements to include in the RTTAP preferred package of improvements.

4 – Baseline Conditions

A comprehensive review of baseline conditions sets the stage to evaluate existing challenges to mobility and provides the framework for a needs assessment to inform transportation improvement recommendations. During the RTTAP planning process, memorandums were developed to document relevant data and present analysis for the categories listed below. Baseline conditions were developed for the following categories:

- Roadway Network
- Freight and Goods Movement
- Demographics
- Disadvantaged Community Status
- Employment and Commute Characteristics
- Multimodal Network (Bicycle and Pedestrian Facilities)
- Transit Service
- Crash History
- Vehicle Operations

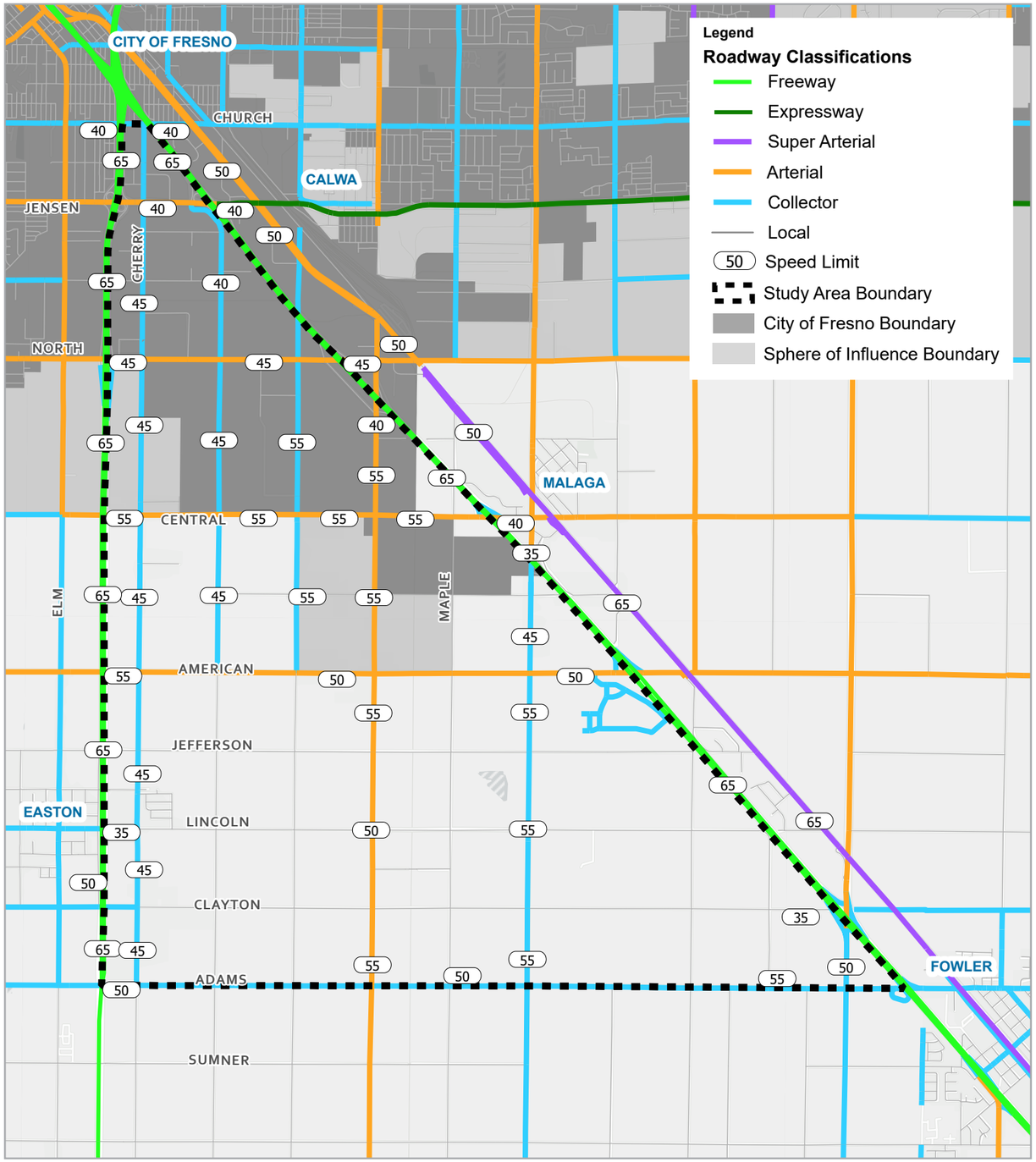
This chapter presents highlights of the RTTAP Study Area's existing transportation network and travel trends to establish baseline (2019) conditions. The baseline conditions memorandums for the above categories are provided in Appendix C.

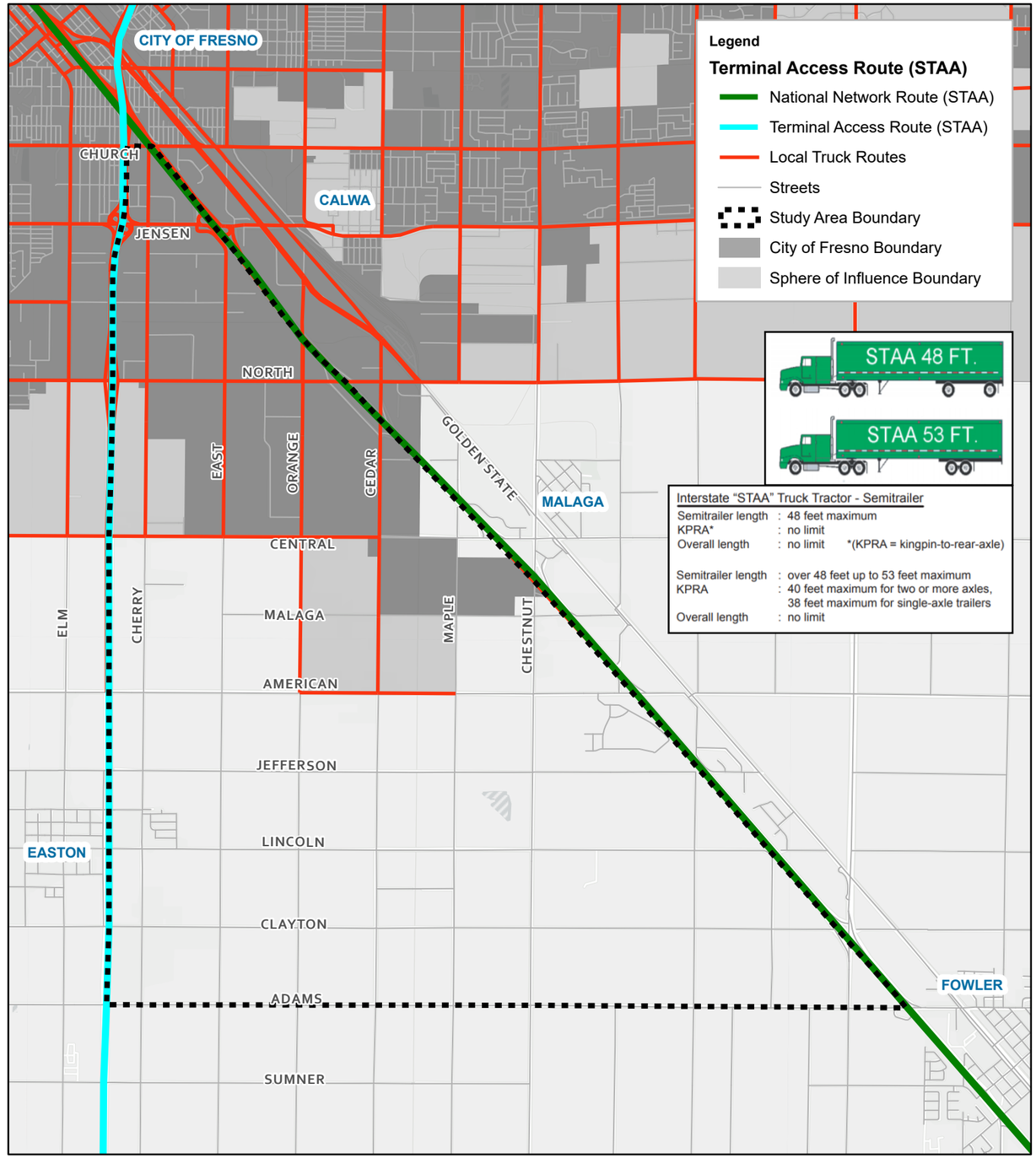
Regional Context

RTTAP is primarily an industrialized area in south Fresno that has access to two north-south State Routes (41 and 99) an essential north-south connection within the California's transportation networks, providing connections to significant east-west routes, including State Route 180, several secondary roadways (Jensen, Central, North, American and Adams). Additionally, freight and passenger railroad access within the RTTAP is provided by Burlington Northern Santa Fe (BNSF) and Union Pacific (UP). As of this writing, the California High Speed Rail is continuing to construct the first phase of the HSR between Merced and Bakersfield, which includes the City and County of Fresno.

Roadway Network

The roadway network within the Plan Area is generally a traditional grid-based network of north-south and east-west streets. Major streets are generally spaced at half-mile intervals. The Plan Area encompasses City limit and County limit roadways. The existing roadway network in the Plan Area includes a mix of arterials, collectors, local residential streets, rural roadways, and industrial roadways. State Routes 41 and 99 are located immediately east and west of the Plan Area respectively and provide regional access to the Plan Area via interchanges at Jensen Avenue, North Avenue, Central Avenue, American Avenue, and Clovis Avenue. Figure 3 presents road classifications, speed limits, and truck routes for the RTTAP Study Area facilities.





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REVERSE TRIANGLE
TRANSPORTATION AREA PLAN

GHD

FRESNO COUNCIL OF GOVERNMENTS
REVERSE TRIANGLE
TRANSPORTATION AREA PLAN

RTTAP ROAD CLASSIFICATIONS, SPEED LIMITS AND TRUCK ROUTES

Project No. **11192258**
Revision No. **-**
Date **JULY 2021**

FIGURE 3

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Print date: 01 Jul 2021 - 15:42

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

Freight and Goods Movement

Freight and goods movement play an integral role in the distribution of agricultural products, processed food and energy products throughout California. Additionally, companies have located large regional and national distribution centers in the San Joaquin Valley (SJV) taking advantage of reasonably inexpensive land, low cost labor and goods access to rail and interstate/highway networks. The comprehensive freight and goods movement assessment is provided in Appendix C.

Truck Routes

The Study Area encompasses two main highways, State Route 99 to the east and SR-41 to the west, along with local roads, Church Avenue to the north and Adams Avenue to the south. According to Caltrans California Truck Network Maps, SR-41 is designated as a Terminal Access (STAA) route and SR-99 is designated as a National Network (STAA) route in the RTTAP Study Area, as shown on Figure 3. State Route 99 and State Route 41 serve as the backbone for the Study Area. Internal to the Study Area, the roadway network encompasses rural county roads and local city roads. Within the City of Fresno they include Jensen Avenue, North Avenue and Central Avenue and within Fresno County they include American Avenue, Clayton Avenue and Adams Avenue (all east-west approaches).

The project area encompasses a myriad of commercial business of which include Ulta Distribution Center, Amazon Distribution Center, Pepsi Bottling Group, Valley Wide Beverage, Mission Foods, FedEx Ground, FedEx Freight, UPS Freight and several trucking sales and service companies among others. In order to sustain the movement of goods and services for these sectors, truck route designations were developed.

Rail

Freight

Within the Study Area, BNSF and Union Pacific are the main lines that provide the primary railway connections between SJV and the national rail network. While trucking is by far the dominant freight transportation mode in the SJV, rail plays a critical role for long-haul movement. One of the biggest advantages of freight rail is the lessening of environmental impacts by removing heavy truck traffic from roadways.

Passenger

Within the project area, Amtrak shares the BNSF rail line which connects the Fresno Amtrak station to the Hanford Amtrak station. According to a Fresno Bee article written by Tim Sheehan (November 2018), the 30 mile train ride is the busiest station pair on the San Joaquin Route. Within the project area, the rail line runs north-south between Cedar Avenue and Maple Avenue.

High Speed Rail

According to California High Speed Rail (HSR) Authority's BuildHSR.com website, the goals of high-speed rail are reducing congestion and pollution, 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. High speed rail is anticipated to lesson environmental impacts by removing the additional vehicles on the transportation network. Recently (early 2019), the Governor scaled back this project to focus on completion of the 171-mile segment between Bakersfield and Merced. There is a planned HSR stop to be located within Downtown Fresno just north of the RTTAP Study Area, and the rail line would continue south adjacent to Cedar Avenue within the RTTAP Study Area.

Demographics

The Study Area has a small residential community with approximately 3,600 people. There are several Census Block Groups partially within the boundaries of the Study Area and partially outside of its boundaries within nearby communities with an estimated population of about 11,100. There are also almost 9,900 people employed within the Study Area who live outside of the RTTAP Study Area, with many of these individuals commuting to the RTTAP Study Area from the north.[2] The follow summarizes the RTTAP Study Area demographics.

Age

Overall, the residential community is slightly older compared to the City as a whole, with a greater share of persons between 45 and 74 years old. The median age within the Study Area is 34 compared to 31 for the City of Fresno.

Race/Ethnicity

Study Area residents come from diverse backgrounds, with a concentration of minority residents and larger proportion of Latino residents compared to Fresno as a whole. Roughly 67 percent of Study Area residents are of Hispanic origin, compared to 50 percent of the City of Fresno.

Income

The average Median Household Income (MHI) for the Census Tracts covering the Study Area is $48,844, compared to $50,432 MHI for the City of Fresno and $53,969 MHI for Fresno County[3]. Among the four Census Tracts with a portion covering the Study Area, the northernmost Census Tract (Tract 11) has the lowest MHI at $34,000. Furthermore, the Tracts to the north of the Study Area, where many of the people employed within the Study Area live, have similarly low MHI.

Poverty Status

Among the Census Tracts covering the Study Area and those to the north of the Study Area, there is a concentration of people living below the federal poverty level. Almost 40 percent of the population living within the northernmost Census Tract covering the Study Area lives under the poverty level. While a lower percentage of the population is living under the poverty level in the other three Census Tracts, the percentage of the population within these Tracts who are living under the poverty level range from about 19 to 24 percent. Additionally, the Census tracts to the north of the Study Area feature similarly high levels of poverty, with as much as 60 percent of the population living under the federal poverty level.

Access to Vehicles

The northernmost Census Tract partially covering the Study Area (Tract 11) has the highest percentage of households without access to a vehicle, at 15.4 percent. Among the three Census Tracts to the south, Tract 15, 17 and 18, about five, four and six percent of the population, respectively, do not have access to a vehicle. Moreover, among the Census Tracts to the north of the Study Area, as much as 50 percent of the population has no vehicle access, with the percentage of those with access to a vehicle ranging from about 14 to 50 percent.

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[2] Longitudinal EStudy Area Employment Characteristics and Commute Destinations Memorandum, GHD, March 2021

[3] https://www.census.gov/quickfacts/fact/table/fresnocountycalifornia,fresnocitycalifornia/INC110219

Language

Between about 26 and 34 percent of the adult population within the Census Tracts covering the Study Area are bilingual in English and at least one other language. Within the same Census Tracts, between 23 and 38 percent of the adult population have limited English ability.

Existing Communities

Disadvantaged communities suffer disproportionate air quality, environmental and health burdens which are compounded by economic challenges. The RTTAP Study Area and the neighboring areas have populations that could be considered disadvantaged communities based on a multitude of characteristics including income and poverty status, minority status, exposure to pollutants, as well as vehicle access and language barriers. The entire RTTAP Study Area and surrounding areas are designated as Senate Bill (SB) 535 disadvantaged communities and/or Assembly Bill (AB) 1550 low-income communities. RTTAP improvement projects aim to improve connectivity and access and to mitigate negative impacts from industrialization to disadvantaged and low-income communities. Chapter 7 describes these benefits in detail.

CalEnviroScreen 3.0

On behalf of the California Environmental Protection Agency (CEPA), the Office of Environmental Health Hazard Assessment (OEHHA) developed an analysis tool known as CalEnviroScreen 3.0 (updated June 2018). This tool is used to designate disadvantaged communities in accordance with Senate Bill 535 of 2017 and assists the State of California and communities to determine core areas in need of immediate reinvestment to mitigate pollution and advance environmental improvements.

The CalEnviroScreen 3.0 model is based on CalEPA's definition of cumulative impacts. This model is based on geography, specifically census tracts in California. The model is made up of four components, including two pollution burden components and two population characteristics components. Each component is made up of a set of indicators comprising of 12 pollution burden indicators and eight population characteristics indicators.

Disadvantaged communities may receive up to 25% of the proceeds from the Greenhouse Gas Reduction Fund to go toward projects that provide a benefit to disadvantaged communities. The entire RRTAP Study Area falls within the disadvantaged community status. Actually, CalEnviroScreen 3.0 exhibits high pollution, low population areas of the state as being a disadvantage community in accordance with SB 535. CalEnviroScreen 3.0 scores communities on a 10-tiered percentile for air pollution. The Pollution Burden score is the average of Environmental Effects and Exposures components, where the Environmental Effects component is weighted one-half because we consider Environmental Effects to make a smaller contribution to Pollution Burden than Exposures do.

The CalEnviroScreen results show that STTAP Study Area and its nearby communities are among the Census Tracts that are the most environmentally burdened in the entire State. The entirety of the Study Area and much of the surrounding communities are within the 95th to 100th percentile range, as shown in A.

FCOG Environmental Justice Designation

FCOG's 2018 Regional Transportation Plan (RTP) and Sustainable Communities Strategy (SCS) includes an Environmental Justice Analysis, demonstrating FCOG's compliance as a Metropolitan Planning Organization (MPO) with the federal and state requirements of the RTP development process related to Title VI and Environmental Justice (EJ). EJ population groups defined by FCOG's analysis include minority and/or low-income populations compared against the County region as a whole (). Additional detail on Fresno COG's Environmental Justice methodology can be found in Appendix H of the 2018 RTP and SCS.

SB 535 and AB 1550

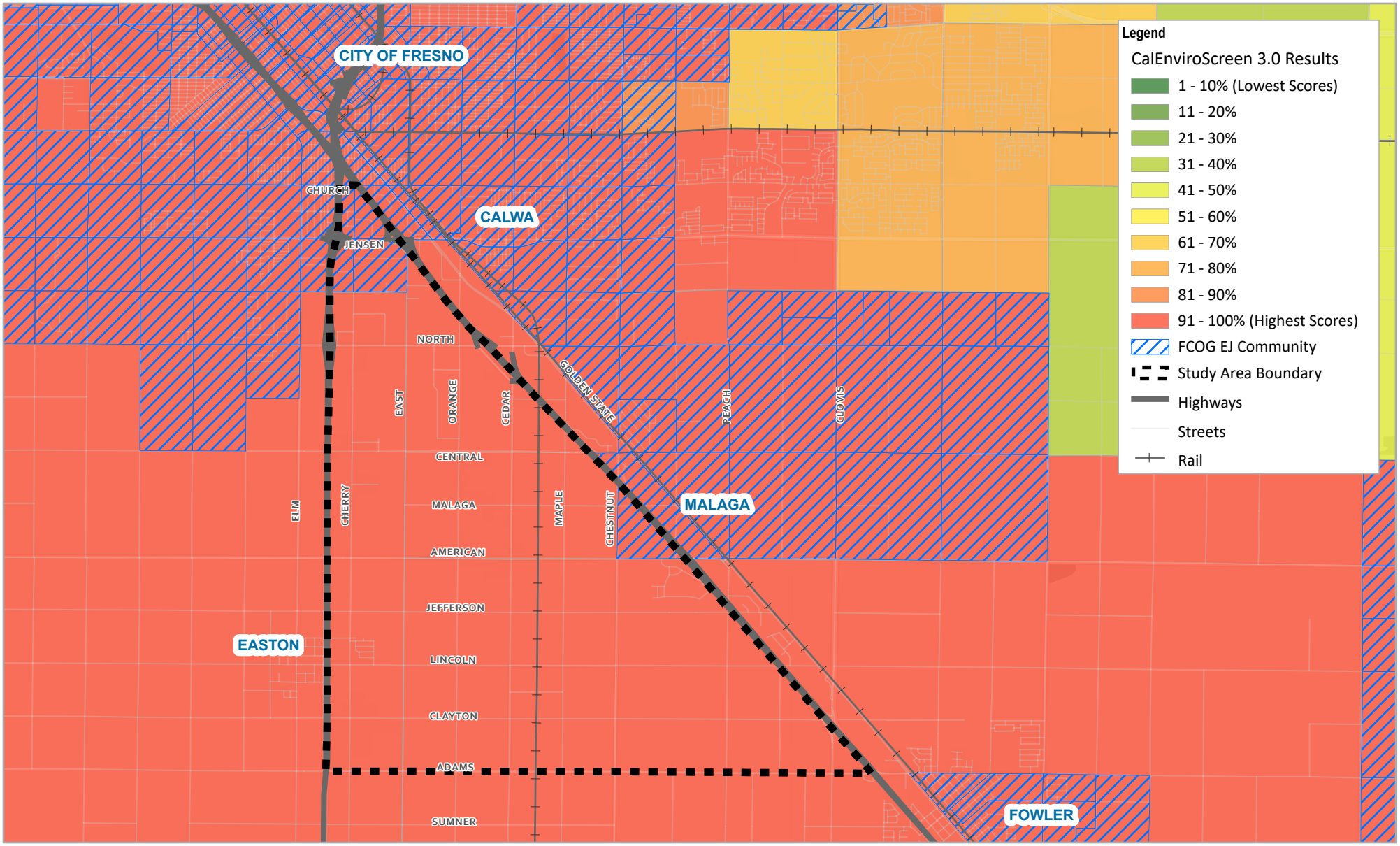
Some populations are particularly vulnerable to environmental impacts of climate change and pollution. These populations are designated as priority populations by the California Air Resources Board (ARB). Priority populations include SB 535 disadvantaged communities and Assembly Bill (AB) 1550 Low-Income Communities. At least 35 percent of California's climate investments must benefit these priority populations to ensure social equity and environmental justice for the populations that have historically been the most impacted.

As stated previously, CalEnviroScreen is used to designate disadvantaged communities in accordance with SB 535 of 2017. Per SB 535, disadvantaged communities are defined as the Census Tracts scoring within the top 25 percent of CalEnviroScreen. In addition to the Tracts scoring in the top 25 percent overall, Census Tracts that score in the highest 5 percent of CalEnviroScreen's Pollution Burden Indicator, but do not have an overall score due to undependable socioeconomic or health data, are also designated as SB 535 disadvantaged communities.

Priority populations also include low-income communities and households as defined by AB 1550. Per AB 1550, low-income communities are designated by the Census Tracts that are at or below 80 percent of the statewide median income. Low-income households are defined by households whose median income is at or below the threshold designated as low-income by California Department of Housing and Community Development (HCD) State Income Limits.

As shown in Figure 5, the entirety of the Study Area and the surrounding areas are designated as disadvantaged communities, per SB 535 and AB 1550 definitions, consistent with the CalEnviroScreen 3.0 results discussed in the previous section. A portion of the Study Area is also designated as both disadvantaged and low-income. All of these areas are considered priority populations for infrastructure investments.

Additionally, much of the population the Study Area serves lives in a household with no access to a vehicle, which provides challenges for individuals accessing employment, education, or basic services. As discussed previously, the percent of the population living within the Study Area that do not have access to a vehicle is roughly 15 percent in the Study Area's northernmost Census Tract. However, this figure is even higher in the Census Tracts north of the Study Area – as high as 50 percent for some of the Census Tracts. Moreover, between 23 and 38 percent of the adult population in the Census Tracts covering the Study Area have limited English ability, providing further challenges for these populations.



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REVERSE TRIANGLE
TRANSPORTATION AREA PLAN

FRESNO COUNCIL OF GOVERNMENTS
REVERSE TRIANGLE
TRANSPORTATION AREA PLAN

CALENVIROSCREEN 3.0 RESULTS & FCOG EJ COMMUNITIES

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Revision No. **-**
Date **JULY 2021**

FIGURE 4

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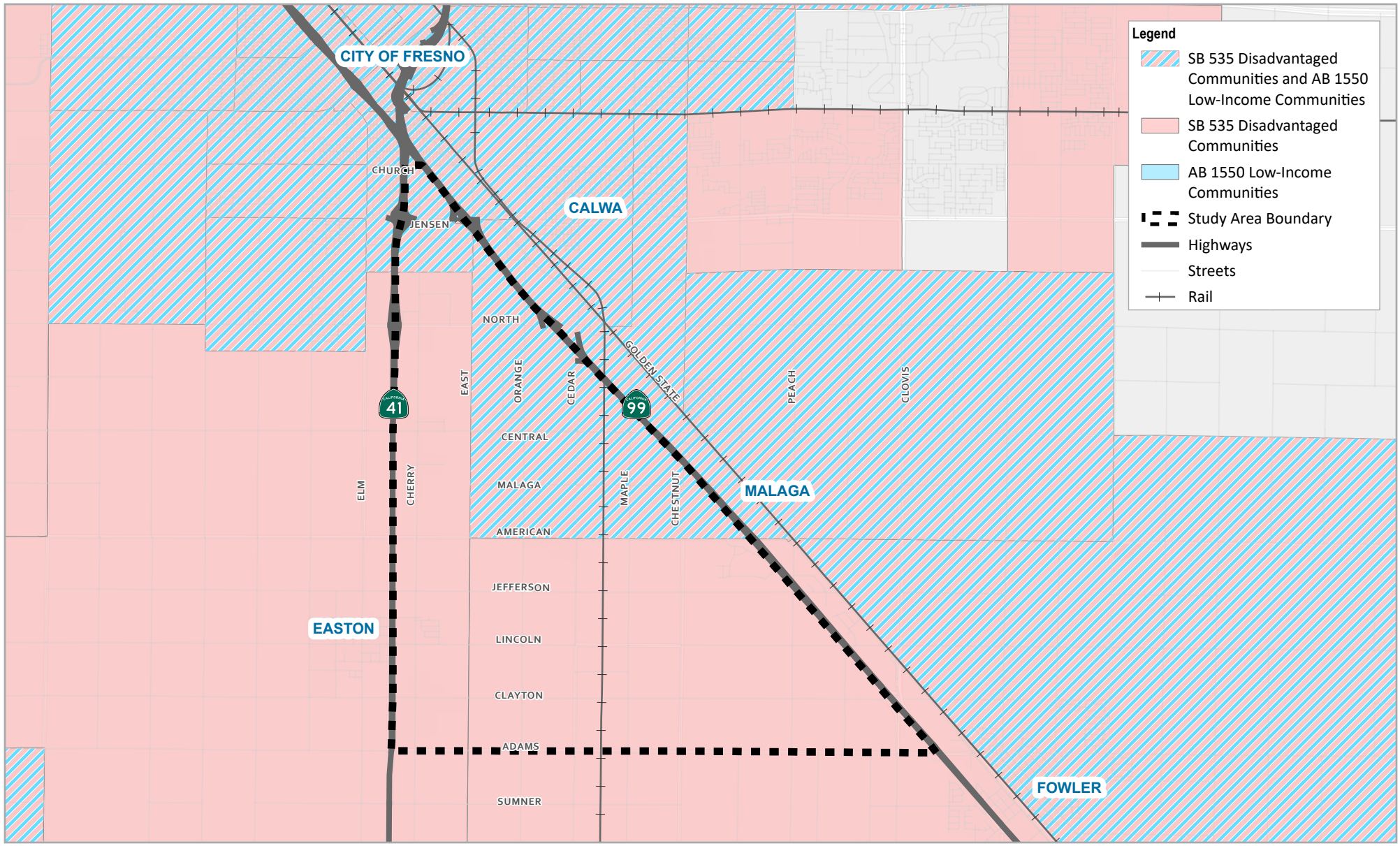
Data source: Light Gray Base: Fresno County Dept. PWP, Esri, HERE, Garmin, SafeGraph, METI/NASA, USGS, Bureau of Land Management, EPA, NPS, USDA; CalEnviroScreen Results: CA ARB . Created by: pthornton



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REVERSE TRIANGLE
TRANSPORTATION AREA PLAN

FRESNO COUNCIL OF GOVERNMENTS

REVERSE TRIANGLE TRANSPORTATION AREA PLAN

DISADVANTAGED & LOW-INCOME COMMUNITIES

Project No. **11192258**
Revision No. **-**
Date **JULY 2021**

FIGURE 5

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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; Priority Population Data: CA ARB. Created by: pthornton

Employment and Commute Characteristics

The data analyzed and presented herein is sourced from the U.S. Census Longitudinal Employer-Household Dynamics (LEHD) On the Map data sets for 2018. The comprehensive employment and commute characteristics assessment is provided in Appendix D.

A growing industrial center adjacent to several major transportation corridors, the Study Area is a hub of industrial distribution uses. The predominant industry sector of the almost 10,000 jobs associated with the Study Area is manufacturing (41.4 percent), followed by wholesale trade (15.4 percent) and transportation and warehousing (14.1 percent).

Top employers within the Study Area include Taylor Communications, Ulta, Amazon, and Mission Foods, which combined account for more than half of Study Area jobs, all of which are located north of Central Avenue within the City. Figure 4C shows the distribution of jobs within the RTTAP Study Area, with employment concentration generally following the City boundary line.

RTTAP Commute Trends

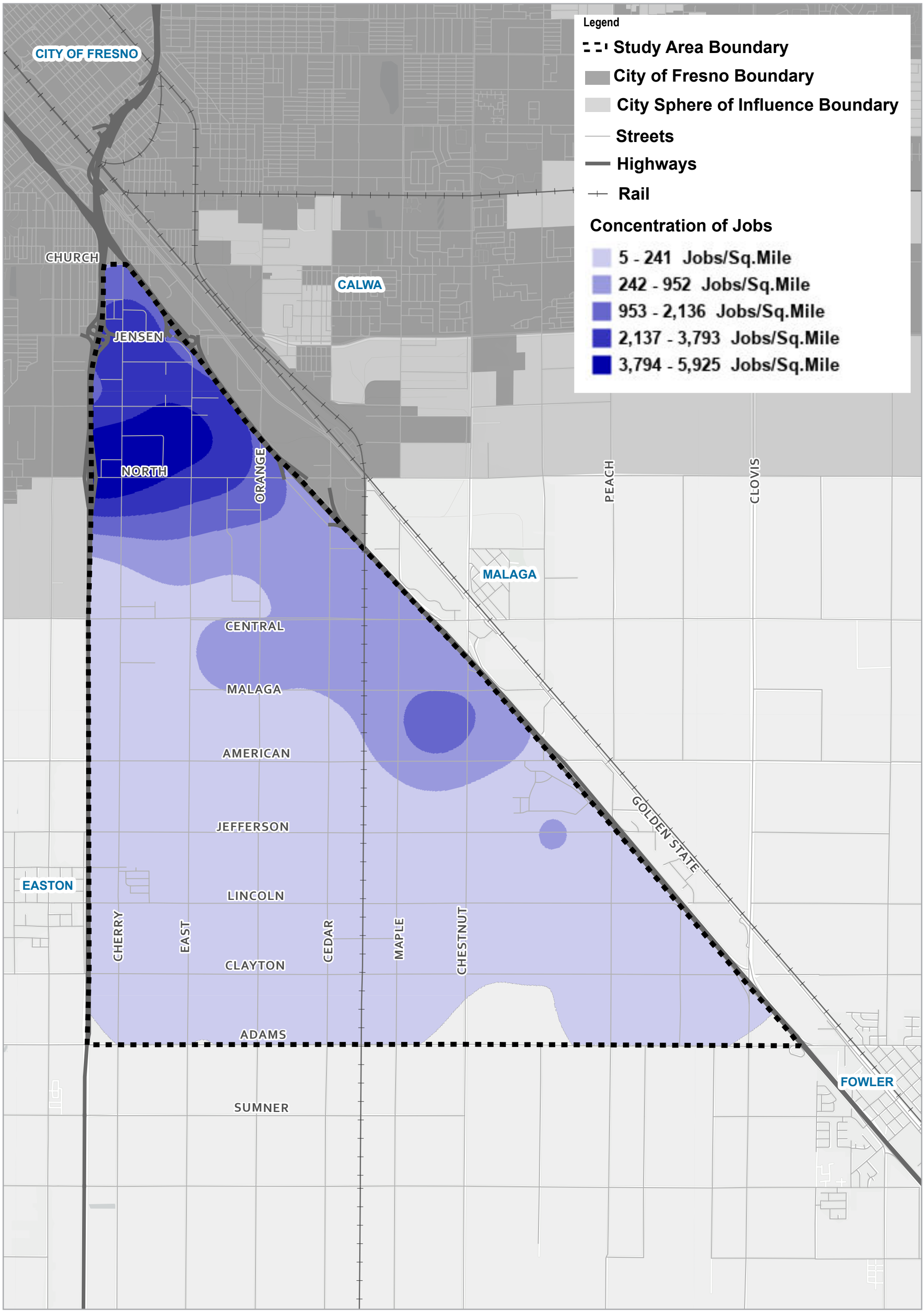
The commute characteristics of employees, the location of major employers, and the impact of goods movement associated with job centers in the Study Area is vital in understanding travel patterns and transportation needs within the Reverse Triangle. The following highlights describe employment and commute trends for the RTTAP Study Area:

- Of total employed RTTAP residents, over 93 percent are employed outside of the Study Area.
- Of total persons employed within the RTTAP Study Area, 99 percent live outside of the Study Area.
- Most persons residing within the RTTAP Study Area work in the City of Fresno to the north.
- Most persons employed within the RRTAP study live in the City of Fresno to the north.

Transit Service

Transit service in the City of Fresno is provided by Fresno Area Express (FAX). Of the 18 fixed routes, four (4) FAX routes serve the RTTAP Study Area, primarily at the northern end of the project Study Area. These include Routes 32, 34, 38 and 41. Route 34 (Jensen Avenue) and 38 (Cherry Avenue) travel through the project area, which includes approximately 15 bus stops locations. Several regional routes also serve the Study Area directly or indirectly. Fresno County Rural Transit Agency (FCRTA) routes in or near the RTTAP Study Area are: Coalinga Transit, Kart Transit and Southeast Transit. Existing transit routes connecting to the RTTAP Study Area are shown in Figure 7.

In addition to the previously described routes operating in the Study Area, FAX Handy Ride ADA demand responsive services also provides service offering door-to-door transit service within the City of Fresno.



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REVERSE TRIANGLE
TRANSPORTATION AREA PLAN

GHD

FRESNO COUNCIL OF GOVERNMENTS
REVERSE TRIANGLE TRANSPORTATION AREA PLAN

DISTRIBUTION OF STUDY AREA JOBS

Project No. 11192258
Revision No. -
Date JULY 2021

FIGURE 6

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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

Transit Commute Trends

Southwestern Fresno is serviced by Fresno Area Express (FAX) and Fresno County Rural Transit Agency (FCRTA); however, the RTTAP Study Area is currently only serviced by FAX routes 34 and 38 along Jensen Avenue, Cherry Avenue, and Church Avenue in the northernmost portion of the Study Area. Additional routes provide service to areas west, east, and north of the Study Area. FCRTA provides public transit service from rural communities to the City of Fresno, including the Coalinga Intercity Transit Route through the community of Easton and the Southeast Transit Route through the community of Fowler. The area is also served by Fresno County EOC through Social Services funding, including overnight hours of door-to-door transit for CalWorks clients working at major employers who operate overnight shifts, when other transit options are not available.

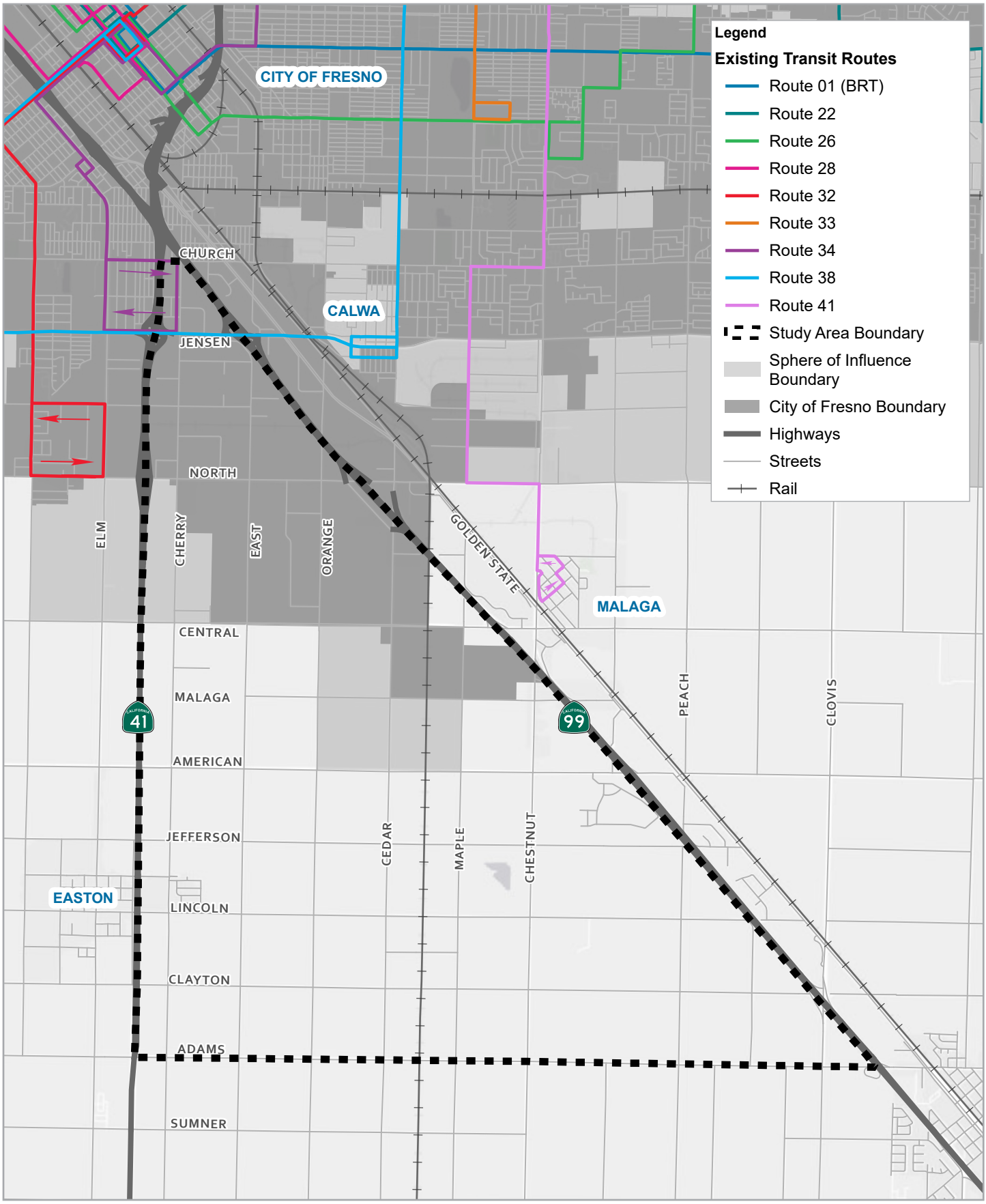
The FAX Fresno Clovis Metropolitan Area Short Range Transit Plan (SRTP), FY 2018-2022 outlined past trends in Fresno County and provides the following assessments:

- Very little traffic congestion makes driving an automobile very attractive for those who can afford them.
- Low density development is occurring on Fresno's urban fringe where transit services do not exist now.
- Development encroachment on farmland is an ongoing concern due to the high demand for agricultural products from this region.
- The San Joaquin Valley faces significant air quality challenges. The entire Valley is designated as non-attainment for both the national and California air quality standards for ozone and particulate matter.
- Approximately 80% of FAX riders take the bus because they either do not drive or cannot afford a car. This rate is roughly double the transit dependency rate found in other cities of a similar size.
- Due to a number of factors, the demand for Transit Oriented Development (TOD) is lower in Fresno than other US cities of similar size, making it a challenge to build, finance and market these projects.

As described in the Fresno COG draft FY 2020/21 Unmet Transit Needs Assessment, FAX has identified the lack of transit service to the North Pointe Business Park as an unmet transit need that is reasonable to meet. Specifically, FAX plans to evaluate and implement transit service options in calendar year 2022 to major employment centers in the project area, as consistent with the action in the 2022-2026 FCMA SRTP to implement service from Downtown Fresno to North Point Business Park.

Service Frequency

Service frequencies vary from 15 minutes to 60 minutes with most routes operating at 30-minute headways. Regular service stops at 10:00 pm on most routes on weekdays, with extended service until midnight on the most heavily travelled sections of certain routes. The service operates until approximately 7:00 pm on weekends. The extended night service is relatively new and was developed to address the limited viability of transit for many workers, students and low-income people who need public transportation outside of current operating hours. Service frequency on the weekends is at 30 minutes for all routes excluding the four lowest performing routes.



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REVERSE TRIANGLE
TRANSPORTATION AREA PLAN

FRESNO COUNCIL OF GOVERNMENTS
REVERSE TRAINAGLE
TRANSPORTATION AREA PLAN

EXISTING
TRANSIT FACILITIES

Project No. 11192258
Revision No. -
Date JULY 2021

FIGURE 7

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Data source: World Light Gray Canvas Base: Fresno County Dept. PWP, Bureau of Land Management, Esri, HERE, Garmin, INCREMENT P, USGS, EPA, City of Fresno, Fresno County, FAX, TIGER. Created by: pthornton

Existing Multimodal Network

Approximately 12 square miles or 80 percent of the RTTAP Study Area is considered rural Fresno County. The existing multimodal network within the RTTAP Study Area is primarily disconnected and substandard and is limited to roadways within the city boundary. The following images provide examples of existing roadway conditions with and without the presence of bicycle lanes and/or sidewalk. The following sections describe existing pedestrian and bicycle facilities.

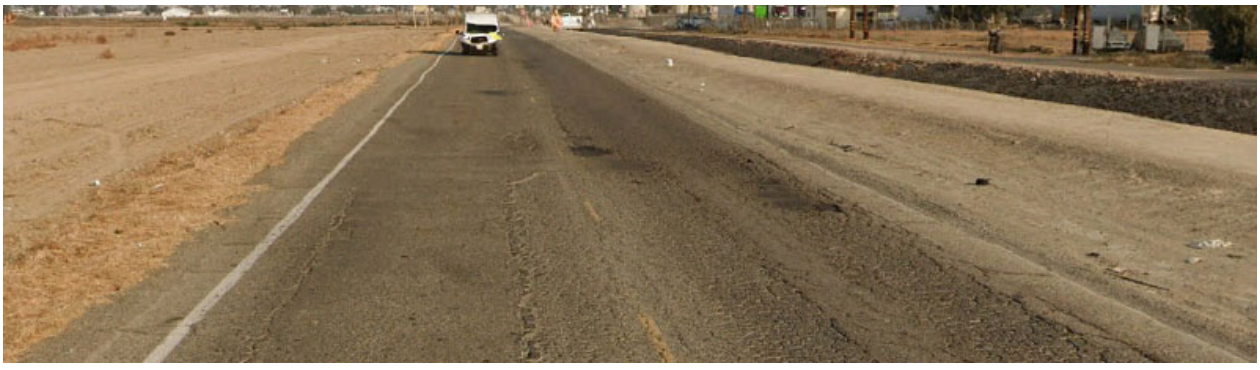
Roadway with Sidewalks, without Bike Lanes or TWLTL

Location: Cherry Avenue between Jensen Avenue and Central Avenue

Roadway with Sidewalks and Bike Lanes

Location: Orange Avenue between Jensen Avenue and Central Avenue

Roadway without Bike Lanes or Paved Shoulders



Location: Central Avenue between Orange Avenue and Cedar Avenue

Pedestrian Facilities

GHD conducted a field review to identify existing sidewalks, curb ramps and bicycle facilities within the boundary of the RTTAP as shown on Figure 8. As shown, pedestrian facilities are more prominent in the northern portion of the RTTAP Study Area. This is a result of development that has occurred within the City of Fresno. However, there are many locations that lack sidewalks or that have sidewalk gaps between developments. In the southern sections of the RTTAP Study Area, sidewalk and bicycle facilities become sparse, as new development has yet to occur.

Bicycle Facilities

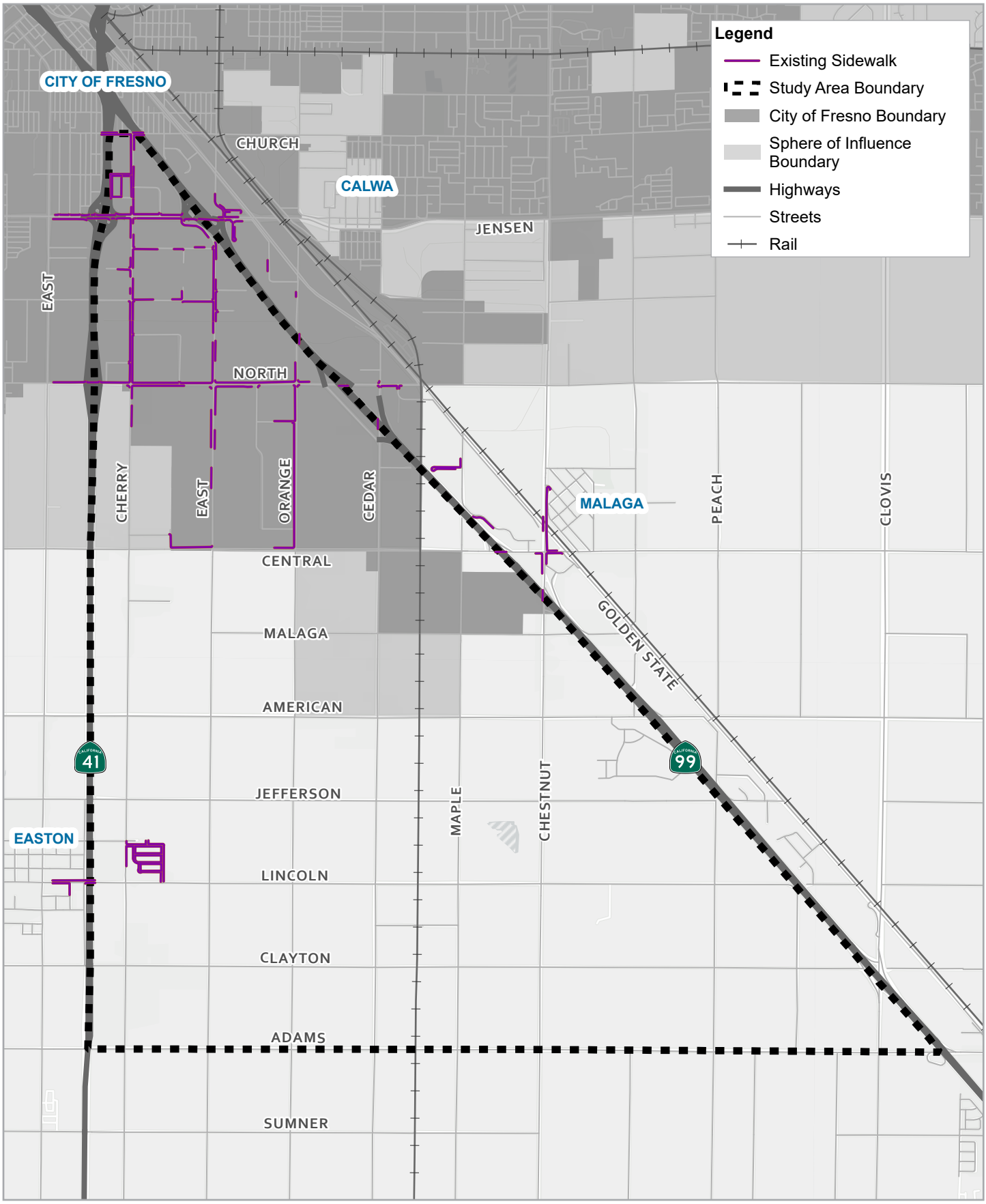
According to the Fresno County General Plan County-wide Land Use Diagram, this area is mostly zoned agriculture, therefore bicycle facilities do not exist as described by Caltrans five facility types. The Study Area roadway infrastructure shares the road with bicyclists and can be considered a mixed-use roadway system. However, bicycle movement along these rural county roads can inhibit ridership use base on the level of stress that the roadway presents (roadway width, traffic speed, the presence of parking lane, etc.), as discussed in the following section ("Bicycle Level of Traffic Stress").

Within the Study Area, Class II bicycle lanes are located on:

- Church Avenue from Fig Avenue to Golden State Boulevard
- North Avenue from Cherry Avenue to Orange Avenue
- Central Avenue from Ulta Distribution Center frontage road section to East Avenue
- Orange Avenue from Central Avenue to North Avenue
- Cherry Avenue from Valley Iron Inc. (frontage road – 1,300 ft south of North Avenue) to Cummins Pacific (frontage road – 675 ft north of Annadale Avenue)
- East Avenue from Central Avenue to Dorothy Avenue
- Orange Avenue from Central Avenue to Fresno Industrial Center driveway (just south of the overpass)

Figure 9 identifies the network of bike lanes within the Study Area as well as those surrounding the project limits. As shown, there are Class II bike lane facilities north of Central Avenue (within city limits). This area has seen design improvements that encompass complete street standards, such as sidewalks and street lighting.

A challenge regarding the existing bikeway network is the connectivity gaps to nearby bikeway networks, Elm Avenue to the west and Church Avenue to the north. As mentioned earlier, one of the goals to promote bicycling is connectivity of the bicycle network. With continual growth of the area, implementation of policies, programs and development standards with appropriate agencies is a way to successfully complete connectivity of the bike network within the project area.



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REVERSE TRIANGLE
TRANSPORTATION AREA PLAN

FRESNO COUNCIL OF GOVERNMENTS
REVERSE TRAINAGLE
TRANSPORTATION AREA PLAN

EXISTING
PEDESTRIAN FACILITIES

Project No. 11192258
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Date JULY 2021

FIGURE 8

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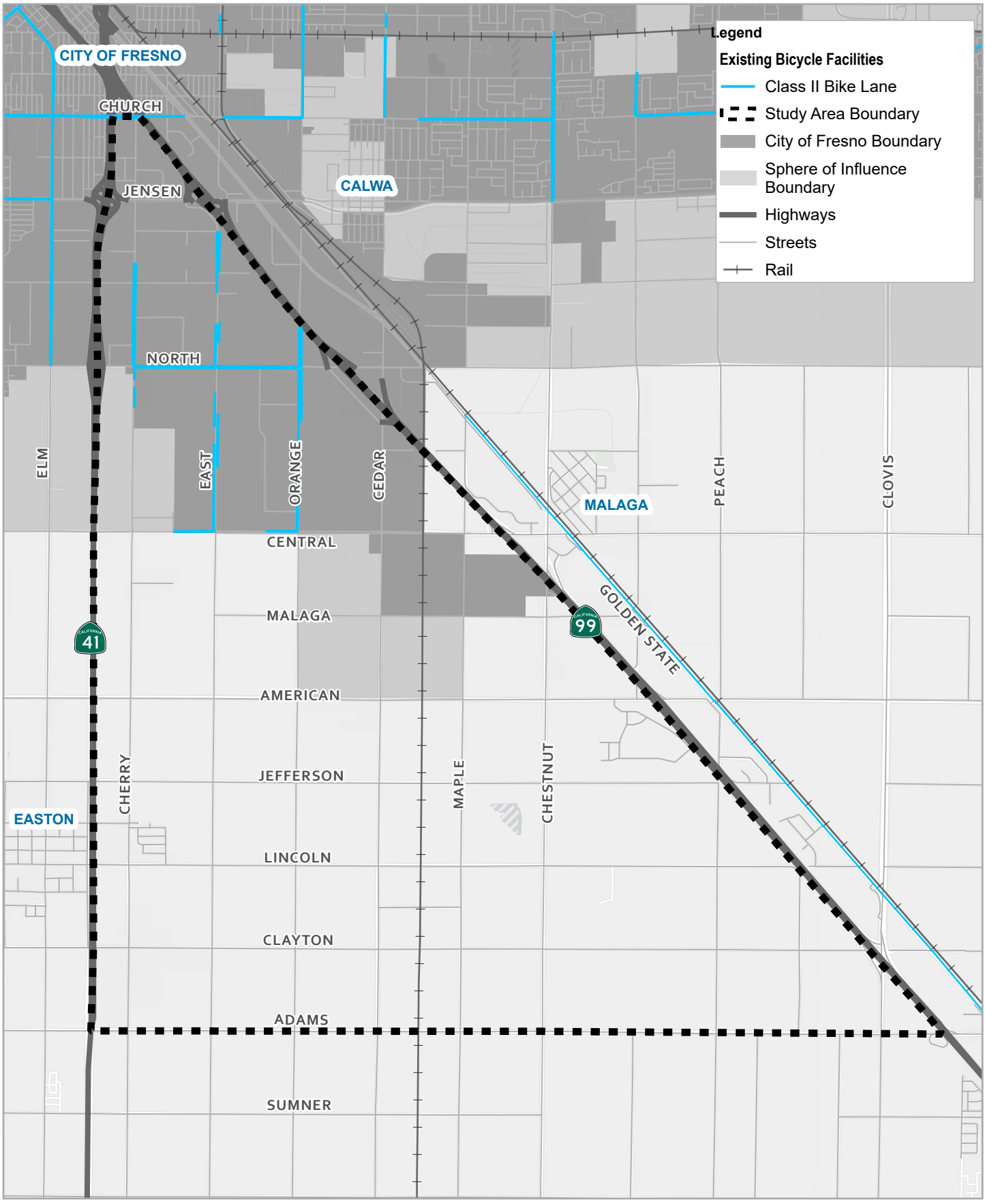

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REVERSE TRIANGLE
TRANSPORTATION AREA PLAN

FRESNO COUNCIL OF GOVERNMENTS
REVERSE TRAINAGLE
TRANSPORTATION AREA PLAN

EXISTING
BICYCLE FACILITIES

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Date JULY 2021

FIGURE 7

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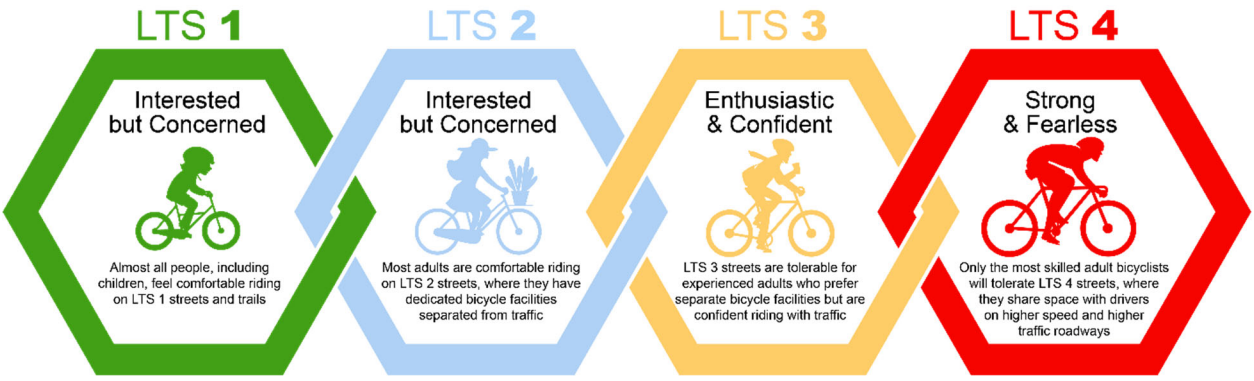
Data source: Light Gray Base: Fresno County Dept. PWP, Esri, HERE, Garmin, SafeGraph, METI/NASA, USGS, Bureau of Land Management, EPA, NPS, USDA. Created by: pthornton

Bicycle Level of Traffic Stress

Existing bicycle conditions for the Study Area were analyzed based on the Mineta Transportation Institute's Bicycle Level of Traffic Stress (LTS) methodology, which can be obtained from the paper, Low Stress Bicycling and Network Connectivity (Report 11-19, Mineta Transportation Institute, May 2012). Bicycle LTS is a rating system of the safety, comfort, and convenience of transportation facilities from the perspective of the user. The approach outlined in the Mineta report uses roadway data, (i.e., posted speed limit, number of travel lanes, daily traffic levels, and presence and character of shoulder or bicycle lanes) to analyze bicyclist comfort level.

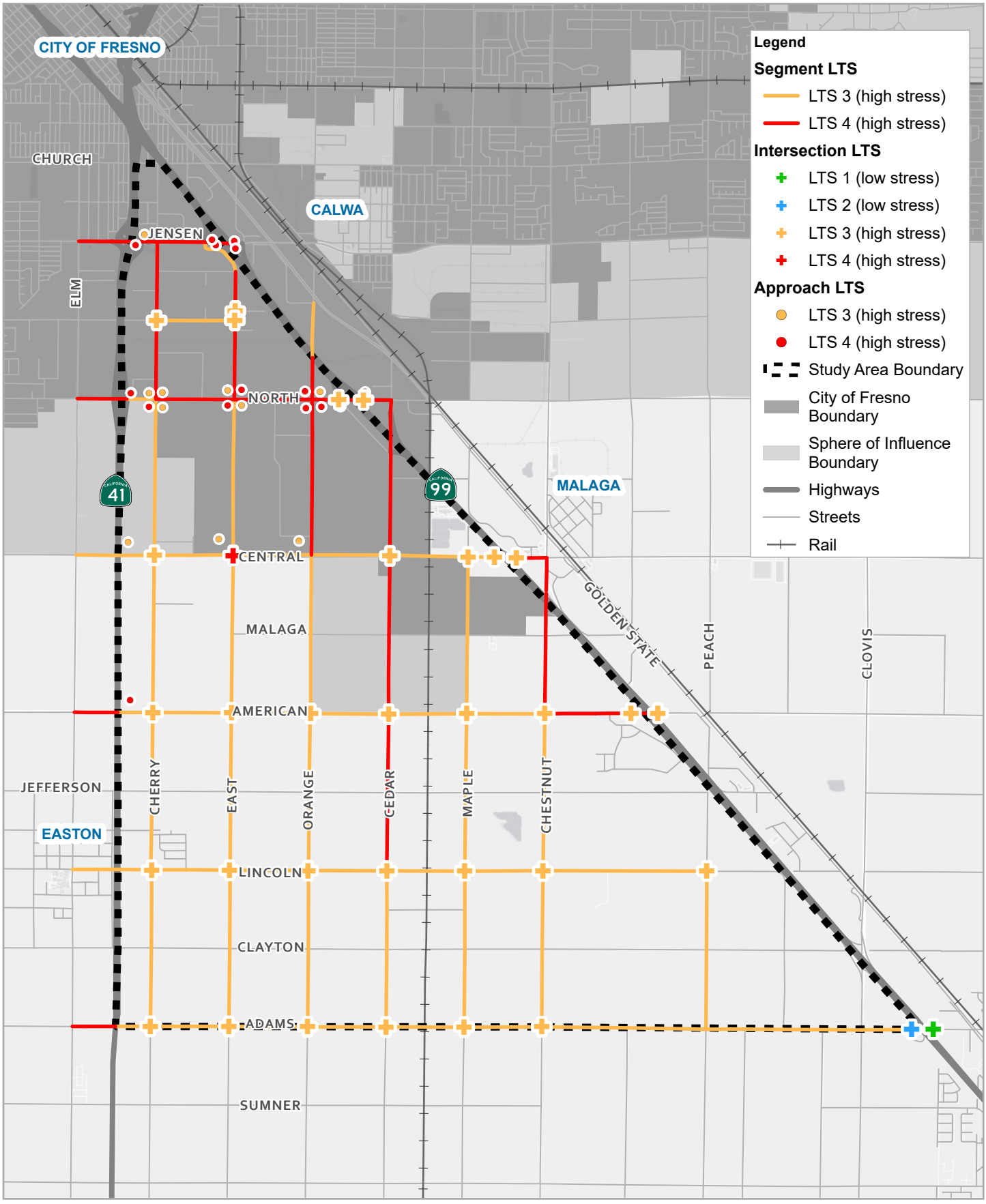
The Bicycle LTS methodology breaks road segments into one of four classifications/ratings for measuring the effects of traffic-based stress on bicycle riders, with 1 being the lowest stress or most comfortable, and 4 being the highest stress or least comfortable, as illustrated in the following graphic. The greater the separation between the outside travel lane and bicyclist generally means less stress for users.



It is likely that the LTS scores show directional differences along a given route, due to potential differences in infrastructure characteristics. Therefore, both directions are reported for a given roadway segment. However, the methodology for the criteria aggregate (overall LTS) follows the weakest link principle: the dimension with the worst level of stress governs. For example, if the two directions of a roadway segment result in different scores, the worst of these two segments are reported as the overall score. Moreover, if a segment is considered low stress, and there is a high stress intersection approach at the end of the segment, the whole segment is considered high stress.

Figure 10 summarizes the Bicycle LTS results for the segments, crossings, and intersection approaches in the Study Area as applicable. As illustrated, areas with commercial development (area between Jensen Avenue and North Avenue) recorded high-stress due to the higher speeds and daily traffic volumes. As an example, North Avenue at the North Point Business Park (photo to the right) located at North Avenue/East Avenue is an arterial road that incorporates complete street characteristics such as dedicated class II bike lanes, two-through lanes and a median/two-way left turn lane.

The southern portion of the Study Area also recorded high stress (south of Central Avenue). Similar to the northern portion of the Study Area; speed and lack of bicycle facilities contributed to high stress levels for the segments and intersections. Approaches were not mapped due to the absence of right turn lanes. The approaches would not be considered high stress, due to lower volumes and no right turn. As an example, the intersection of Adams Avenue/Cedar Avenue (photo above) is representative of intersection approaches within the southern portion of the area, most of which lacked dedicated right turn lanes.



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REVERSE TRIANGLE
TRANSPORTATION AREA PLAN

FRESNO COUNCIL OF GOVERNMENTS
REVERSE TRAINAGLE TRANSPORTATION AREA PLAN

BICYCLE LEVEL OF TRAFFIC STRESS

Project No. **11192258**
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Date **JULY 2021**

FIGURE 10

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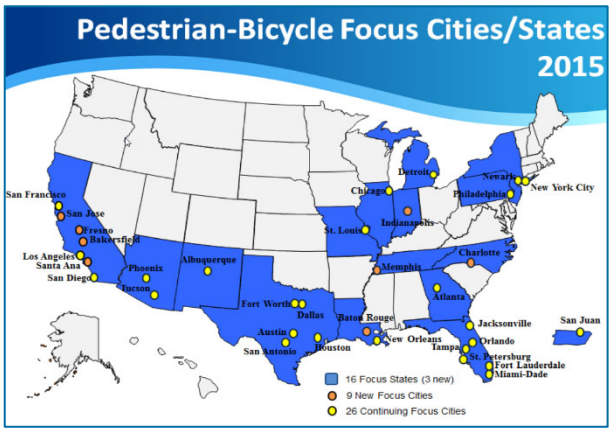
Data source: World Light Gray Canvas Base: Fresno County Dept. PWP, Bureau of Land Management, Esri, HERE, Garmin, USGS, EPA, NPS, Fresno County, City of Fresno, TIGER. Created by: pthornton

Crash History

The U.S. Department of Transportation Federal Highway Administration (FHWA) has been working aggressively to reduce pedestrian and bicyclist deaths. As part of the efforts, FHWA identified Pedestrian-Bicycle Focus Cities/States in 2015 (last modified on April 1, 2019) that were selected based on their high pedestrian and bicycle fatality rates. Fresno was one of the new focus cities listed in California as shown in the map (to the right).



FHWA Resource

Additionally, improving the safety of pedestrians, walking and cycling in Fresno is one of the main goals of the Fresno Active Transportation Plan (ATP). Therefore, in keeping with the ATP, the RTTAP also strives to improve the safety of walking and bicycling in and around the Study Area.

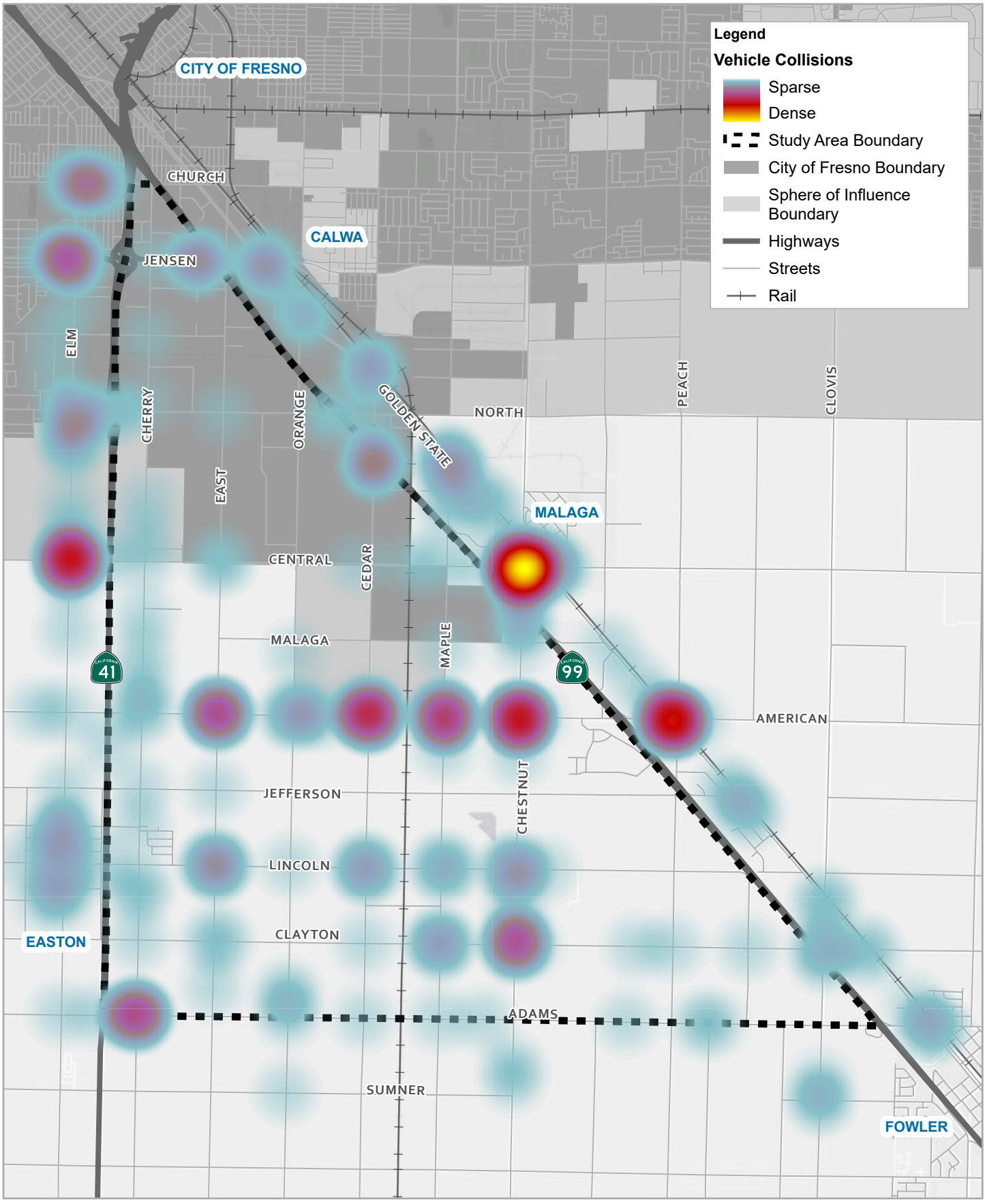
The following summarizes the history of all crash types (including crashes involving automobiles only, an automobile and pedestrian, and an automobile and bicyclist) within the RTTAP Study Area based upon data collected from the Transportation Injury Mapping System (TIMS). A comprehensive crash assessment and methodology discussion is provided in Appendix C. This data was initially evaluated wholistically for the entire RTTAP Study Area. Ultimately, data was evaluated on a location basis for crash reduction calculations associated with recommended safety improvements, as presented in Chapter 7.

Within the crash analysis period between January 2012 and December 2017, there were 307 total fatal or injury crashes. Primary contributing factors include the following: automobile right of way violation (40%); unsafe speed violation (15%); improper turning violation (13%), and traffic signal and signs violation (13%). Motor vehicle fatal or injury crashes are presented on Figure 11.

Bicycle and Pedestrian Crashes

Within the Plan Area, sidewalks are generally found mostly in the built-out northern (north of North Avenue) portion. However, there also several gaps in the sidewalk network throughout the built-out area, most notably along many of the arterials and collectors, including most of Cherry Avenue, East Avenue, Orange Avenue, North Avenue and Jensen Avenue. Jensen Avenue serves as an arterial with a fully developed sidewalk facility throughout the Plan Area limits. The patchwork development patterns in the Plan Area have also left some developed areas isolated without any pedestrian connections to adjacent developed areas. For example, the Ulta distribution center located at Central Avenue and East Avenue and the Amazon distribution center located on Central Avenue and Orange Avenue provide sidewalk on their respective frontages. However, along other undeveloped sites, sidewalk coverage is not complete and does not allow pedestrian to safely and comfortable walk to the developed areas to its north.

Investigation of bicyclist-involved vehicle collisions from January 2012 to December 2017 based on Statewide Integrated Traffic Records System (SWITRS) data found nine bicycle collisions and one fatality just outside the plan area over the five-year period. These recorded instances do not show any key hot spots: however, additional collisions not reported in the SWITRS database may have occurred. Investigation of pedestrian-involved vehicle collisions from January 2012 to December 2017 based on Statewide Integrated Traffic Records System (SWITRS) data found nine pedestrian collisions and no fatalities within the Plan Area over the five-year period. These recorded instances do not show any key hot spots: however, additional collisions not reported in the SWITRS database may have occurred. Bicycle and pedestrian crashes are presented on Figure 12.



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REVERSE TRIANGLE
TRANSPORTATION AREA PLAN

FRESNO COUNCIL OF GOVERNMENTS
REVERSE TRAINAGLE TRANSPORTATION AREA PLAN

HEAT MAP OF MOTOR VEHICLE CRASHES (2012-2017)

Project No. 11192258
Revision No. -
Date JULY 2021

FIGURE 11

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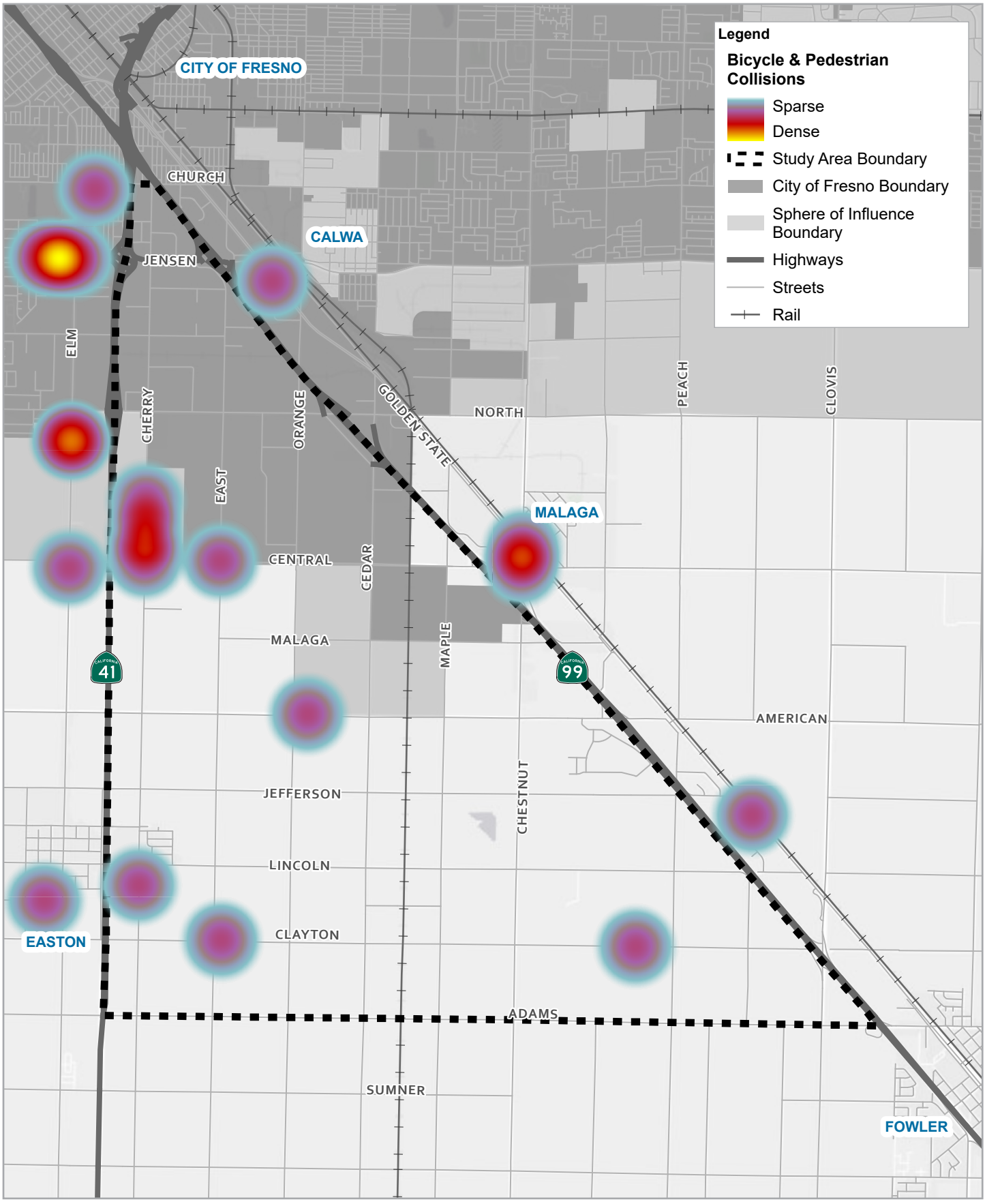
Print date: 01 Jul 2021 - 16:20

Data source: Collision Data: SWITRS (2012-2017) ; World Light Gray Canvas Base: Fresno County Dept. PWP, Bureau of Land Management, Esri, HERE, Garmin, USGS, EPA, NPS. Created by: pthornton



Paper Size ANSI A

0 0.25 0.5 0.75 1

Miles

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Map Projection: Lambert Conformal Conic
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane California V FIPS 0405 Feet

GHD

REVERSE TRIANGLE
TRANSPORTATION AREA PLAN

FRESNO COUNCIL OF GOVERNMENTS

REVERSE TRAINAGLE TRANSPORTATION AREA PLAN

HEAT MAP OF BICYCLE AND PEDESTRIAN CRASHES (2012-2017)

Project No. 11192258
Revision No. -
Date JULY 2021

FIGURE 12

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Print date: 01 Jul 2021 - 16:20

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Vehicle Operations

Congestion and Travel Time Reliability Assessment

Congestion and travel time reliability analysis was conducted to support FCOG's Regional Congestion Management Program (RCMP) which recommends the incorporation of travel time reliability and speed-based congestion measures to support the quantification of both passenger vehicle as well as goods movement performance metrics. It is also consistent with new requirements for State DOTs and MPOs to assess the performance of the Interstate and non-Interstate National Highway System (NHS) per the National Highway Performance Program (NHPP). Specifically, this entails assessing freight movement on the Interstate System; and to assess traffic congestion and on-road mobile source emissions for the purpose of carrying out the Congestion Mitigation and Air Quality Improvement (CMAQ) Program.

Travel time reliability is defined as the variation in travel time for the same trip from day to day ("same trip" implies a trip made with the same purpose, from the same origin, to the same destination, at the same time of the day, using the same mode, and by the same route). If variability is large, the travel time is considered to be unreliable, because it is difficult to generate consistent and accurate estimates for it. If there is little or no variation in the travel time for the same trip, the travel time is considered to be reliable.

Buffer Time represents the additional time a motorist needs to budget for to ensure they arrive at their destination at the expected time 95% of the time. Buffer Time Index (BTI) simply normalizes Buffer Time for distance and is expressed as a ratio or percentage (added percent of time required). A higher BTI indicates more time drivers need to budget for to drive the corridor as a typical drive time becomes less reliable. BTI equal to or greater than 0.5 indicates that a motorist will need to budget 50+ percent more time over the normal travel window (i.e., departing earlier) to ensure an on-time arrival 95 percent of the time (i.e., equates to allowing for one late arrival for every 30 trips).

The comprehensive congestion and travel time reliability assessment and methodology discussion is provided in Appendix A. The following summarizes the results for the AM and PM peak hour periods for Passenger Vehicles and Heavy-duty Trucks on the designated NHS in Fresno County, including SR 99, SR 41, Jensen Avenue, North Avenue (SR 99 to Golden State Boulevard), and Chestnut Avenue (Adams Avenue to Central Avenue).

Overall, the study segments were found to be generally uncongested, with the exception of Jensen Avenue during the AM peak hour (truck traffic only) and PM peak hour. Travel time is generally reliable along uncongested segments of SR 99 and SR 41, and generally unreliable along uncongested segments of Jensen Avenue, North Avenue, and Chestnut Avenue.

Passenger Vehicles

AM Peak Hour: Uncongested segments were reliable along the Study Area boundary segments (SR 99 and Hwy 41) with BTI < 25%. Additionally, unreliable BTI >= 50% segments were located along Chestnut Ave between Adams Ave to Central Ave and on Jensen Ave from Golden State Blvd to Hwy 41 interchange off/on ramps.

PM Peak Hour: Uncongested segments were reliable along the Study Area boundary segments (SR 99 and Hwy 41) with BTI < 25%. Additionally, unreliable BTI >= 50% segments were located along Chestnut Ave between Adams Ave to Central Ave and on Jensen Ave from Golden State Blvd to Hwy 41 interchange off/on ramps.

Heavy-duty Trucks

AM Peak Hour: Uncongested segments were reliable along the Study Area boundary segment SR 99 with BTI < 25% and Hwy 41 showed semi-reliability with BTI > 25%. Additionally, unreliable BTI >= 50% segments were located along

Chestnut Ave between Adams Ave to Central Ave and on Jensen Ave from Golden State Blvd to Hwy 41 interchange off/on ramps.

PM Peak Hour: Uncongested segments were reliable along the Study Area boundary segment SR 99 with BTI < 25% with Hwy 41 showing segments of reliability and unreliability. Additionally, unreliable BTI >= 50% segments were located along Jensen Ave from Golden State Blvd to Hwy 41 interchange off/on ramps with semi-reliability with BTI > 25% along Chestnut Ave between Adams Ave and Malaga Ave.

Roadway Level of Service

Eight existing roadway segments were quantified using average annual daily traffic (AADT, or daily volumes on a roadway averaged over a year period) values that were collected in May 2019. All eight roadway segments currently operate below established standards and are listed in Table 2 below. The comprehensive roadway existing conditions assessment and methodology discussion is provided in Appendix C.

Table 2 – Existing Intersection Level of Service (AM/PM Peak Hour)

#	Roadway Segment	Limits	No. of Lanes	Facility Type	AADT	LOS
41	Cherry Avenue	Central Avenue to North Avenue	2	Collector	1,720	B
42	American Avenue	Highway 41 to Cherry Avenue	2	Arterial	2,580[1]	B
43	Orange Avenue	American Avenue to Jefferson Avenue	2	Local	510	B
44	Maple Avenue	American Avenue to Jefferson Avenue	2	Local	830	B
45	Cedar Avenue	Central Avenue to Malaga Avenue	2	Arterial	1,620	B
46	Central Avenue	Cedar Avenue to Maple Avenue	2	Arterial	3,490	B
47	American Avenue	Cedar Avenue to Maple Avenue	2	Arterial	2,330	B
48	Adams Avenue	East Avenue to Maple Avenue	2	Collector	2,250	B

1. Seven day average total

Intersection Level of Service

Turn movement counts for 40 intersections were analyzed using Synchro 10.0 (Trafficware) integrated computer software program. Turn movement counts were collected in May of 2019. Of the 40 intersections, only two intersections currently operate below established standards during either the AM or PM peak hours as listed in Table 3 below. The comprehensive intersection existing conditions assessment and methodology discussion is provided in Appendix C.

Table 3 – Existing Intersection Level of Service (AM/PM Peak Hour)

#	Intersection	Control Type[1,2]	Target LOS	AM / PM Peak Hour					
				Delay (sec)	LOS	Warrant Met?	Delay (sec)	LOS	Warrant Met?
3	North Avenue / SR-99 SB Off-Ramp (Parkway Dr)	TWSC	D	90.2	F	Yes	86.4	F	No
17	Clovis Avenue / SR-99 SB On-Ramps	TWSC	D	32.0	D	No	75.6	F	No

Notes: 1. TWSC = Two-Way Stop Control
2. LOS = Delay based on worst minor approach for TWSC
3. Warrant = Based on California MUTCD Warrant 3