Fresno County Rural Transit Agency

State Route 99 Transit Feasibility Study

FCRTA
Fresno County
Rural Transit Agency
Accessible EV Mobility & Infrastructure For All

Caltrans

February 2025

WALKER CONSULTANTS

PRECISION CIVIL ENGINEERING, INC.

ENERGEIA

Acknowledgements

This study was developed with support of people, organizations, and governments in Fresno County and across the country. Thank you to those who provided input and

Technical Advisory Committee

Thomas Gaffery, City of Fowler

Kamara Biawogi, City of Selma

Lupe Macias, City of Selma

Christin Windover, City of Kingsburg

Kay Bertken, League of Women Voters

Simran Jhutti, Fresno Council of Governments

Jennifer Rodriguez, Fresno Council of Governments

Kristopher Grey, Fresno Area Express Transit, City of Fresno

Amy Hance, Clovis Transit

Thomas Dulin, Fresno Economic Opportunities Commission

Dr. Yachun Chow, California Air Resources Board

Brandon Gonzalez, Fresno Housing Authority

Karla Martinez, Leadership Council for Justice and Accountability

Natalie Delago, Leadership Council for Justice and Accountability

Fresno County Rural Transit Agency

Janelle Del Campo

Moses Stites

Caltrans

Nicholas Isla, District 6

Lorena Mendibles, District 6

Christopher Xiong, District 6

Consultant Team

Walker Consultants

Chrissy Mancini Nichols

Tania Schleck

Keith Hall

Ben Weber

Sydney Stephenson Shah

Bobby Mordenti

Precision Engineering

Jared Linney

Energeia

Nick Auerbauch

All images from Walker Consultants unless otherwise noted.

CONTENTS

01 | Executive Summary

The Need for Increased Transit Service

State Route 99 in Fresno County, also known as the Golden State Corridor, connects southwest Fresno County to downtown Fresno. It is a critical State economic link that brings food from the most productive agricultural region in the world to market and connects workers to jobs.

It is also very congested. With limited options other than driving commuters sit in traffic, which threatens economic activity and creates an unsafe travel environment. The related vehicle emissions further contribute to Fresno County's poor air quality. With population growth anticipated in the Fresno region, congestion and air quality will continue to worsen without a viable alternative to driving.

Providing high-quality transit service in rural areas is challenging, particularly in Fresno County, which spans almost 6,000 square miles. Most rural areas are sparsely populated and lack the density to support the costs associated with providing high-quality transit.

However, the State Route 99/Golden State Corridor has a number of closely spaced and larger population centers directly on the corridor, or that can be connected to the corridor through a transfer.

This feasibility study is an opportunity to build a new transit service model in rural Fresno County to support residents in disadvantaged communities with a travel option other than driving.

Goals of the State Route 99 Transit Feasibility Study

Increase Transit Use

- Increase access and more comfortable connections
- Enhance amenities
- Move more people than vehicles
- Reduce congestion
- Increase connections to eastern Fresno County
- Support operating expenses

Increase Equity, Environmental Sustainability & Economic Opportunity

- Reduce VMT and GHG
- Increase access for disadvantaged people
- Integrate with other transit services
- Support local development and planning efforts
- Provide affordable transportation
- Support operating expenses

An Implementable, Community Support Project

- Service is feasible and at the appropriate scale
- Strong community support
- Cost-effective in line with existing plans
- Competitive for state and federal funding
- County

Project Background

This Transit Feasibility Study evaluated how to improve transit on one of the country's most traveled corridors, State Route 99 (SR 99). SR 99 is an essential connection to bring agriculture products to market in the most productive agricultural region in the world. It connects workers to jobs and residents to quality-of-life destinations. SR 99 is critical to California's economic vitality.

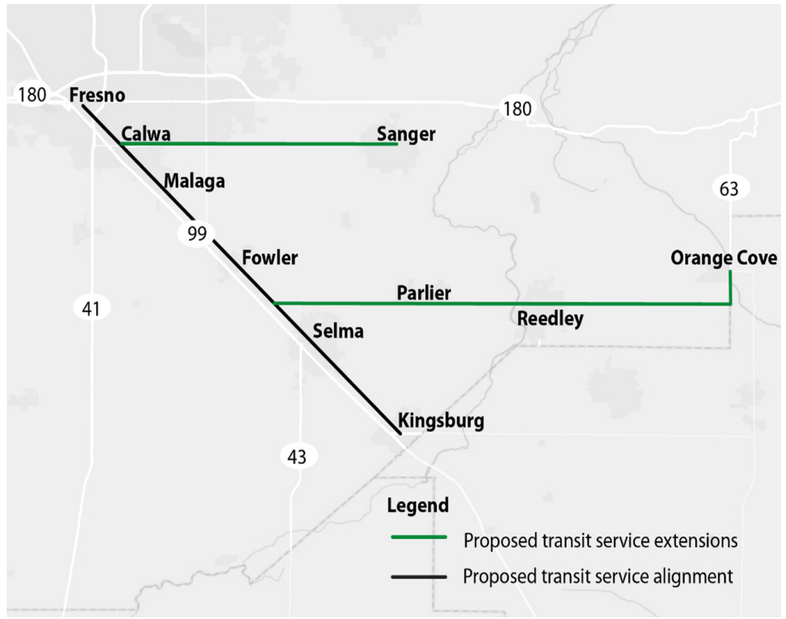
However, increases in average daily traffic cause serious congestion and safety issues along SR99. At the same time, local residents along the corridor have limited alternatives to driving. FCRTA's existing Southeast route, which travels from Kingsburg to Fresno does not provide frequent service.

Without a real alternative to driving, traffic forecasts are expected to increase by almost 50% along the corridor. As a result, local residents' quality of life will suffer as they sit on congested highways, unable to access employment opportunities, health care, and other necessary amenities. Further, most of the communities along this corridor are considered disadvantaged and burdened by pollution, which will only increase without an alternative option to the high cost of driving.

Parallel to SR 99 runs Golden State Boulevard, a 14.1-mile stretch of historic SR 99 with several freight rail crossings from Fresno to Kingsburg. This Transit Feasibility Study evaluated new transit service on Golden State Boulevard and SR99 to connect the City of Fresno with the cities of Malaga, Fowler, Selma, and Kingsburg. Connections would potentially be made to other Fresno locations, such as Parlier, Reedley, Sanger, Orange Cove, and Visalia. The study evaluated the physical and financial feasibility of several transit alternatives including low-or zero emissions light rail, bus rapid transit, or hybrid transit operating on railroad tracks.

The communities along the main corridor and spurs are in a rural setting and have relatively low populations. However, they have vibrant commercial cores with shops and restaurants. They are mostly surrounded by farmland and anchored by the agricultural industry, but they also have a number of healthcare, education, and employment, and manufacturing destinations.

State Route 99 Transit Feasibility Study Area



Key Findings

FCRTA and the Project Advisory Committee concluded that BRT is a local solution for a regional congestion issue on State Route 99. Therefore, a longer-term, potential investment in bus infrastructure for the managed lane improvements planned by Caltrans for the SR 99 corridor could allow FCRTA to enhance its transit network while supporting Caltrans' congestion reduction efforts.

FCRTA could work with Fresno County to add bus lanes or shoulder bus lanes along the eastern side of Golden State Highway. The adjacent rail corridor to the east limits local highway access and creates a condition where a southbound contraflow bus lane, a northbound peak shoulder bus lane, and median platform stations could be viable and relatively low-cost options to build a busway in the corridor. These projects would likely take place incrementally over a longer period that extends beyond the Fresno Council Of Governments existing long-range planning horizon.

In the shorter term, FCRTA should focus on building transit ridership through conventional and creative solutions to create a service network on the corridor.

Creating a People Friendly Golden State Boulevard

The Golden State Corridor improvement project is already underway, a complete streets project on the Golden State Corridor with 14.5 miles of improvements from Mission Street in Kingsburg to American Avenue in Fresno, running through the cities of Fowler, Selma, Kingsburg, and unincorporated areas.

Funded by Local Measure C, the goal of the project is to improve transportation on the corridor, creating safer and more comfortable walking and biking connections. Improvements include bike lanes, upgraded sidewalks, new traffic signals, lighting, landscaping, and other infrastructure. This transit feasibility study was closely coordinated with the Golden State Corridor improvement project to ensure consistency with any proposed transit service and associated infrastructure improvements.

Recommendations

Near Term Recommendation

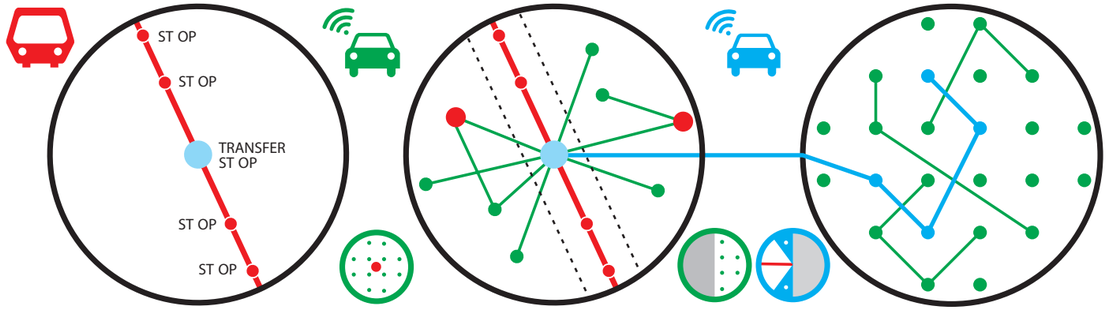
- Increase fixed-route frequency on the Southeast route from three to six trips per day.
- New microtransit service in towns along the corridor to serve local trips, beginning in Fowler and rolling out to Kingsburg, Selma, Malaga, and Calwa.
- Microtranist trips would connect to the fixed-route Southeast service to provide continuing service to the City of Fresno.
- As ridership grows, add microtransit service to the spur areas of Reedley, Parlier, Orange Cove, Sanger, and Del Rey

Long Term Recommendation

- When ridership of the new service meets established thresholds, plan for implementation of Bus Rapid Transit on State Route 99/Golden State Corridor.
- Potentially align Bus Rapid Transit with a managed lane on State Route 99, which is controlled by Caltrans.

Benefits to Communities on the Corridor

- Supports travel behaviors that are occurring within the rural areas.
- The demonstration zone can be rolled out to all cities in steps.
- Supports the off corridor cities of Reedley, Parlier, Orange Cove, Sanger, and Del Rey.
- Allows service to grow over time, and even long-term move to managed lanes on State Route 99 as ridership grows and Caltrans plans for the future to reduce traffic congestion on the corridor.



Increase Frequency on Existing Southeast Route

Corridor On-Demand Microtransit Connects to Southeast Route

Spur On-Demand Microtransit Connects to Southeast Route

Near Term Recommendation

Corridor Service

- **Increase the frequency of Southeast fixed-route**
  - Improved service schedule, every two hours
  - As demand increases, add additional service blocks to expand service in AM/PM peaks and evenings
- **App-based on-demand local service that connects to Southeast route**
  - Connects to and from the Southeast route to serve local transportation needs
  - On-demand microtransit service zone - one end of the trip within a geographical zone and designated stop location
  - Phase 1: Transfer point in downtown Fowler (mid-point)
  - Expand transfer points as the service grows
    - Fresno
    - Malaga
    - Calwa
    - Selma
    - Kingsburg
  - Allows for a transfer every two hours with one vehicle. If there is higher demand:
    - 1 vehicle for on-demand
    - 1 vehicle for fixed route

Spur Service

- **On-demand local microtransit service** with connection to fixed-route
- **Schedule transfer connection to Southeast route** for communities close to, but not directly on the corridor
  - Parlier, Reedley, Orange Cove, Sanger
  - Phased, connection point starting in downtown Fowler

Alternating schedule pattern with scheduled trips to a fixed-route transfer location in Fowler

Defined periods of local zone travel that end 15 minutes before the vehicle enters fixed-route mode to give time for final pickup and drop-offs and end local availability

Passengers who only want to transfer to the fixed-route would schedule an on-demand trip to the designated transfer point in Fowler before the end of the pickup /drop-off period

Bus would travel to the designated transfer point and pick up any passengers boarding the fixed route component of the service

The following operations must be configured for the service:

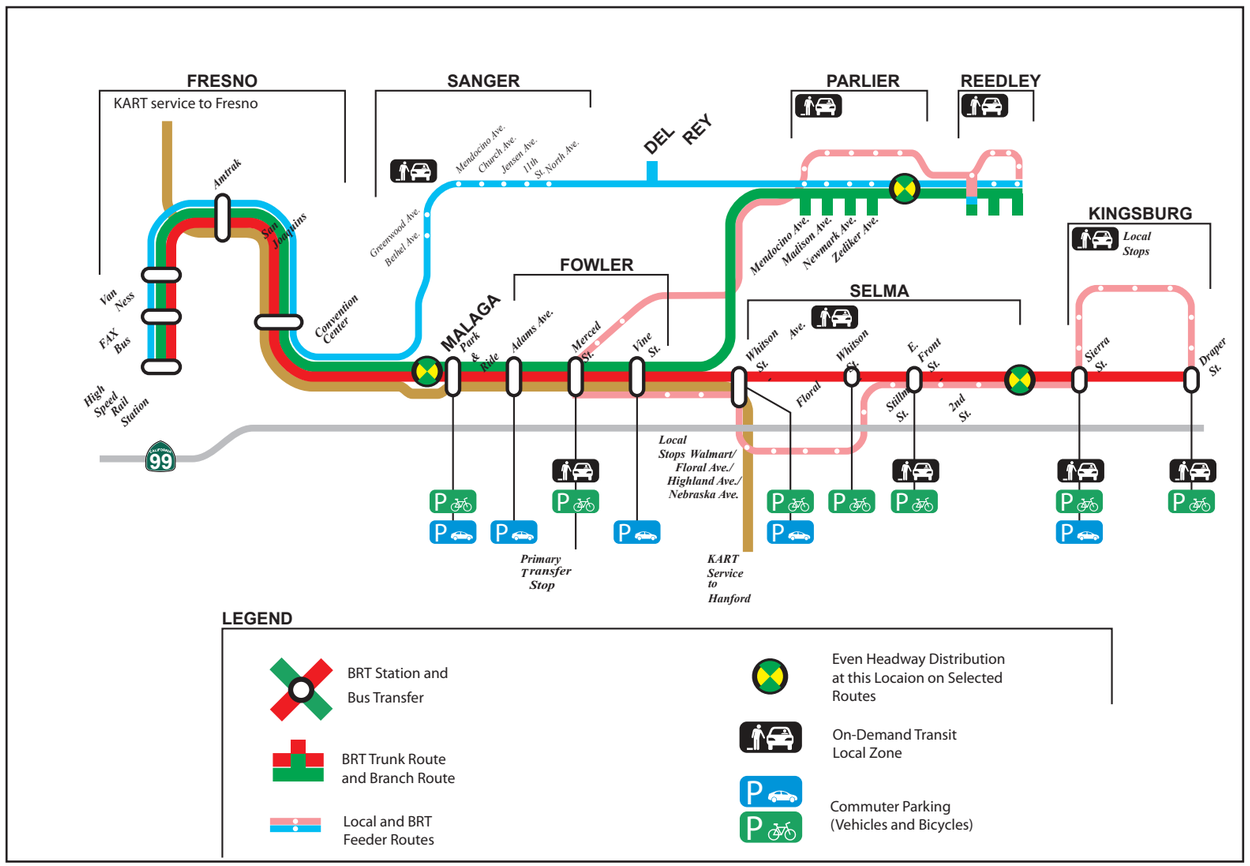
- Zone size and availability windows
- Passenger demand
- Distance to designated transfer point
- Locations of additional designated destination points in the zone
- In single-vehicle operation, the vehicle must be ADA-compliant with an overlay of ADA complementary paratransit service
- In dual-vehicle operation, the fixed-route service must be operated by an ADA-accessible vehicle, but the on-demand service may be a standard sedan as long as there is an overlay of ADA-complementary paratransit

Long Term Recommendation

As demand for service increases over time, the system could evolve toward a more frequent bus network along the Southeast/SR 99/Golden State Corridor spine. As ridership increases, in line with service thresholds described in Section 7, a bus rapid transit investment may make sense. Bus rapid transit could be aligned with a potential future managed lane on State Route 99. This strategy could support the goal of reducing congestion on SR 99, which we have found to be a regional challenge with trips beginning and ending beyond Fresno County. Park and Rides would be located at points along the corridor.

Bus Rapid Transit would begin directly on the corridor, with on-demand microtransit continuing to operate in the spur areas to provide a connection.

Aspirational Bus Rapid Transit Buildout on the State Route 99 /Golden State Corridor and Spur Areas



Meeting Project Goals

The recommended service has a high potential to meet project goals.

High Potential	Medium Potential	Low Potential
●	◑	○
Service has a high potential to meet project goals	Service may meet project goals, but hurdles exist	Service is unlikely to meet project goals

Service	Light Rail	Bus Rapid Transit	Hybrid Rail	Hybrid Microtransit and More Frequent Service
Improves Transit Service				
› New higher frequency	●	●	●	●
› Enhances Existing Service	○	◑	○	●
Increase Access				
› Access to more than 10 activity centers	●	●	●	●
Implementation				
› Can be implemented in the near-term with longer-term expansion opportunities	○	○	○	●
Community Support				
› Support from over 50% of community	●	●	●	●

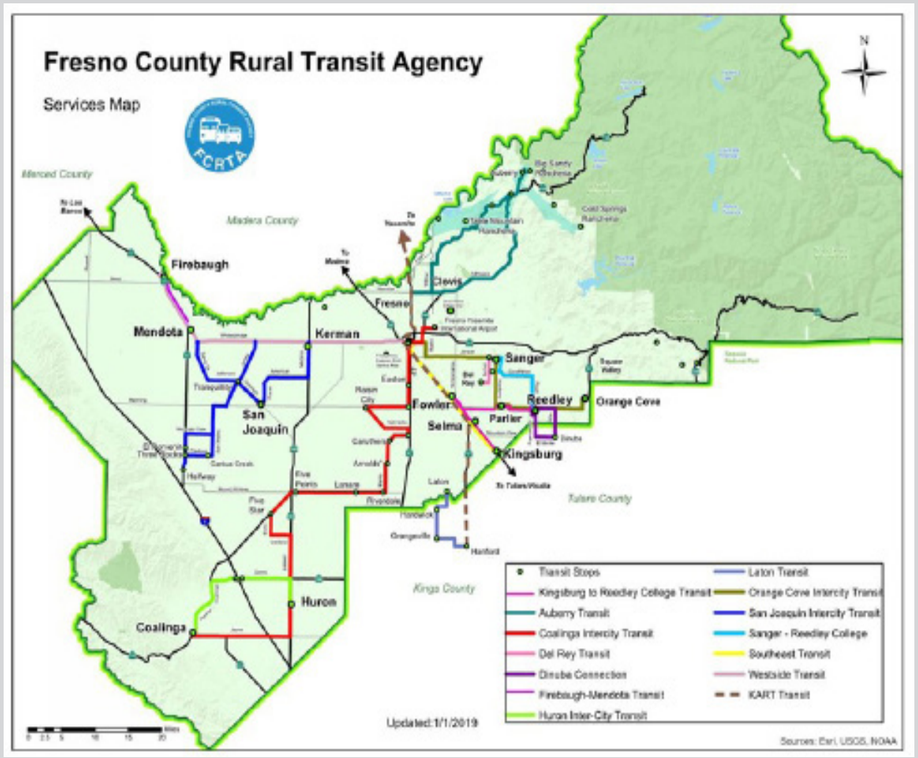
Service	Light Rail	Bus Rapid Transit	Hybrid Rail	Hybrid Microtransit and More Frequent Service
Cost Effectiveness				
› Project has an achievable level of cap & operations costs/opportunity for farebox recovery	○	○	○	●
Ridership Potential				
› Ridership forecasts support the initial investment in service	○	◑	○	●
Construction & Operations Feasibility				
› Right of way permits construction and FCRTA is ready to operate	○	○	○	●
Economic Development				
› Zoning enables TOD and economic development opportunities to support the investment	○	◑	○	◑

Fresno County Rural Transit Agency

The Fresno County Rural Transit Agency (FCRTA) provides public transit services to the rural communities of Fresno County. FCRTA covers almost 6,000 square miles across the County to serve communities up to 60 miles away from the City of Fresno, the County seat and main urban center. Most communities FCRTA serves are disadvantaged, and many FCRTA riders are transit-dependent.

FCRTA has four main service types: inter-city bus service, intra-city bus service, rural dial-a-service, and is piloting microtransit service. It operates 26 transit sub-systems in 13 rural incorporated cities and 39 unincorporated communities in Fresno County. FCRTA provides regular fixed-route services, which follow designated routes and schedules, reservation-based, demand-responsive service, and on-demand microtransit service that offers curb-to-curb transportation.

Fresno County Rural Transit Agency Service Area



Rural Transit Best Practices

The project team selected three transit agencies to review and understand best practices in rural areas with higher-capacity fixed routes and bus rapid transit service. These agencies were chosen because they serve rural areas and offer services that align with the study objectives.

	Ben Franklin Transit	Whatcom Transportation Authority	Roaring Forks Transportation Authority	Fresno County Rural Transit Agency
Location	Tri-Cities area of Benton and Franklin Counties, WA	Whatcom County, WA	Roaring Forks Valley, WA	Fresno County, CA
Type of Service	Fixed-Route Bus Service On-demand microtransit	Fixed-Route Bus Service Advance reservation zone Service	Bus Rapid Transit	Fixed-Route Bus Service On-demand microtransit

Ben Franklin Transit

BFT identified the following best practices regarding stop spacing and location for high-frequency routes:

- Ideal bus stop spacing falls between 0.25 and 0.33 miles.
- The placement of stop pairs across from one another is considered a best practice.
- Stop placement at or near intersections is a priority for pedestrians to access crosswalks.
- Transit should be placed at or near critical destinations like retail shopping centers, supermarkets, pharmacies, medical offices, and hospitals. Additional stops should be located at or near key transfer points, providing riders with seamless transfers to connecting routes.

Whatcom Transportation Authority

- Operates four higher frequency “GO Lines,” comprised of existing fixed-route service.
- Generally, WTA’s highest ridership bus routes are those routes serving its Go Lines.
- All GO Lines are within Bellingham City limits, which serve higher-density areas and heavily traveled corridors.
- WTA’s marketing materials, transit maps, and transit guides have different branding for GO Lines than the other fixed routes.
- Due to increases in traffic congestion and other issues, WTA has had to make significant investments to maintain the scheduled 15-minute frequencies for certain GO Lines.

Roaring Forks Transportation Authority

- Implemented VelociRFTA BRT service between Glenwood and Aspen, the comparable rural BRT route in the United States.
- Service has 18 miles of dedicated or HOV lanes along its 41-mile route, off-board payment, and high-quality stations with amenities such as Wi-Fi and real-time arrival information.
- Demonstrated that BRT can be a successful and cost-effective way to provide fast, efficient, and reliable transit service in areas with low population densities.
- Increased ridership: VelociRFTA has seen a 27.6% increase in ridership since its launch. People are interested in using public transportation when it is convenient, fast, and reliable.

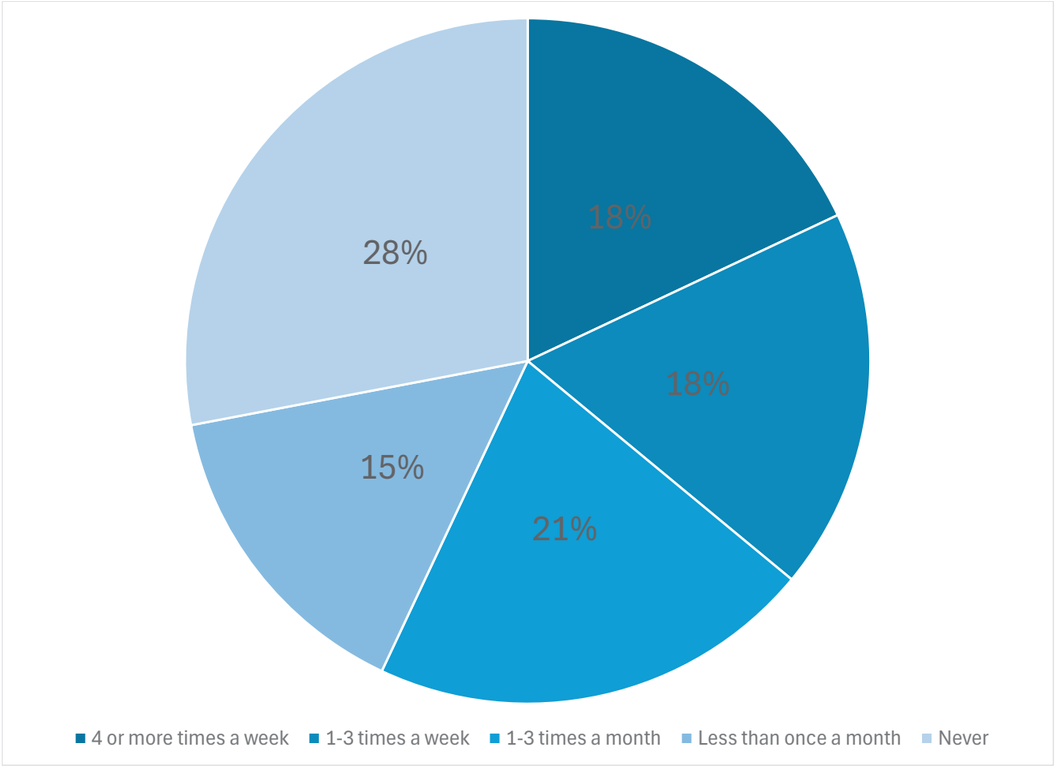
Community Engagement

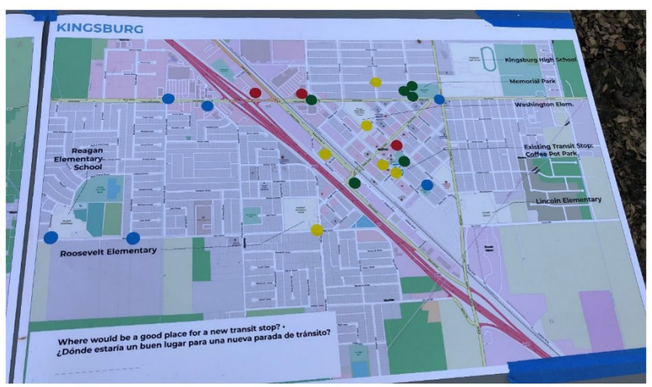
The Walker team and FCRTA staff conducted community outreach at several junctures in the project to gain input that informed recommendations. The team held six community popup events, conducted door-to-door interviews with businesses, and visited potential station locations to post flyers, talk with residents, and visitors, and distribute surveys.

The following are key takeaways from the outreach findings. It is important to note the rural context nature of FCRTA's services in relation to community feedback. Unlike an urban, high-density transit system, FCRTA operates rural services that can be limiting based on the large coverage area and resources available.

- Combined over 70% of respondents said they would use the transit at least some of the time, with about 35% of people saying they would use it at least one a week.
- Approximately 20% of respondents indicated they don't have access to a vehicle or share a car with another person, suggesting these respondents need access to reliable and frequent transit services.
- 32% of respondents said limited transit options result in them taking fewer trips, suggesting that people aren't attempting to use transit at all because it doesn't serve their needs but that improved transit service might encourage some increased transit interest.
- The most significant barriers respondents reported to taking transit are "it takes too long" (43%), "it doesn't arrive often enough" (32%), and "it doesn't take me where I need to go" (29%). People feel that the travel times and the limited destinations impede transit use.
- When asked about what survey respondents would want to see in new transit service, "travel time" (57%) and "stop locations near my home or my destinations" (50%) were the most common responses.
- Over 90% of respondents say they would need wait times to be under 15 minutes to make transit appealing. This suggests that waiting times are critical to riders and that current FCRTA waiting times, which are much longer, maybe unappealing.
- 87% of respondents had not ridden public transportation in the past two weeks, suggesting low familiarity with the transit, service mismatch, or lack of need to travel.

Question: If there were new transit on the SR99/Golden State Corridor that ran frequently and all day long, how often do you think you would use it:





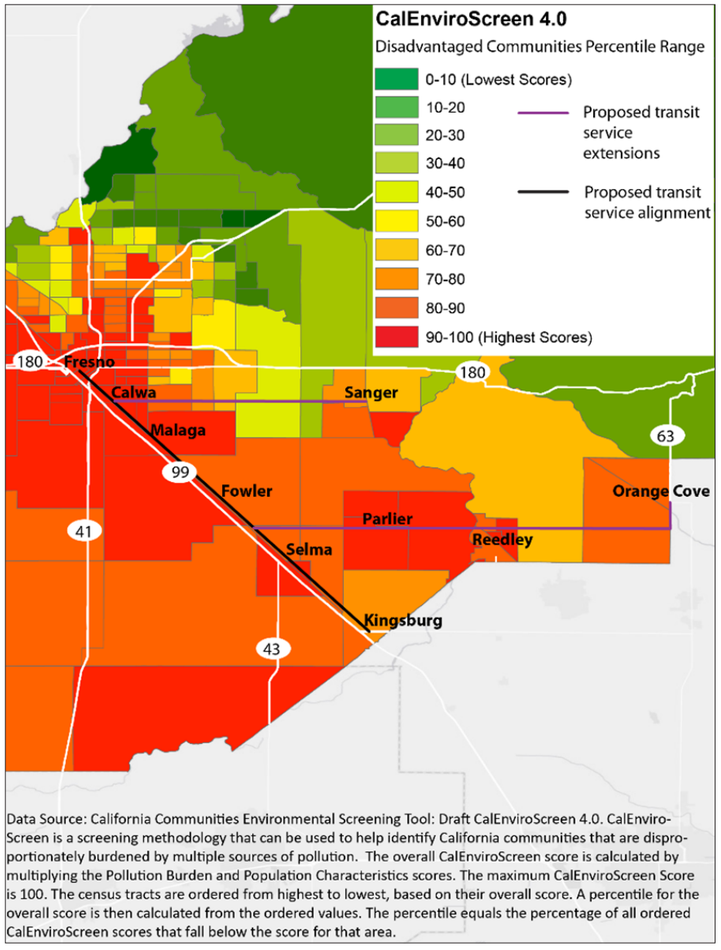
Existing Conditions on the Corridor

The State Route 99 corridor suffers from a high level of congestion due to passenger vehicles and commercial freight trucks. This congestion increases emissions, inhibits goods movement, lowers productivity, and limits access.

FCRTA offers fixed route transit service in the corridor cities . FCRTA also has intra-city on-demand transit service within each of the 13 rural cities, targeting local trips within each city.

Per CalEnviroScreen 4.0 data, all of the corridor cities are at least in the 70th percentile level of disadvantage compared to other California communities, indicating a need for increased investment in these communities.

Disadvantaged Areas on the SR 99 Corridor

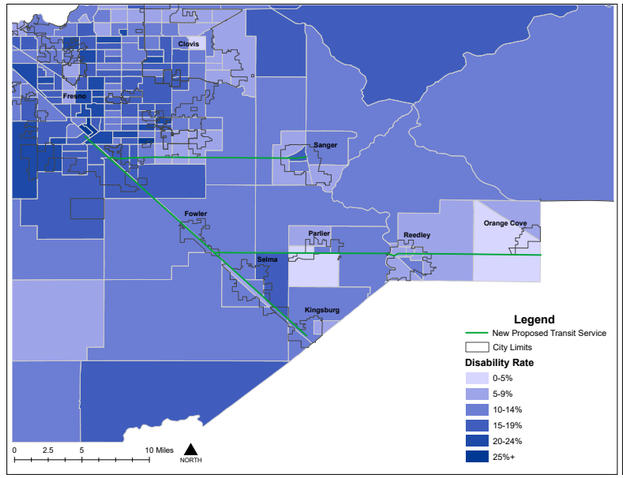


Data Source: California Communities Environmental Screening Tool: Draft CalEnviroScreen 4.0. CalEnviro-Screen is a screening methodology that can be used to help identify California communities that are dispro-portionately burdened by multiple sources of pollution. The overall CalEnviroScreen score is calculated by multiplying the Pollution Burden and Population Characteristics scores. The maximum CalEnviroScreen Score is 100. The census tracts are ordered from highest to lowest, based on their overall score. A percentile for the overall score is then calculated from the ordered values. The percentile equals the percentage of all ordered CalEnviroScreen scores that fall below the score for that area.

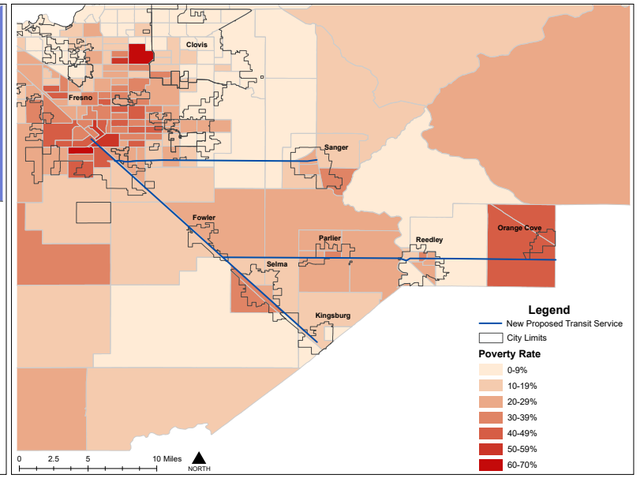
Key demographics that indicate transit dependency are poverty, vehicle availability, population with disabilities, and seniors. Vehicle ownership and maintenance are expensive, necessitating affordable public transportation.

All of the communities along the corridor have fewer than one vehicle per household indicating a lack of car access.

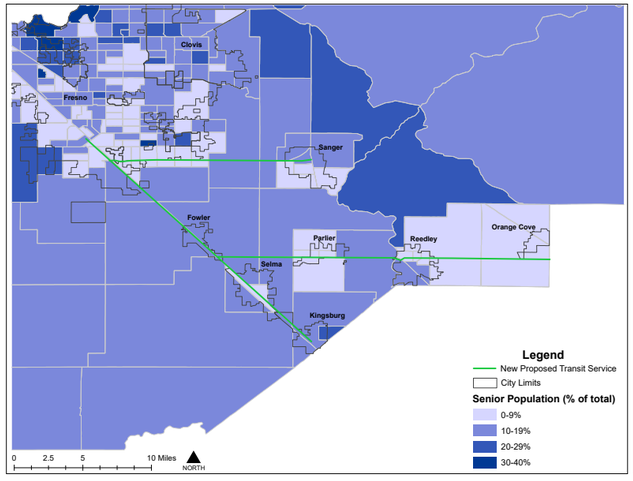
Disability Rate: Many of the communities have higher levels disabled people



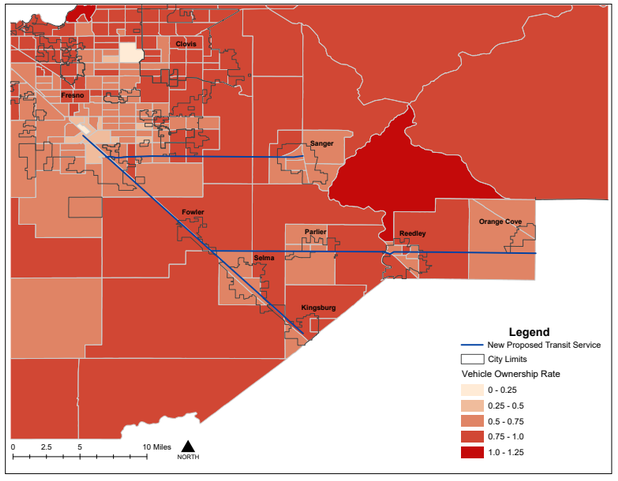
Poverty Rate: Many of the communities suffer from high poverty rates



Senior Population: Many of the communities have higher levels of senior residents



Vehicles Per Person of Driving Age: All of the communities along the corridor have fewer than one vehicle per household indicating a lack of car access



Source: Data – US Census Bureau ACS 2021 5-Year Estimates, Map – Walker Consultants.

Transit + Land Use Evaluation

Demographics and Growth

Although the corridor is growing in some locations (e.g., new housing and jobs, Census demographic data for 2010 and 2020, and estimates through 2023 show a slight population increase), the regional travel demand model developed and maintained by Fresno Council of Governments (FCOG) shows limited future growth. This is likely because most of the population and job growth in the corridor is expected to occur outside of the downtown cores. This growth pattern makes it challenging to operate a Bus Rapid Transit or light rail on the corridor.

Within the travel demand model, only Kingsburg shows any significant change in growth, compared to the other cities on the corridor, with an 18% increase in population and a 10% increase in employment. Growth in Selma is projected to be flat, with a 1% decline in population and no change in employment. Similarly, growth in Fowler shows no change in population and a 1% growth in employment. These rates of growth reflect existing city boundaries and the city fringes, which are more difficult to serve with transit. Growth rates may change, as development is occurring in these areas, which is not reflected in the regional model. This may present a longer term transit opportunity.

Solving The Density Challenge

Bus Rapid Transit or fixed-route bus service operates on a linear route and would not veer outside of the downtown cores

+

New housing and jobs are occurring outside of the downtown cores in locations that are not walkable to the bus stops

=

In the near-term the corridor lacks the density for viable BRT or light rail

Increasing existing service + local microtransit can serve near-term needs

Land Use and Zoning

The current lack of density makes light rail or Bus Rapid Transit services difficult to implement and cost-prohibitive in the near term. Key land use and zoning issues include:

- Presence of single-family zoning over other types of zoning within one-half mile of potential transit stops. Less mixed-use (commercial/residential) zoning.
- Minimum lot size requirements for commercial, multi-family residential, and mixed uses. Since lots in areas close to transit stops are typically smaller than the minimum size requirements for mixed-use and multi-family developments, these walkable and transit-friendly land uses can only be built along city fringes away from transit.
- Minimum parking requirements consume much of the land that would be walkable to the transit stops. Not only do the minimum parking requirements inhibit transit-oriented uses, but they can also reduce the feasibility of redevelopment of non-conforming uses.

The cities on the corridor lack the density to currently support Bus Rapid Transit or Light Rail.

Transit Station *½ Mile*	2019 Density *Population + Employment + Students*	2035 Density *Population + Employment + Students*	Maximum Potential *Buildout with Existing Zoning*	Minimum Parking *Required for Maximum Buildout*	Zoning and Land Use within ½ Mile of Transit Stop						
					Single-Family Zoning	Multi-Family Zoning	Commercial Zoning	Industrial Zoning	Rights-of-Way	Other	Parking *(Illustrative only)*
Fresno *Downtown and HSR Station*	21,792 total 43.4 / acre 32% of max.	27,498 total 54.7 / acre 40% of max. 26% growth	68,842 total 137.0 / acre	57,084 0.8 parking spaces per user	0%	0%	54%	10%	35%	1% (P)	N/A
Fowler *7th and Merced*	2,943 total 5.9 / acre 18% of max.	2,943 total 5.9 / acre 18% of max. 0.002% growth	16,466 total 32.8 / acre	13,663 total 0.8 parking spaces per user	22%	9%	21%	13%	34%	1%	94 acres (19%)
Fowler *FBC Rezoning*			16,595 total 33.0 / acre	>= 12,959 total							89 acres (18%)
Selma *2nd and Whitson*	7,391 total 14.7 / acre 36% of max.	6,765 total 13.4 / acre 33% of max. 8.5% decline	20,732 total 41.2 / acre	16,654 0.8 parking spaces per user	21%	15%	20%	6%	36%	2%	115 acres (23%)
Selma *FBC Rezoning*			26,800 total 53.3 / acre	21,106 total							145 acres (29%)
Kingsburg *Simpson and Draper*	5,114 total 8.6 / acre 37% of max.	5,752 total 9.6 / acre 42% of max. 12.5% growth	13,711 total 27.3 / acre	11,377 total 0.8 parking spaces per user	19%	15%	19%	7%	35%	5%	78 acres (16%)
Kingsburg *FBC Parking Review*			20,929 total 41.6 / acre (from P)	<= 2,478 R <= 1,991 FBC >= 2,125 C/I							45 acres (9%)

Based on current zoning, where every single-family residence has the allowed ADU 15 50% average household size

"per user" = resident + employee + student

Total area

Zoned land uses are inclusive of parking

Notes: Fresno zoning is centerline to centerline; ROW applied at 35% typical Fresno allows a pay-in-lieu of within parking districts – (P) represents parking-only sites (e.g. not directly associated with land use)

Open Space, Land in Reserve, etc.

Parking is part of zoned land uses and = parking + access at 300sf/space

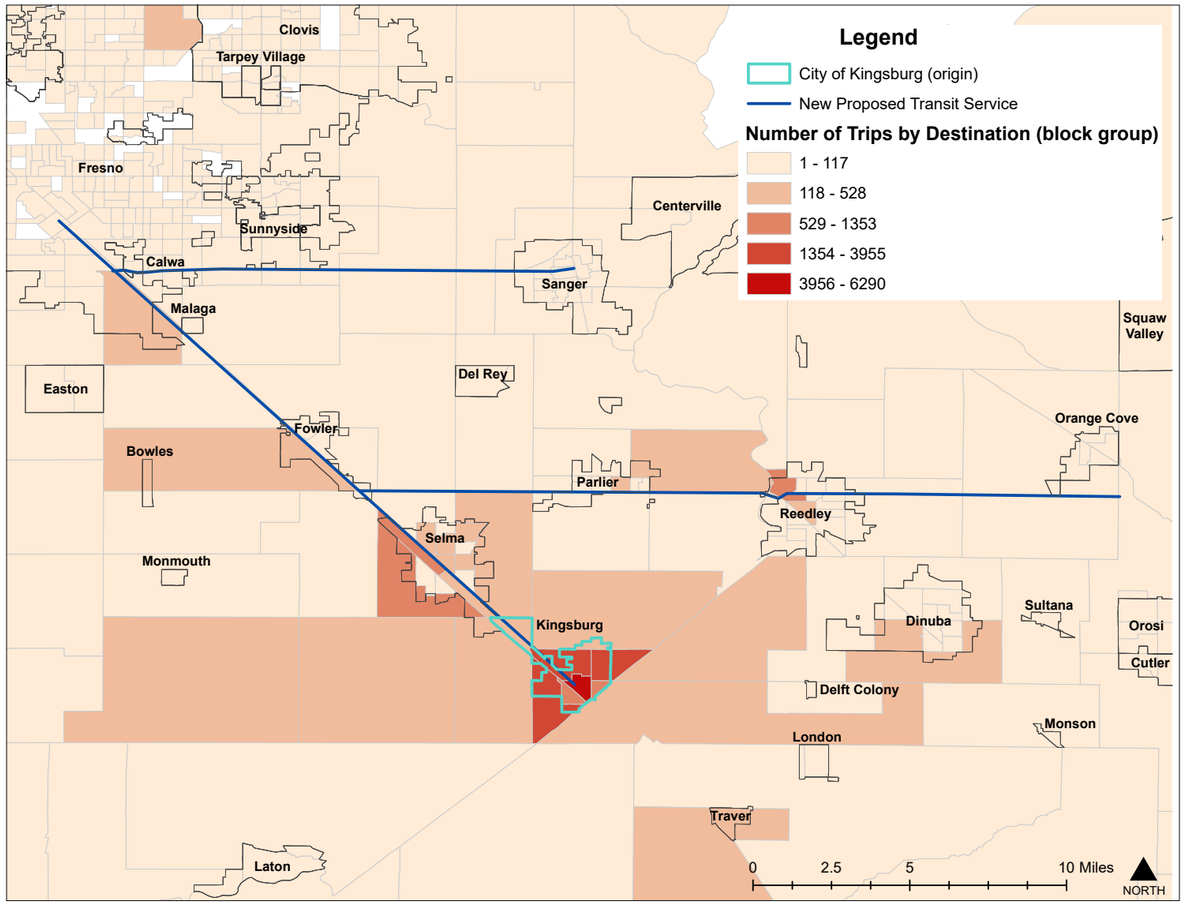
In 2022 the State of California adopted AB 2097, which eliminates parking minimums near a major transit stop, which is defined as an existing rail or bus rapid transit station or the intersection of two or more major bus routes with a frequency of service intervals of 20 minutes or less during peak commute periods. However, the recommendation is this study does not support this level of service for the near term, so the existing requirements still apply.

Origin Destination Analysis

Many of the trips originating and ending in the corridor cities stay local in or near each City, indicating lower demand for a high-frequency transit service connecting these communities. Many of these cities offer employment, shopping, and healthcare opportunities, resulting in less need to travel to other cities and Fresno. Most agricultural fields are located outside the incorporated cities on the corridor. The figure below demonstrates the origin/destination analysis with Kingsburg as the origin, with most trips to nearby destinations. See Section 3 for trip details in other cities on the corridor.

Kingsburg Travel Analysis:

Travel origin and destination analysis shows that many trips on the corridor remain in the same town or the immediate surrounding areas.



Source: Walker Consultants.

Transit Service Alternative Options

The team evaluted three transit service options.

Bus Rapid Transit

BRT is a fixed-route bus system that operates at least 50% of its service on a dedicated lane with defined passenger stations, traffic signal priority where a red light changes to green when the bus approaches, level-platform boarding, and separate branding of the service. Transit agencies in North America have developed a lower tier of BRT, often called arterial rapid transit (ART). ART routes have most of the defined BRT features, except that they operate predominately in mixed traffic. Fresno's FAX Q and MetroRapid in Los Angeles are examples of ART.

Light Rail Transit

LRT is rapid transit that operates electric-powered single cars or short trains on fixed rails. LRT typically mixes with street traffic. LRT is typically powered through an overhead line supplied continuously along the route to the vehicle through a pantograph. LRT most commonly operates with sets of two or three cars but can operate longer trains. Modern light rail systems typically operate with low-floor vehicles that allow level boarding in or along urban streets at a level slightly higher than a street curb (floor height varies, but 12" to 14" above the top of the rail is typical in North America).

Hybrid Rail

A rail service that operates on rail lines that also typically serve freight. Hybrid rail requires coordination with rail roads, who own the track. The Union Pacific Railroad operates tracks along the study area on the Golden State Corridor.

Example of BRT Operating on a City Street

Image: Walker Consultants.

Feasibility Evaluation

The following strengths, weaknesses, opportunities, and threats analysis helped to determine the feasibility of implementing a new transit service. There are a number of strengths to support transit on the corridor including population centers, stakeholder support, wide right-of-way, and existing service. Opportunities include new employment centers and housing coming to the corridor, future high-speed-rail, among others. Weaknesses include that it is currently an auto-oriented corridor with traffic originating outside of Fresno County. Threats include competition for limited funding and overall cost.

State Route 99 Transit Feasibility Study SWOT Analysis

Alternatives Assessment

Highly productive transit service, especially rail and bus rapid transit, depend on a high-density central hub (a major downtown) with high-density residential and mixed-use areas along corridor station areas. For example, the transit density threshold for viable bus rapid transit is 20 people, employees, and students per square acre.

Level of Density in Transit Station Areas for Productive Service

Performance		Distance from High-Capacity Transit Station							
Criteria	Measure	Main Hub of a High-Capacity Transit Line *(Multiple stops)*	Within 1/8 mile of a Station	Secondary Hub on a High-Capacity Transit Line *(Multiple stops)*	1/8 to 1/4 mile of a Station	1/4 to 1/2 mile of a Station	1/2 to 1 mile of a Station	Greater than 1 mile from a Station	
Station Area Transit Density	Density of Combined **Population + Employment + Student** (P+E+S) per Acre	160 *P+E+S / Acre* *Typical Density for a large downtown*	80 *P+E+S per Acre* *Typical Density for a mid-sized downtown or a large suburb employment center*	60 *P+E+S per Acre* *Typical Density for a smaller downtown or a suburban employment center*	40 *P+E+S per Acre* *Typical density for an "inner suburb," typically a streetcar suburb*	20 *P+E+S per Acre* *Typical density for an "inner suburb," typically a historic interurban corridor*	15 *P+E+S per Acre* *Modern mixed multi-family and single-family neighborhoods with schools and shopping centers*	10 *P+E+S per Acre* *Modern single-family areas with neighborhood schools and shopping centers*	5 *P+E+S per Acre* *Large lot suburban neighborhoods*
Transit Density Thresholds for Maximizing Transit	Defined by the density and extent of mixed uses within walking distance of high-capacity transit	MAJOR CENTER *Subway/Metro Commuter Rail/Bus Light Rail Transit Bus Rapid Transit Streetcar Frequent Bus Services that run every 5 minutes or less is common*	CENTER *Commuter Bus Light Rail Transit Bus Rapid Transit Streetcar Frequent Bus Services that run every 5-15 minutes is common*	HIGH DENSITY MIXED-USE AREA *As a standalone downtown: bus rapid transit or frequent bus (typically every 10-15 minutes on key routes) As a secondary center: may have any higher capacity mode connecting to a Major Center or Center*	MEDIUM DENSITY-MIXED USE AREA *Typically, a light rail, streetcar, or frequent bus corridor, but may have higher capacity modes connecting to a Major Center or Center*	LOW DENSITY MIXED-USE AREA *Typically, a bus rapid transit or frequent bus corridor (service 15-20 minutes all day), but may have higher capacity modes connecting to a Major Center or Center*	SUBURBAN HIGH DENSITY *Basic or frequent bus service in peak periods (every 15-30 minutes) with a basic level of midday service (30 minutes)*	SUBURBAN MEDIUM DENSITY *Basic local bus service in peak periods (15-30 minutes) with infrequent midday and late evening service; fixed-route service may be a candidate for microtransit as a replacement*	SUBURBAN LOW DENSITY *Typically, a commuter community with park-and-ride access to commuter bus or rail; area may be better suited for microtransit to provide basic access*

Performance		Distance from High-Capacity Transit Station					Rationale
Criteria	Measure	Within 1/8 mile	1/8 to 1/4 mile	1/4 to 1/2 mile	1/2 to 1 mile	Greater than 1 mile	
Employment (E) Commute Destination + Visitors *(e.g. shopping)*	Actual total employment or estimated employment based on commercial floor area by land use type	Regional *(Walk from Transit)*		Neighborhood Retail *(Small Scale Walk Access)*		Employment Accessible By Driving	Employment/shopping end of trips have greater sensitivity to transit access.
		MORE ←			→ LESS		
Population (P) Commute Origin	Actual total population or estimated population based on number of dwelling units and residents per household	Walkable Scale Multi-Family				Lower Density Residential Only	Provides residential TOD with a variety of housing types; but residential trip ends are less sensitive to transit distance/access
		SOME ←			→ MORE		
Students (S) Commute Destination	Student total through high school plus average weekday in-class higher education student attendance on campus	City/Region Wide Institutions (universities, colleges, trade schools, and specialty/magnet schools)			NOT DESIRABLE		Focuses schools with regional access needs and students most likely to use transit near transit stops.
		NOT DESIRABLE	Area/Sector Wide Institutions (high schools, community college campuses)			Major institutions have higher transit need and utilization	Places locally-focused schools closer to residential trip origins.
		Local institutions have lower transit need/use			Neighborhood Institutions (middle, elementary schools)		

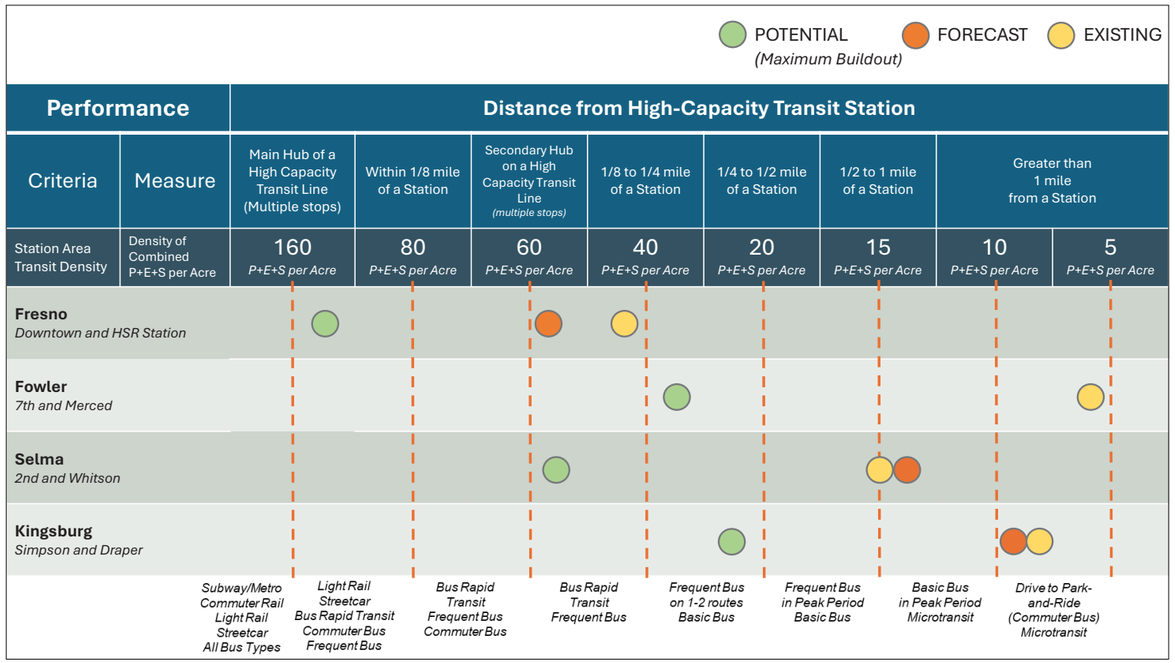
Existing and forecasted land use densities within one-half mile of stations along the SR99/Golden State Corridor relative to their ability to support various transit service levels are lower than what is necessary for a productive transit service.

A rail solution is not feasible within existing and forecast land use population, employment, and density. A rail solution is also not feasible within the expected FCRTA budget capacity.

The high cost of building and operating any type of rail system is well above FCRTA's budget capacity. Although lower in cost, even bus rapid transit would prove a challenge within FCRTA's current financial capacity and existing and forecasted population densities (noted by the orange and yellow circles).

Longer term, the maximum buildout potential (noted by the green circles) may support bus rapid transit on the corridor.

Level of Density Buildout on the Corridor to Support Transit



Cost Comparison

The following recent BRT, LRT, and hybrid rail transit corridors provide data to develop a cost comparison, an important metric given the limited availability of state and federal funding:

- The one comparable rural BRT route in the United States (Glenwood/Aspen, CO).
- Two recent and modest LRT routes were compared (Phoenix, AZ and Norfolk, VA).
- Two hybrid rail routes were compared (one older route in Austin, TX, and a newer route in Sonoma-Marin, CA).
- A network of three connected hybrid rail routes planned or operated by three different transit agencies (Dallas/Denton/Fort Worth).
- Houston is added as a highly productive LRT route that is just under 13 miles, about half the length of the SR99/Golden State Corridor, and shorter than most peer comparisons (except Norfolk at 7 miles).

The estimated development densities, total population, and employment along the SR99/ Golden State Corridor are much lower than those of the cities compared.

Density and Cost Comparison

FCRTA
Golden State Corridor

Characteristics
21 miles, 21 stops (TBD)

Population and Employment Totals
Downtown Fresno (93701 + 93721)
E: 22,726 P: 17,627 **T: 40,353** **D: 11,321/m²**

Rural/Urban - Southwest Fresno (93706)
E: 15,610 P: 38,448 T: 54,058 D: 331/m²

Rural/Urban - Southeast Fresno (93725)
E: 20,707 P: 25,386 T: 46,093 D: 704/m²

Rural - Fowler (93625)
E: 2,147 P: 6,730 T: 8,877 D: 359/m²

Rural - Selma (93662)
E: 7,183 P: 29,741 T: 36,924 D: 469/m²

Rural - Kingsburg (93631)
E: 3,547 P: 16,666 T: 20,213 D: 252/m²

EMPLOYMENT CENTER COMPARISON
Selected New and Planned Fixed-Guideway Transit Systems

Population and Employment Totals
Fort Worth - Downtown
E: 34,323 P: 8,111 T: 42,434 D: 9,836/m²
Denton - Downtown
E: 21,152 P: 27,407 T: 48,259 D: 8,647/m²
Dallas - Downtown
E: 100,362 P: 11,336 **T: 111,968** **D: 91,826/m²**
DFW Airport
E: 60,000 (estimated) **T: 60,000** (estimated)
Austin – Downtown/University of Texas
E: 81,882 P: 36,174 T: 118,056 D: 56,663/m²
A: 52,384 (adjusted for students) **T: 170,440** **D: 81,805/m²**
Sonoma-Marin (San Francisco)
Not calculated *(designed to serve ferry transfer to San Francisco)*
Phoenix – Downtown/Midtown/Uptown
E: 84,822 P: 40,438 T: 124,860 D: 12,737/m²
Norfolk – Downtown
E: 30,200 P: 37,333 T: 67,533 D: 24,042/m²
Houston – Downtown (including University of Houston-Downtown)
E: 106,302 P: 11,815 T: 118,117 D: 84,508/m²
A: 13,384 (adjusted for students) **T: 131,729** **D: 94,247/m²**
Houston - Medical Center (including Teaching Institutions)
E: 88,096 P: 11,814 T: 99,280 D: 39,337/m²
A: 50,000 (adjusted for students) **T: 149,280** **D: 59,208/m²**

Evaluation Results

Evaluation of Light Rail Transit (LRT), Hybrid Rail Transit (HRT), and Bus Rapid Transit (BRT) included three major components:

- Cost and Cost Effectiveness
- Service Utility and Utilization (likely market and potential ridership)
- Technical Feasibility (available right-of-way, design feasibility, and operating environment)

The results of this evaluation show that light rail and hybrid rail are not cost effective due to high cost and low densities of the rural nature of the corridor. Bus rapid transit is the only option for further screening. However, as noted on page 6 and detailed in Sections 6 and 7, BRT is not a near term recommendation, given the low ridership forecast, existing land use densities, and cost factors.

For the near term, we recommend moving forward with increasing existing service on the Southeast route supported by local on-demand microtransit. Over the long term, as ridership and density grow, BRT could be a potential solution.

Transit Viability Modal Screening

COST AND EFFECTIVENESS	FRESNO	LIGHT RAIL			HYBRID RAIL			BUS RAPID TRANSIT		
		LOW	HIGH	POTENTIAL	LOW	HIGH	POTENTIAL	LOW	HIGH	POTENTIAL
Low-High Range of Recent Projects										
Total Capital Cost (22 mile corridor)		$319m	$1.4b	VERY LOW	$105m	$1.98b	LOW	$50m	$178m	MED
Capital Cost per Mile		$27m	$70m	VERY LOW	$3m	$46m	LOW-MED	$1.2m	$38m	MED
Operating Cost per Veh. Rev. Hour		$285.80	$429.23	VERY LOW	$145.73	$1,867.49	LOW-MED	Same as MBDO or MBPT		MED
Operating Cost per Passenger		$8.38	$23.01	VERY LOW	-	-	-	Same as MBDO or MBPT		MED
SERVICE UTILITY AND UTILIZATION		LOW	HIGH	POTENTIAL	LOW	HIGH	POTENTIAL	LOW	HIGH	POTENTIAL
Total Population, Employment, and Academic Enrollments										
Total PEA (ZIP Code)	206,518	Not Compared			Not Compared			System Design and		MED
Total PEA Density (ZIP Code)	500	Not Compared			Not Compared			Context Differs from		MED
Activity Center Scale (PEA in CBD)	40,353	67,533	281,009	VERY LOW	48,259	170,440	LOW	Peer Cost Comparisons		MED-HIGH
Activity Center Density (PEA)	11,321	12,737	94,247	VERY LOW	8,647	81,805	LOW	-		MED-HIGH
Likely Ridership		1,255	5,746	-	585	1,617	LOW-MED	-		TBD
Establish Range										
FEASIBILITY		QUALITATIVE		POTENTIAL	QUALITATIVE		POTENTIAL	QUALITATIVE		POTENTIAL
Engineering and Design		Adequate ROW		HIGH	UPRR Mainline (Transit		VERY LOW	Divided Highway ROW		HIGH
Operational		Typical LRT Context		HIGH	Agency ROW Typical)		VERY LOW	Bus Lanes or Pullouts		HIGH
FEASIBILITY		**ELIMINATE OPTION**			**ELIMINATE OPTION**			**CARRY OPTIONS FORWARD**		

BRT Managed Lane Concept on SR 99

The initial output from the Fresno Council of Governments regional travel demand model showed that the ridership forecast would not meet the threshold for BRT investment.

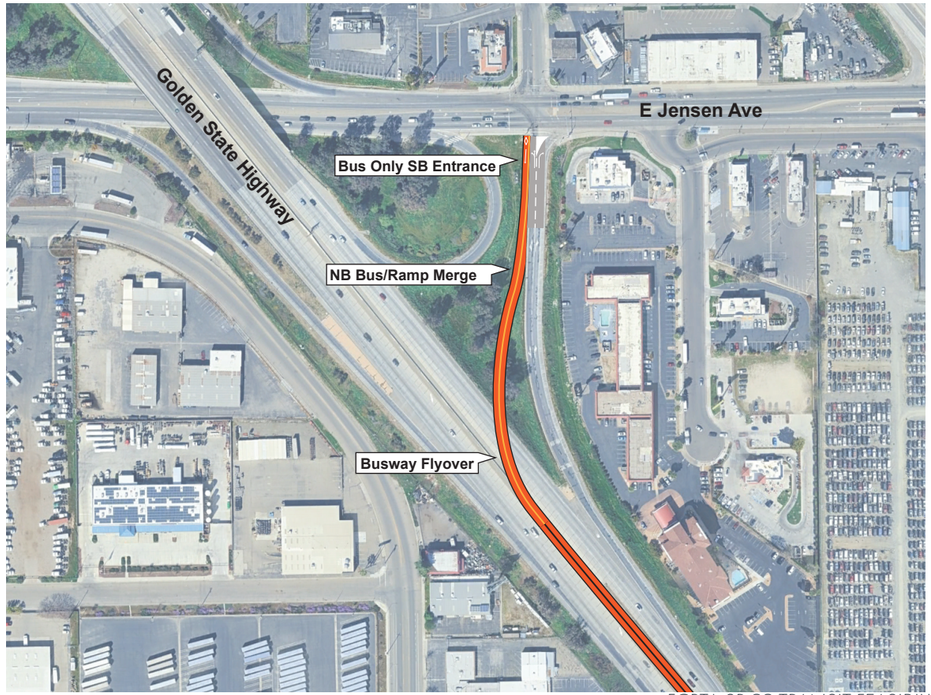
However, there is latent demand for transit along the corridor. Further, congestion on SR 99 is a regional problem that requires a regional cross-county solution.

As FCRTA rolls out the recommended concept to increase service on the existing Southeast route combined with microtransit and as ridership grows, it could meet thresholds where investment in BRT makes sense. This could include a High-Occupancy Vehicle/ High-Occupancy Toll (HOV/HOT) concept. This concept is often referred to as a managed lane. The project team reviewed these concepts with Caltrans, which controls and maintains SR 99.

The primary objective of the HOV/HOT alternative would be to create a transit priority corridor on SR 99 that could serve local stops in communities along Golden State Blvd. while also integrating a park-and-ride based commuter corridor served by transit, vanpools, carpools, private ridesharing, and, at times when capacity allows, single-occupant vehicles. Operational costs of the concept could be covered, in part, by toll revenues, while the capital cost of the corridor could come from state and federal transit and highway funding sources. The managed lanes would be built on the Caltrans-controlled SR 99 corridor with access points to Golden State Blvd., a highway controlled by Fresno County.

The conceptual managed lane/BRT northern terminus would be at Jensen Avenue in the City of Fresno. From this location, buses would operate between the SR 99 managed lanes and Downtown Fresno via G Street, Golden State Highway, East Avenue, and a busway flyover ramp to the median HOV/HOT Lanes on SR 99. The northbound bus lane would merge with the Jensen Avenue off-ramp, while a southbound dedicated bus-only lane would provide through-movements to BRT routes continuing via East Avenue. Concepts for the entire project corridor are included in Section 6.

Conceptual Managed Lane/BRT Northern Terminus in Fresno



Implementation

The immediate next step is to apply for grant funding to operate the new service on a demonstration basis based on the following:

Cost Estimate
The following cost estimates are based on full-scale implementation. Service could be implemented on an area-by-area basis as a demonstration project (costs based on FCRTA's current service costs).

- **Expanded Service on the Southeast Route**
  - **Expanded Service:** From the existing three trips per day on the Southeast corridor to five trips per weekday and three Saturday trips is estimated to cost approximately $300,000.
  - **Full Service:** Seven trips per weekday and six Saturday trips is estimated to cost approximately $400,000.

- **Corridor On-Demand Service**
  - Microtransit – Two six-hour shifts on weekdays from 6:15am. to 11:15am and 3:50pm to 8:50pm, and one eight-hour shift on Saturday is estimated to cost approximately $200,000.

- **Spur On Demand Service**
  - Existing inter-city on-demand and paratransit could be modified into a hybrid service connected to expanded service on the corridor at a nominal cost using existing vehicles and hours of scheduled service in operation.

Funding
Review budget and financial data to determine the level of funding necessary and available to implement new service and the potential for a phased approach.

Capital
- **Vehicles:** FCRTA has available vehicles to begin microtransit service. Review vehicles available to add service on the Southeast route, including Ford E-Transits.
- **Infrastructure and Charging Capacity:** Vehicles are already located at FCRTA maintenance facilities. No additional EV charging infrastructure is necessary.

Operations
- **Staffing:** FCRTA will need to hire additional drivers to operate service. This is likely one of the most challenging aspects of implementation. In the past FCRTA has held local hiring fares and hired a local driver.
- **Technology:** FCRTA should consider the technology options discussed, including an app-based program for scheduling rides.

Energy Analysis
A site by site energy analysis for the new service is included in Section 8. While the microtransit service vehicles may only require up to 10 or 20 kilowatts (KW) of charging power at a given time via Level 2 chargers, future in-route charging for FCRTA's other routes and services may require additional fast-charging infrastructure, BESS and solar PV backup systems to ensure system reliability. Further study is required to determine the exact magnitude and coincidence of charging demand on each community's respective distribution assets, and engagement with PG&E will be necessary to develop a complete view of asset headroom beyond their published forecast period.

Marketing and Communications:
FCRTA should work with the rural towns, unincorporated areas, and local organizations to communicate the new service to the community. This can include flyers, postcards, website information, commercials, and targeted social media ads.

Funding Sources & Applicability Score

The following are potential funding sources for the proposed transit service. The applicability score is a measure of the likelihood of funding, based on the grant source and professional judgement of the project team, who have successfully led over $12 million in grant funding for transit and fleet electrification projects.

Funding Source	Type of Funding	Funding Entity	Applicability	Score
Section 5311	Formula Grants/ Operations	Federal Transit	Formula funds for transit operations	High
Transportation Development Act (TDA)	State Sales Tax funds/ Operations	California Department of	Formula funds for transit operations	High
Grants for Bus and Bus Facilities (5339(b))	Competitive Grant/ Capital	Federal Transit	Funds infrastructure, including vehicles and facilities	High
Low or No Emission Grant Program (5339(c))	Competitive Grant/ Capital	Federal Transit	Funds zero emission vehicles and infrastructure	High
Transit and Intercity Rail Capital Program (TIRCP)	Competitive Grant/ Capital	California Department of	Funds capital improvements that decrease greenhouse gas emissions, vehicle miles traveled, and congestion	High
Measure C	Fresno County Sales Tax/Capital and Operations	Fresno County	-Can be used for operations -Can help FCRTA meet the local match requirement for competitive grants	High
Measure C New Technology	Competitive Grant/ Capital	Fresno Council of Governments	Funds new transit technologies, including EV infrastructure	High
Low Carbon Transit Operations Program (LCTOP)	Formula Funding/ Capital and Operations	California Department of	Operating and capital assistance for transit agencies to reduce GHG emissions and improve mobility, with a priority on serving disadvantaged communities	High
Clean Vehicle Fueling Infrastructure Program	Incentive Program/ Capital	San Joaquin Valley Air Pollution Control District	Funds EV charging stations and solar infrastructure	High
Clean Mobility Options (CMO) Mobility Project Vouchers	Voucher Program/ Capital and Operations	California Energy Commission	Funds transit service, bikeshare, scooter share, EV carshare	High
Innovative Charging Solutions for Medium- and Heavy-Duty Electric Vehicles	Competitive Grant/ Capital	California Energy Commission	Funds innovative EV charging technologies	High
New Starts, Small Starts and Core Capacity Improvements	Competitive Grant/ Capital Investments	Federal Transit	-Funds transit capital investments, including heavy rail, commuter rail, light rail, streetcars, and bus rapid transit. -Grants are highly competitive	Low

Source: Walker Consultants

v

02 | Introduction

Introduction

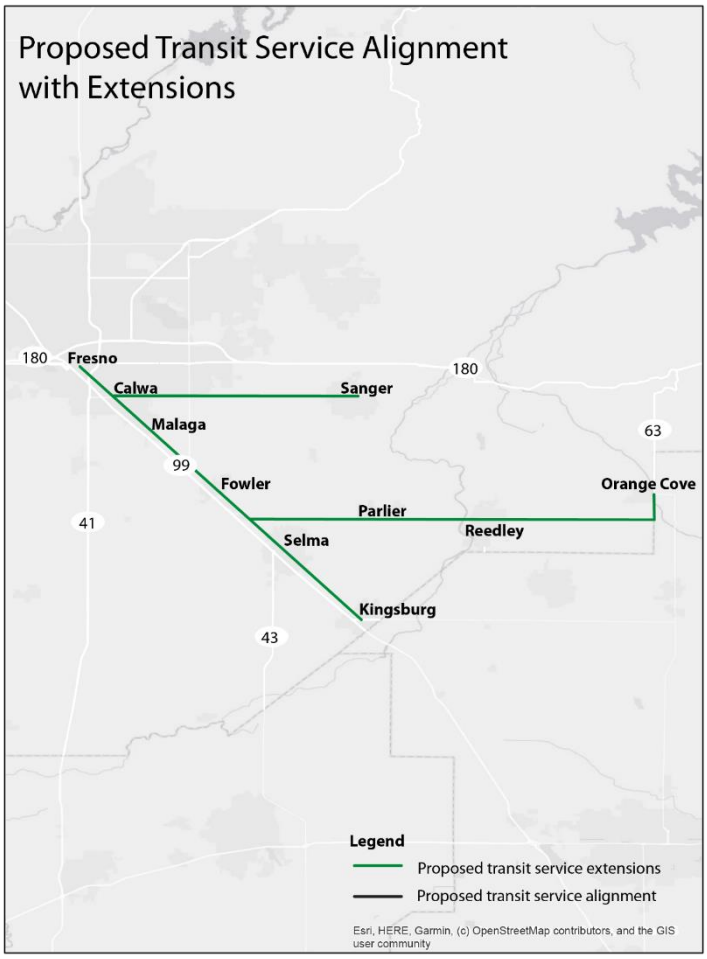
About FCRTA

The Fresno County Rural Transit Agency (FCRTA) provides public transit services to the rural communities of Fresno County. FCRTA covers almost 6,000 square miles across the County to serve communities up to 60 miles away from the City of Fresno, the County seat, and the primary urban center. Most communities FCRTA serves are disadvantaged, and many FCRTA riders are transit-dependent.

FCRTA has four main service types: inter-city bus service, intra-city bus service, rural dial-a-service, and microtransit service. It operates 26 transit sub-systems in 13 rural incorporated cities and 39 unincorporated communities in Fresno County. FCRTA provides regular fixed-route services, which follow designated routes and schedules, reservation-based, demand-responsive service, and on-demand microtransit service that offers curb-to-curb transportation.

Project Background

Providing high-quality transit service in rural areas is challenging, particularly in Fresno County, which spans over 6,000 square miles. Most rural areas are sparsely populated and lack the density to support high-quality transit (with service running every fifteen minutes).[1] However, there is a need for more and better transportation options in rural Fresno County. Demographic data shows there is a high transit dependency based on the number of people living below the poverty line, seniors, disabled, and those who lack access to a vehicle. Community outreach findings show that a lack of transit options that allow for more service near destinations also limits travel. The community responded very favorably to the potential for more transit options.



[1] High-quality transit corridor means a corridor with fixed route bus service with service intervals no longer than 15 minutes during peak commute hours (CA Pub. Res. Code § 21155(b)).

Combined, over 70% of respondents said they would use a more robust transit service at least some of the time.

This Transit Feasibility Study evaluated how to bring frequent transit to one of the State's and Fresno County's most traveled corridors, State Route 99 (SR 99). SR 99 is an essential connection to bring the County's agricultural products to market and connect workers to economic and quality of life opportunities. It is a major route in the most productive agricultural region in the world and critical to the state's economic vitality. Because of this, Senate Concurrent Resolution 17 (SCR17) directs Caltrans to identify transportation-related needs along the corridor that will relieve congestion and improve the movement of goods, enhancing economic development in the San Joaquin Valley.

However, increases in average daily traffic, particularly truck traffic, cause severe congestion and safety issues along SR99. The corridor has been called one of the most dangerous roads in America. At the same time, residents along the corridor have limited alternatives to driving. FCRTA's existing Southeast route, which travels from Kingsburg to Fresno, is limited and does not provide frequent service.

Several current efforts are underway to relieve congestion on the corridor. The Route 99 Corridor Business Plan is a joint effort of local governments and Caltrans to support the Caltrans Route 99 Corridor Enhancement Master Plan. These plans will increase capacity and safety on the corridor. However, given requirements under the State of California's vehicle miles traveled reduction regulations, SB 743, and forecasted population growth, road capacity alone will not solve congestion.

Without a real alternative to driving, traffic forecasts are expected to increase by almost 50% along the corridor. As a result, residents' quality of life will suffer as they sit on congested highways, unable to access employment opportunities, health care, and other necessary amenities. Further, most of the communities along this corridor are disadvantaged and burdened by pollution, which will only increase without an alternative option to the high cost of driving.

Parallel to SR 99 runs Golden State Boulevard, a 14.1-mile stretch of historic Highway 99 with several freight rail crossings that run from Fresno to Kingsburg. The Fresno County Council of Governments' existing plans for the Golden State Corridor include using $53.1 million in local Measure C funding for improvements such as streetscape enhancements, bicycle and pedestrian trails, modified railroad crossings, and site preparation. The Golden State Corridor project is a critical tie-in to any new FCRTA transit service on the corridor, as it will reduce traffic congestion, provide better bike and pedestrian networks that could serve future transit stations, create more access, and catalyze economic development. Phase I groundbreaking occurred last month, and Phase II is set for 2023.

This Transit Feasibility Study evaluated a new transit service that would connect the City of Fresno with the cities of Malaga, Fowler, Selma, and Kingsburg. Connections could also be made to other Fresno locations, such as Parlier, Reedley, Sanger, and Visalia. The study evaluated the physical

and financial feasibility of several transit alternatives along Golden State Boulevard (which runs parallel to SR 99), including low- or zero-emission **light rail, bus rapid transit, or hybrid transit.**

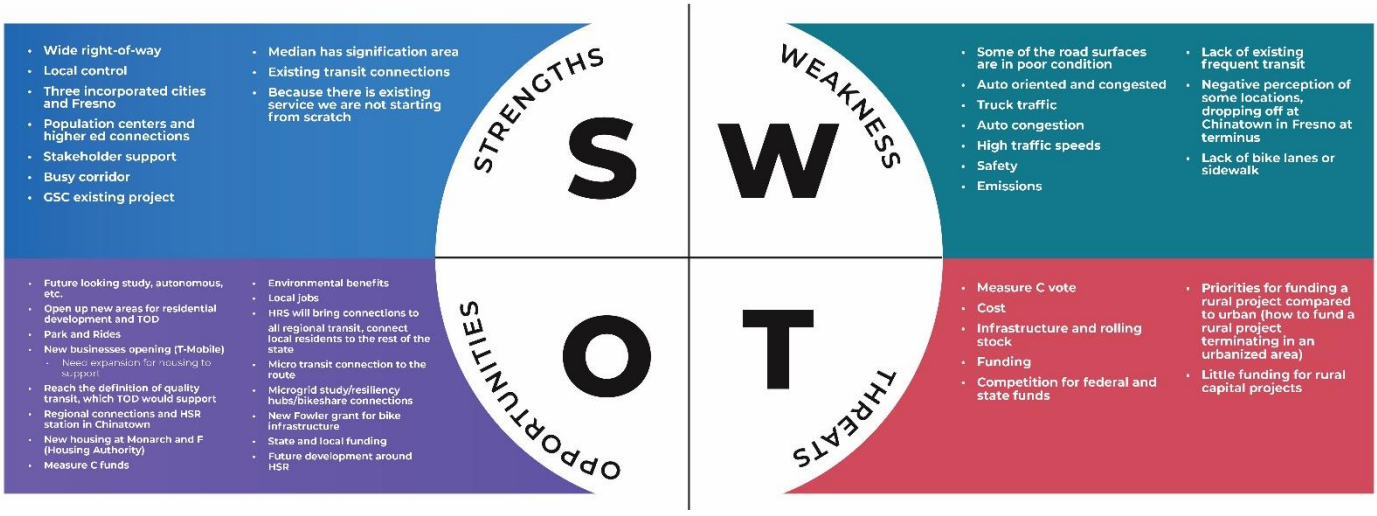
Importantly, service along this corridor must be integrated with FCRTA's existing system and planned investments, which include a new resiliency hub/bus inductive charging hub in Fresno near the future California High-Speed Rail station, a growing EV microtransit service, existing fixed-routes, and plans to develop a new transit microgrid/ community mobility and resiliency hub system.

Fresno County needs more transit options. Congestion on State Route 99 hampers economic activity and creates an unsafe travel environment, and the related vehicle emissions contribute to Fresno County's poor air quality. Without an alternative to driving, these conditions will get worse.

Opportunities and Challenges

Figure 1: Opportunities and Challenges

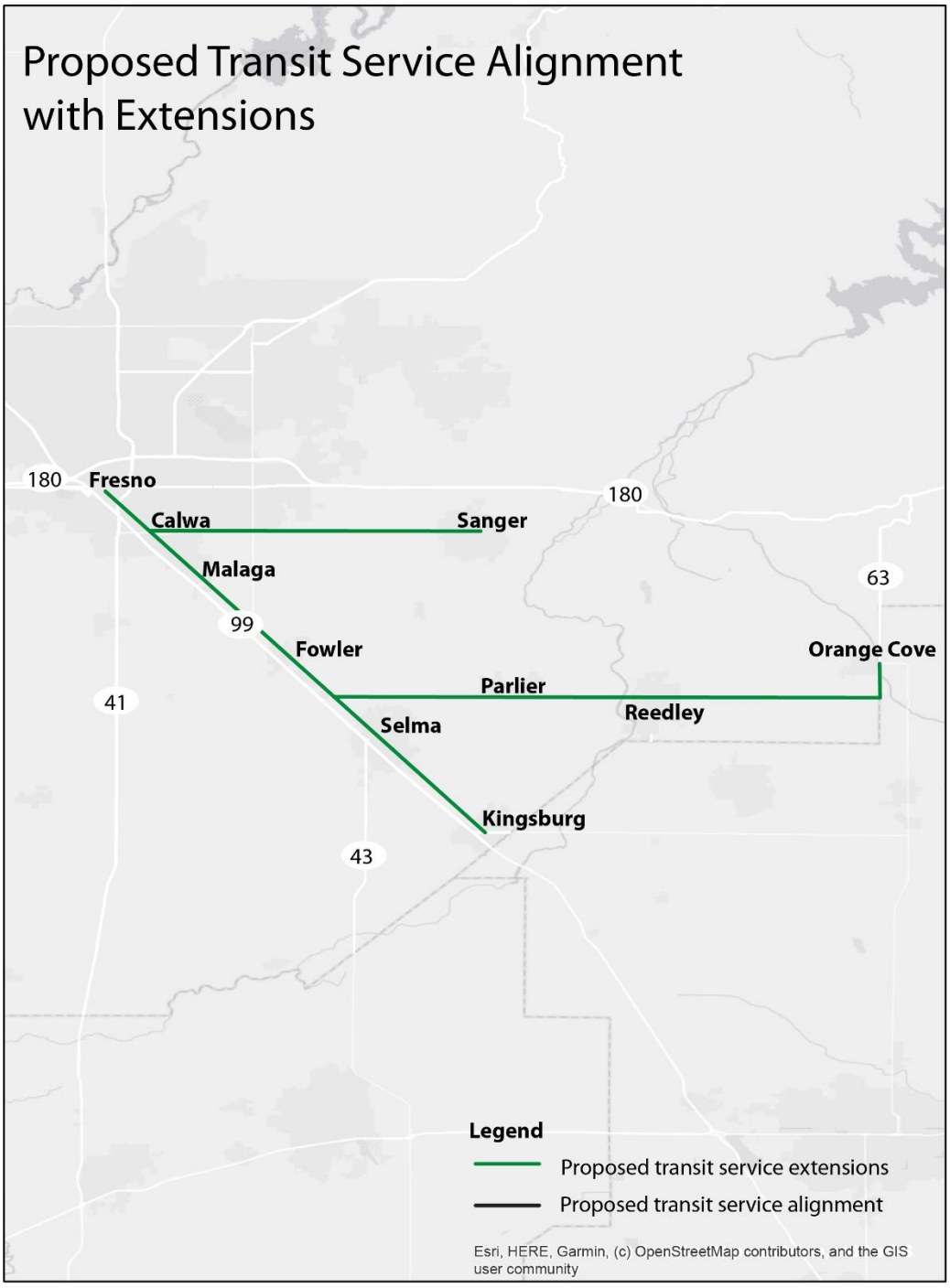
Several opportunities support transit in the study area, but challenges and threats must also be overcome. Figure 1 evaluates the strengths, weaknesses, opportunities, and threats to implementing high-frequency transit on the SR99/Golden State Boulevard Corridor.



Study Area Definition

The study area for the proposed transit service is the Golden State corridor between Kingsburg and Fresno, with potential spurs to Sanger and Orange Cove, as shown in Figure 2.

Figure 2: Proposed High-Frequency Transit Service Study Area



Source: Walker Consultants.

The communities along the main corridor and spurs are all rural and have relatively low populations. Because all of the corridor and spur cities are analyzed as part of the study, they are referred to as "corridor cities." The rural communities typically have vibrant commercial cores with shops and restaurants. These communities are mostly surrounded by farmland and anchored by the agricultural industry, but they also have a number of healthcare, education, and manufacturing facilities. Figure 3 summarizes the population of each of the corridor cities.

Figure 3: Population of Corridor Cities

City	Population	Employment
Kingsburg	12,380	4,762
Selma	24,674	6,496
Fowler	6,700	2,618
Parlier	14,576	2,543
Reedley	25,227	8,645
Orange Cove	9,649	846
Sanger	26,617	8,231
Fresno	542,107	232,999

Source: 2020 Decennial Census.

The cities included in the study are as follows:

- Kingsburg: The City of Kingsburg's downtown is unique, with Swedish architecture and cultural festivals. Major industries in Kingsburg include the Sun-Maid Raisins and Guardian Glass manufacturing facilities.
- Selma: Selma is one of the most populated cities along the corridor and is home to FCRTA's operations and maintenance facilities (both the existing facility and the facility under construction).
- Fowler: Major industries in Fowler include National Raisin Co., an exporter of raisins; FDS Manufacturing, a manufacturer of agricultural and industrial packaging; and Bee Sweet Citrus, a citrus wholesaler.
- Parlier: Major industries in Parlier include Sunwest Fruit Co, University of California Davis Kearney Agricultural Center, Maxco Supply Inc., and United Health Centers of the San Joaquin Valley.
- Reedley: Reedley has a prominent agricultural community and has been nicknamed "The World's Fruit Basket." It is also home to Reedley College, which has an annual enrollment of 15,000 students.
- Orange Cove: Orange Cove has hundreds of acres of orange and lemon citrus fruit, with major packing house operations surrounding the community. Orange Cove is a destination
- site for the annual spring Fresno County Blossom Trail event that kicks off the agricultural growing season.
- Sanger: Sanger is the most populated city in the corridor. Sanger is home to Pitman Family Farms, which produces chicken.
- Fresno: Fresno is the major population center of Fresno County. Fresno is home to major agricultural, medical, cultural, and California State University, Fresno. Fresno is home to a future California High-Speed Rail Station in Chinatown.

03 | Existing Conditions

03 Existing Conditions

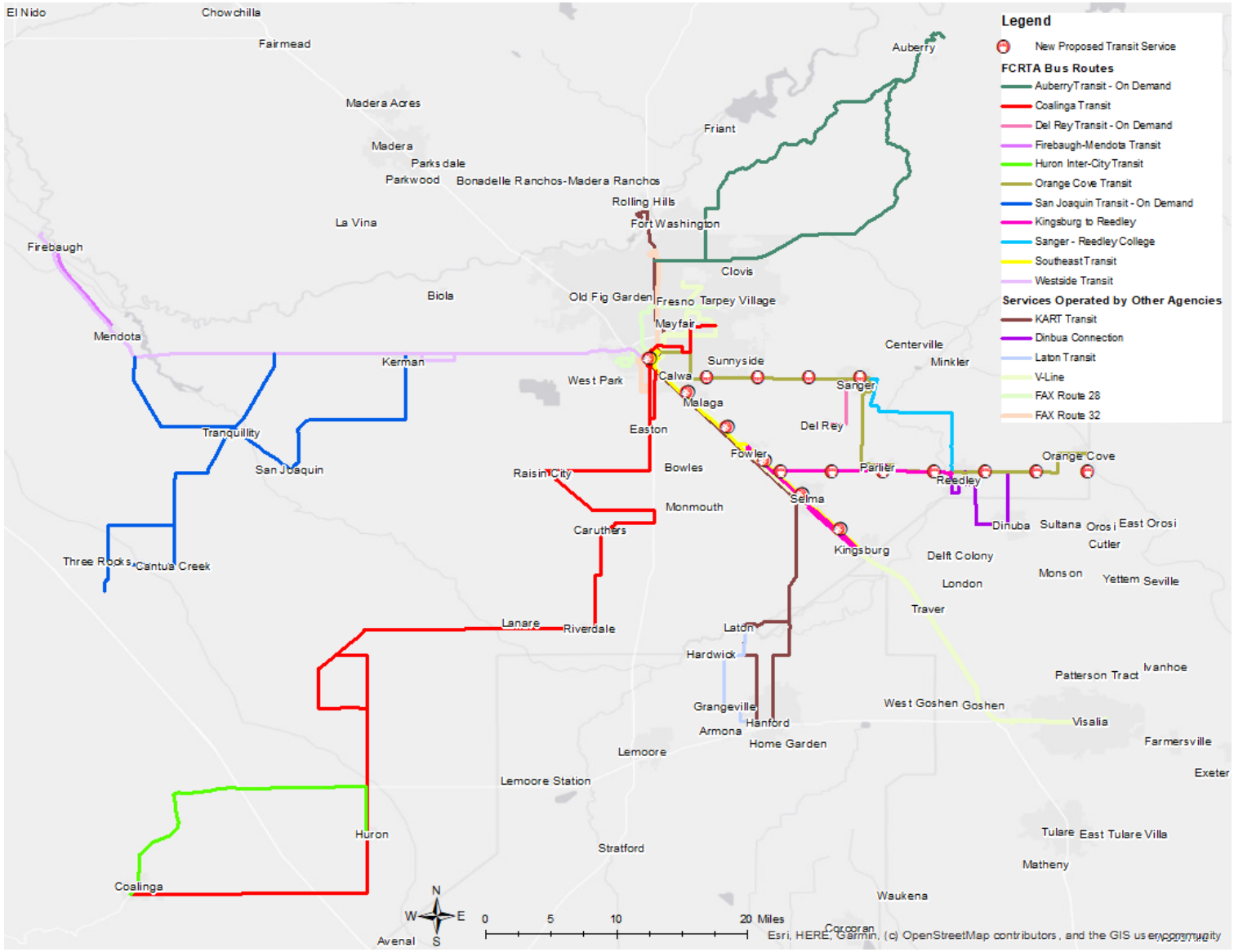
Key Mobility Challenges

The project team reviewed the corridor cities' current demographic and socioeconomic characteristics and travel patterns (origin/destination data). The following key challenges and opportunities emerged from this analysis:

- State Route 99 suffers from a high level of congestion due to passenger vehicles as well as commercial freight trucks. This congestion increases emissions, inhibits goods movement, lowers productivity, and limits access.
- FCRTA offers fixed route transit service in the corridor cities. However, these routes offer a limited schedule and long travel times. FCRTA also has an intra-city on-demand transit service within each of the cities, targeting local trips within each city.
- According to CalEnviroScreen 4.0 data, all of the corridor cities are at least in the 70th percentile of disadvantage compared to other California communities. Disadvantaged communities suffer from multiple sources of pollution.
- When looking at key demographics that indicate transit dependence, the four key metrics are poverty, vehicle availability, population with disabilities, and seniors. Many of these communities suffer from high poverty rates. Car ownership and maintenance are expensive, necessitating affordable public transportation. All the communities along the corridor have fewer than one vehicle per household, indicating a lack of car access.
- The corridor communities are sparsely populated and far apart from one another, making high-frequency transit services challenging to implement and cost-prohibitive.
- Many of the trips originating and ending in the corridor cities stay local in or near each City, indicating lower demand for a high-frequency transit service connecting these communities. Many of these cities have employment, shopping, and healthcare opportunities, resulting in less need to travel to other cities and to Fresno. Most agricultural fields are located outside the incorporated cities on the corridor.

FCRTA Existing Services

FCRTA operates 26 transit sub-systems that operate in 13 rural incorporated cities and 39 unincorporated communities in Fresno County. FCRTA provides both regular fixed-route services, which follow designated routes and schedules, as well as reservation-based, demand-responsive service that offers curb-to-curb transportation. The map on page 35 displays FCRTA's fixed-route and inter-city on-demand transit services in the context of the new proposed transit service along the Golden State Corridor. It also shows services operated by other agencies (KART).



Source: Walker Consultants.

Demographic and Socioeconomic Characteristics

Key demographics:

- Census tracts with unemployment rates greater than 10% are within or around Orange Cove, Reedley, Parlier, Selma, Sanger, and Fresno. By comparison, the unemployment rate is 8.3% for California, suggesting high unemployment rates in these communities. Some communities in Fresno have even higher unemployment rates of above 20%.
- Census tracts with median household incomes of less than $60,000 are generally located within or near Orange Cove, Reedley, Parlier, Selma, Fowler, Sanger, and Fresno. By comparison, the median household income in California is $84,097, suggesting many residents who may ride the transit service are living well below the median household income.
- Census tracts within or around Parlier, Orange Cove, Selma, and Fresno have more than 60% renter-occupied units. By comparison, 45% of the occupied units in California are renter-occupied, indicating a high proportion of renter-occupied units in these communities.
- With the exception of parts of Kingsburg, the majority of the census tracts in the transit service have the majority of the population that is Hispanic or Latino.

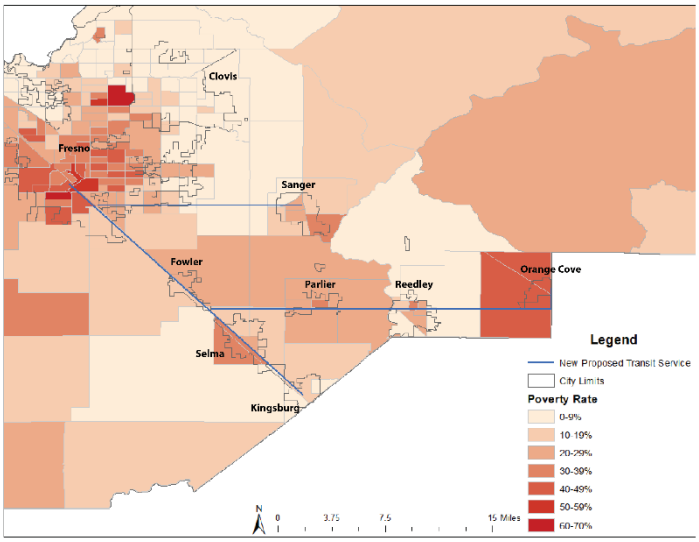
Transit Dependency Factors

When looking at key demographics that would indicate transit dependence, the four key metrics are poverty, vehicle availability, population with disabilities, and seniors. **Error! Reference source not f ound.** shows the transit demand factors.

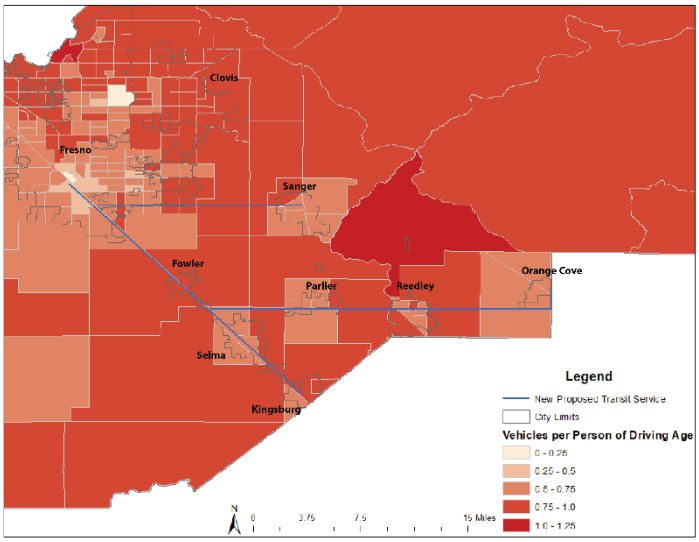
- Census tracts with poverty rates higher than 20% are within or around Orange Cove, Reedley, Parlier, Selma, Fowler, Sanger, and Fresno. By comparison, the poverty rate in California is 12.3%, suggesting high poverty rates in these communities. Several communities have even higher poverty levels, exceeding 60% at the terminus of the proposed transit service in Fresno.
- All of the census tracts in the transit service area have fewer than one vehicle per person of driving age.
- Census tracts within or around Selma, Sanger, and Fresno have at least 15% of the population with disabilities. By comparison, the disability rate for California is 11.2%, indicating some corridor communities have a high proportion of the population with disabilities.
- Census tracts within or around Kingsburg, Sanger, Reedley, and Fresno have at least 20% of the population as seniors. By comparison, 15.2% of the population in California are seniors, indicating some corridor communities have a high proportion of the population who are seniors.

Figure 5: Transit Demand Factors

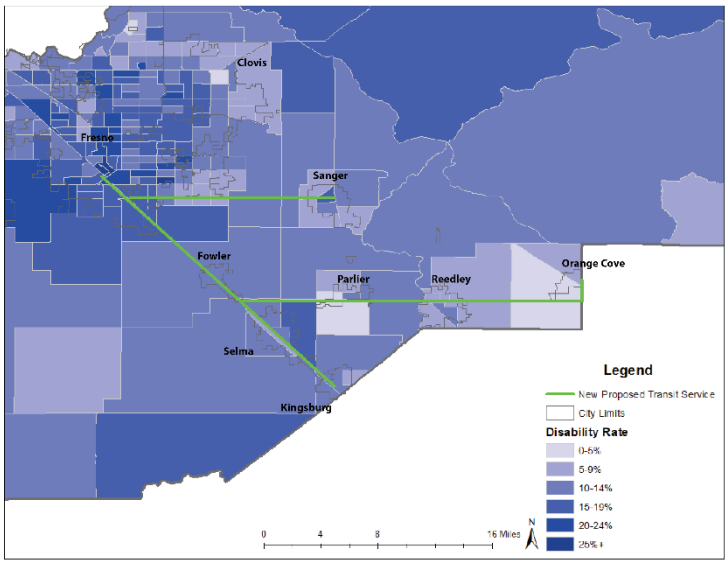
Poverty Rate



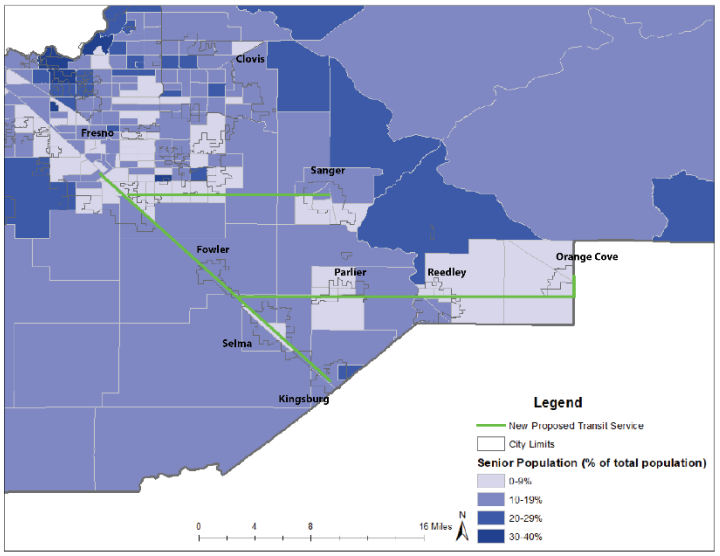
Vehicles per Person of Driving Age



Disability Rate



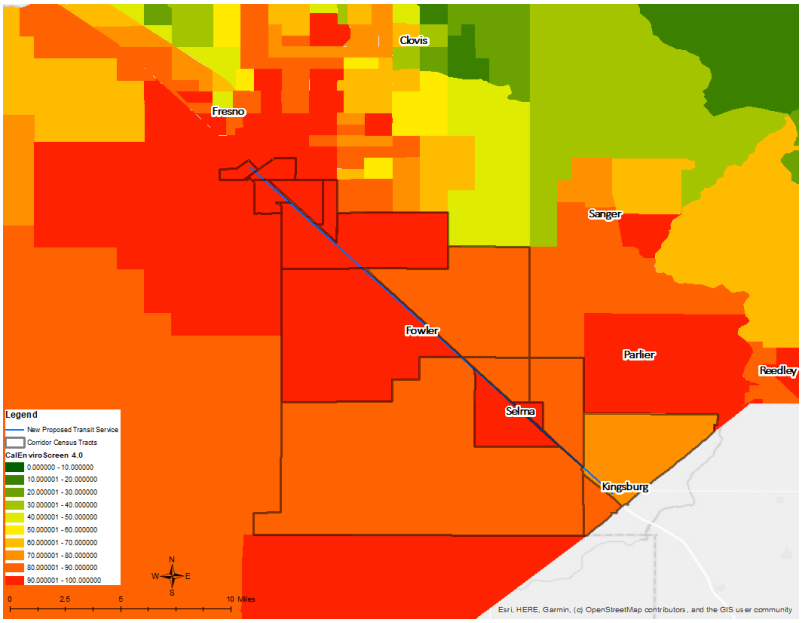
Senior Population



Source: Data – US Census Bureau ACS 2021 5-Year Estimates, Map – Walker Consultants.

Figure 4 shows the CalEnviroScreen 4.0 percentile along the proposed corridor (excluding spurs). All of the communities along the proposed corridor are at least in the 70th percentile of disadvantage compared to other California communities.

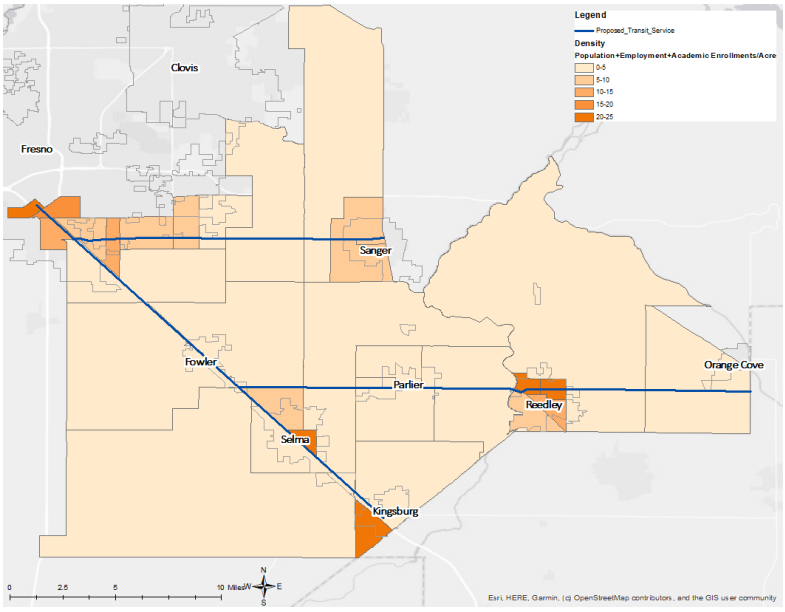
Figure 4: CalEnviroScreen 4.0 Percentile along Proposed Corridor



Source: Data- CalEnviroScreen 4.0, Map – Walker Consultants.

Figure 5 summarizes the density along the proposed corridor (excluding spurs), taking into account a combination of population, employment, and academic enrollment. Census tracts around Kingsburg, Selma, Fresno, and Reedley have the highest density along the corridor.

Figure 5: Population + Employment + Academic Enrollments per Acre along Proposed Corridor



Census tracts around Kingsburg, Selma, Fresno, and Reedley have the highest overall density along the corridor.

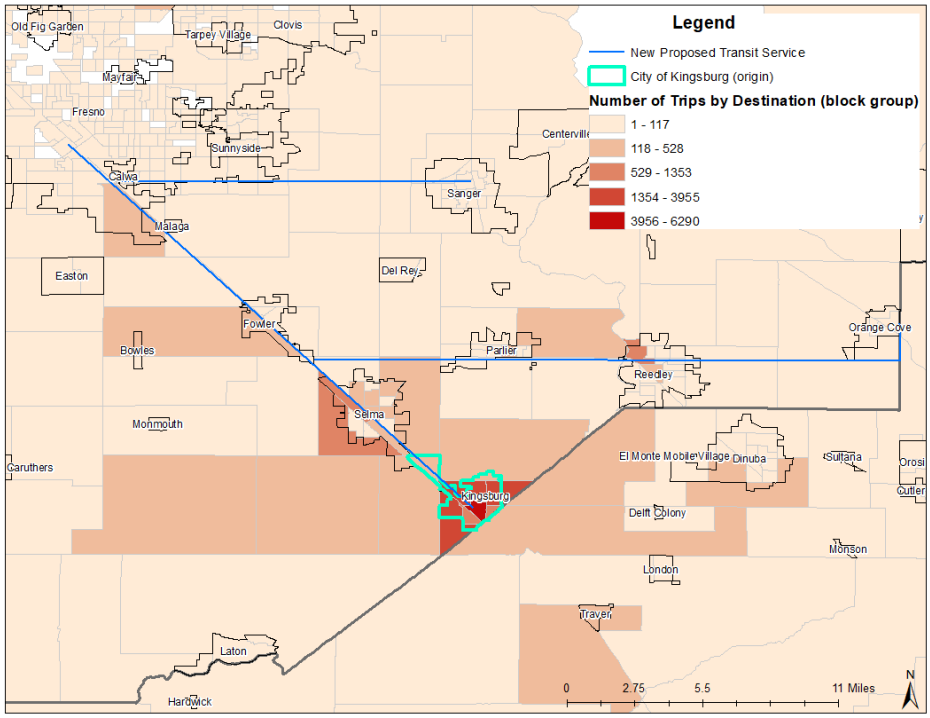
Source: Data- Replica, Map – Walker Consultants.

Origin/Destination Analysis

This section includes an origin/destination analysis for each of the transit corridor cities. The analysis was done by a block group using the Replica data platform, which tracks trips using cell phone data. The analysis looks at total trips and work trips separately. This section also includes jobs by destination data from the U.S. Census Bureau. Overall findings show that trips in FCRTA's service area are to and within the rural areas, not from the rural areas to the City of Fresno.

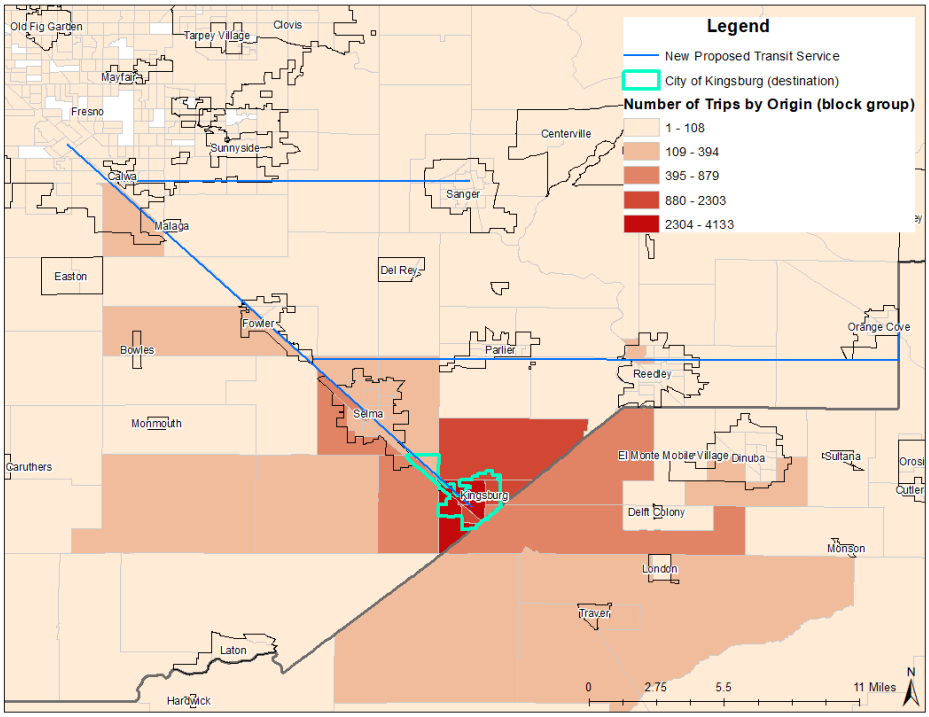
Kingsburg

Figure 6: Total Trips by Destination (Block Group) that originate in Kingsburg (36,100 Trips)



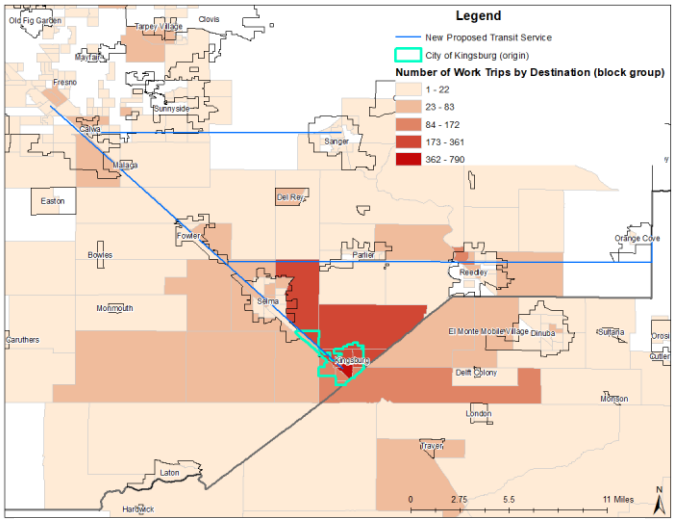
Many trips to and from Kingsburg are local

Figure 7: Total Trips by Origin (Block Group) that end in Kingsburg (34,700 Trips)



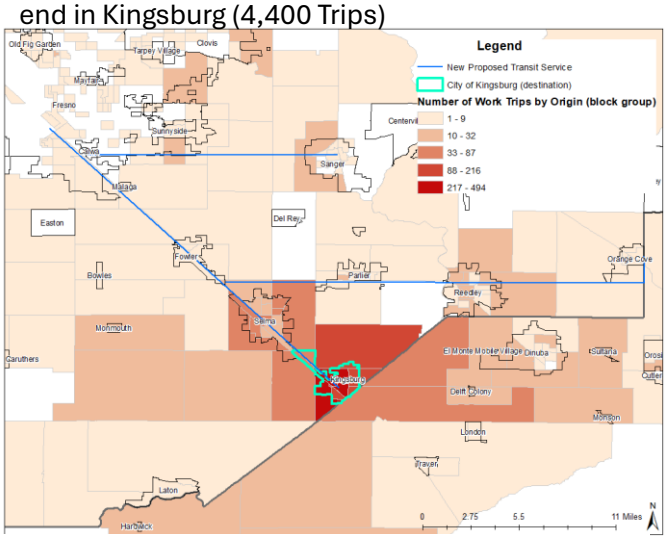
Source: Data – Replica, Maps – Walker Consultants

Figure 10: Work Trips by Destination (Block Group) that originate in Kingsburg (5,990 Trips)



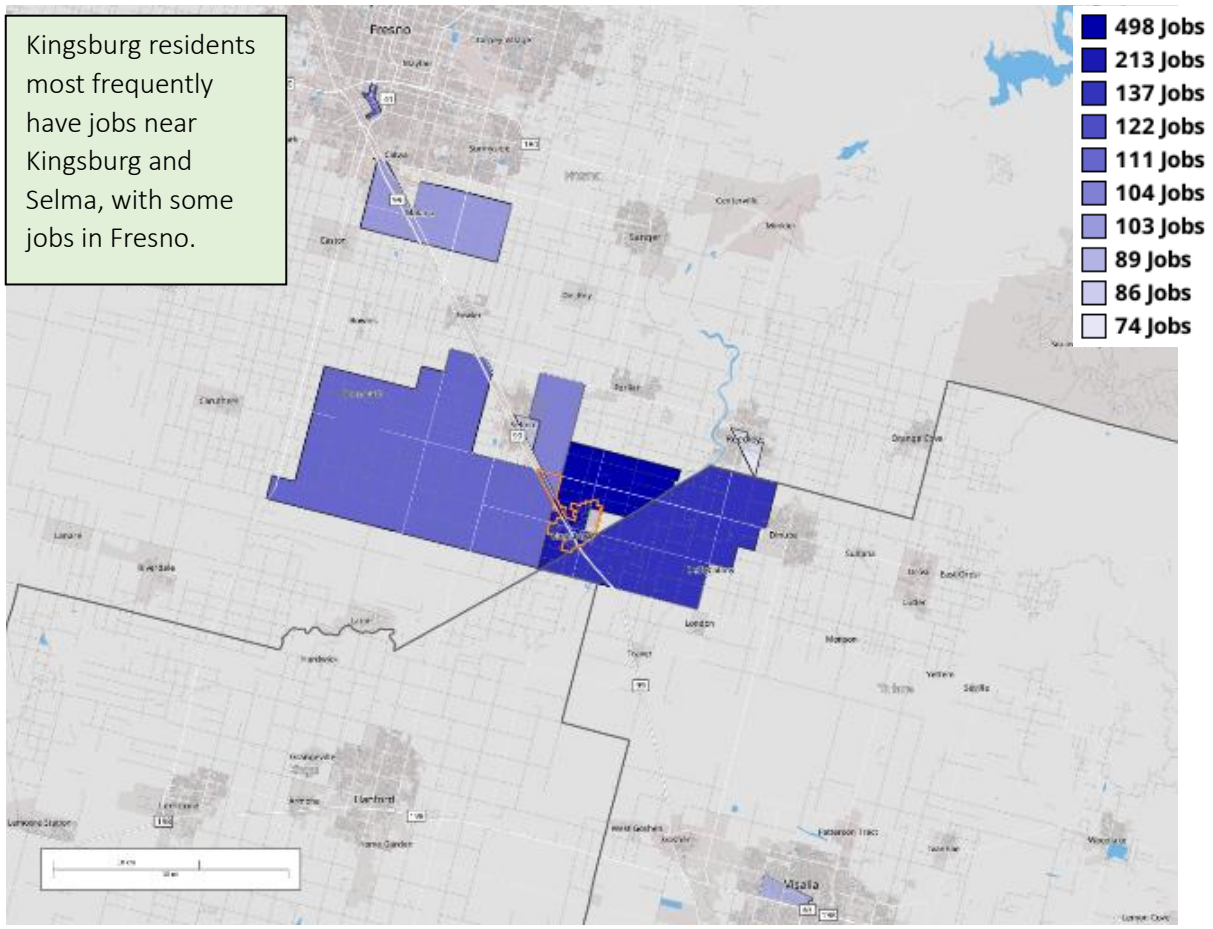
Work trips starting in Kingsburg most frequently end in/near Kingsburg or Selma.

Figure 8: Work Trips by Origin (Block Group) that end in Kingsburg (4,400 Trips)



Work trips ending in Kingsburg most frequently originate in/near Kingsburg.

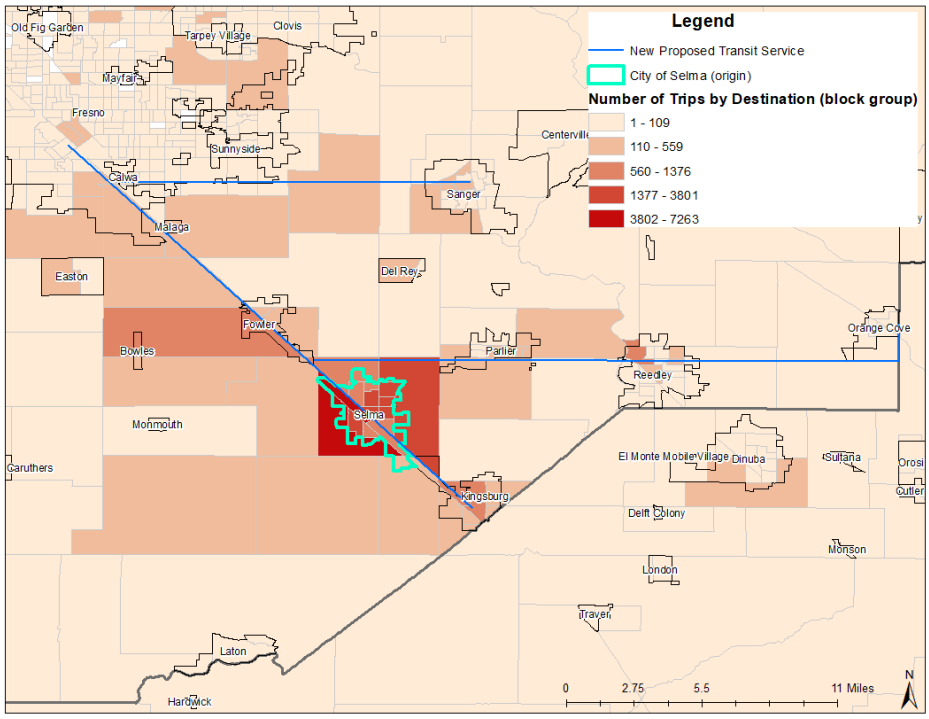
Figure 9: Jobs by Destination (Top 10 Census Tracts) for Workers Living in Kingsburg (5,464 Workers)



Source: United States Census Bureau OnTheMap.

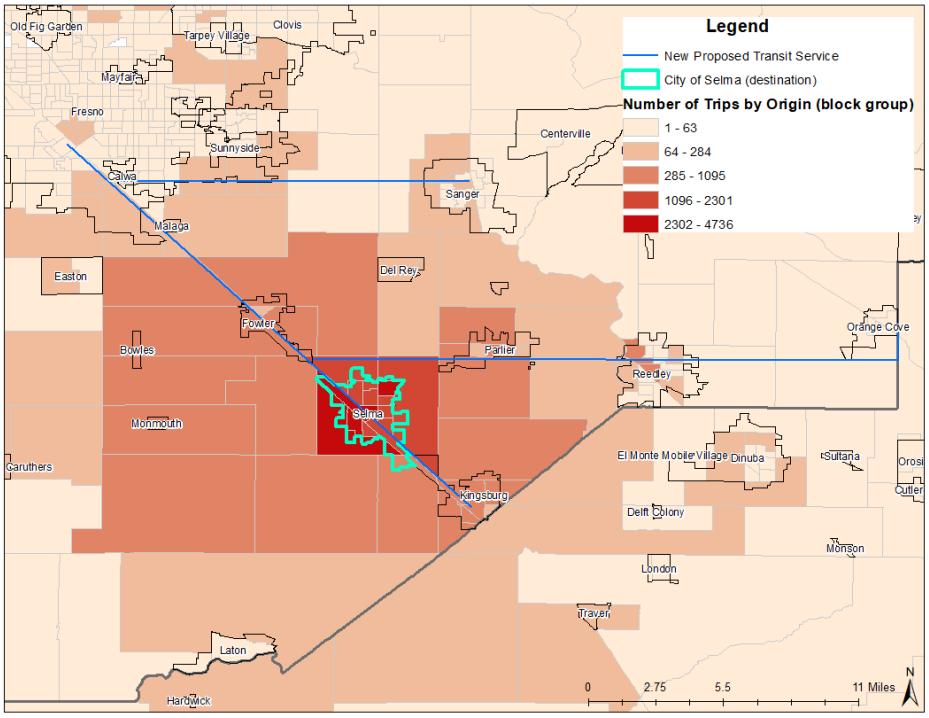
Selma

Figure 10: Trips by Destination (Block Group) that originate in Selma (65,600 Trips)



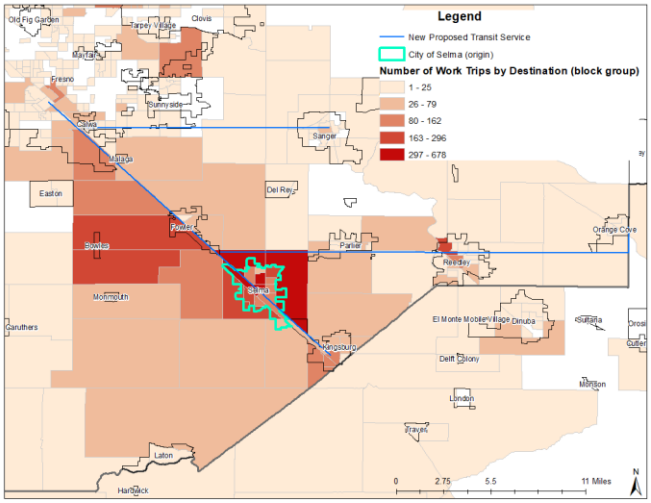
Many trips to and from Selma are local trips.

Figure 11: Trips by Origin (Block Group) that end in the City of Selma (65,600)



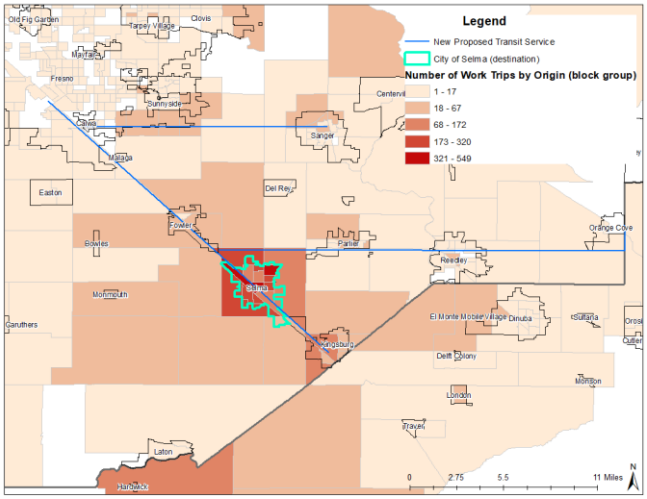
Source: Data-Replica, Map – Walker Consultants.

Figure 12: Work Trips by Destination (Block Group) that originate in Selma (10,400 Trips)



Work trips starting in Selma most frequently end in/near Selma, Bowles, Fowler & Reedley.

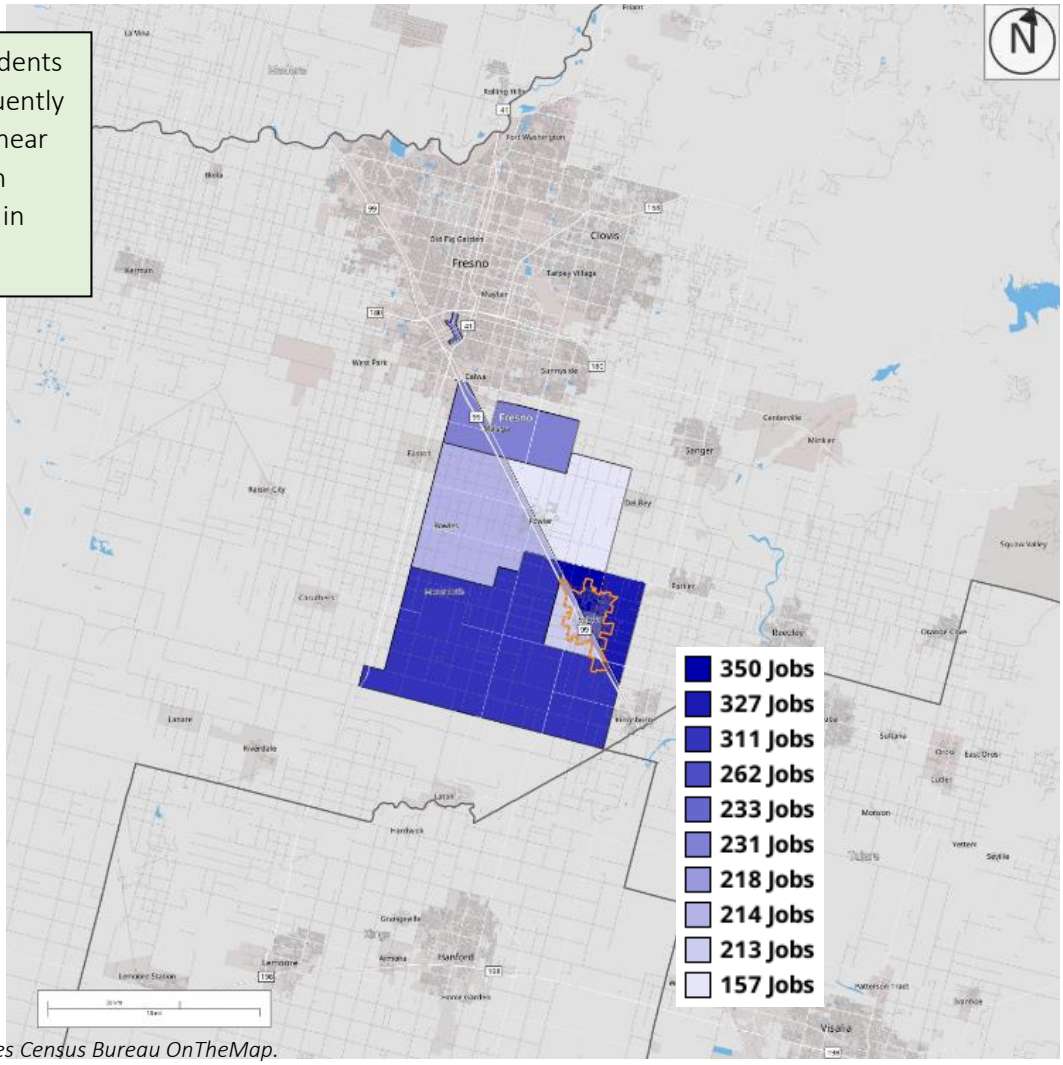
Figure 16: Work Trips by Origin (Block Group) tha end in Selma (7,660 Trips)



Work trips ending in Selma most frequently originate in/near Kingsburg.

Figure 13: Jobs by Destination (Top Ten Census Tracts) for Workers living in Selma (9,266 Workers)

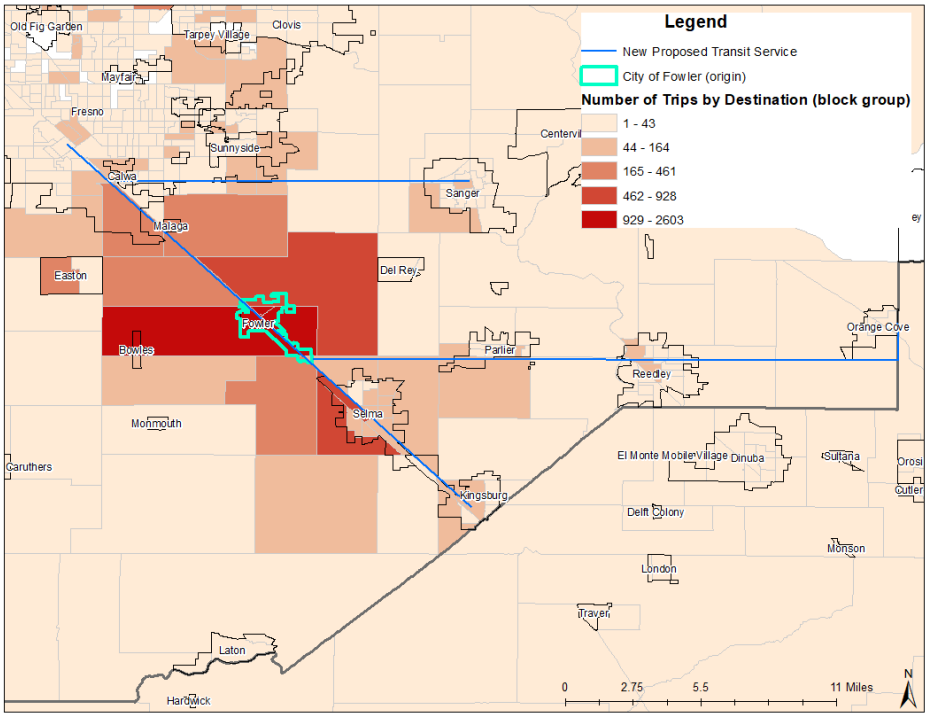
Selma residents most frequently have jobs near Selma with some jobs in Fresno.



Source: United States Census Bureau OnTheMap.

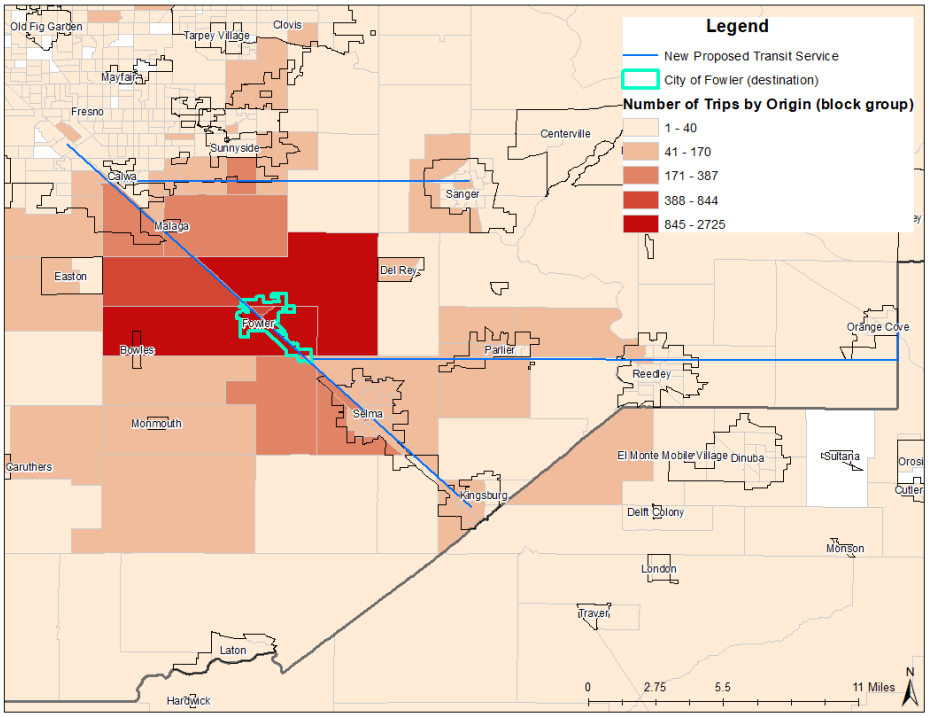
Fowler

Figure 14: Trips by Destination (Block Group) that originate in Fowler (21,8000 Trips)



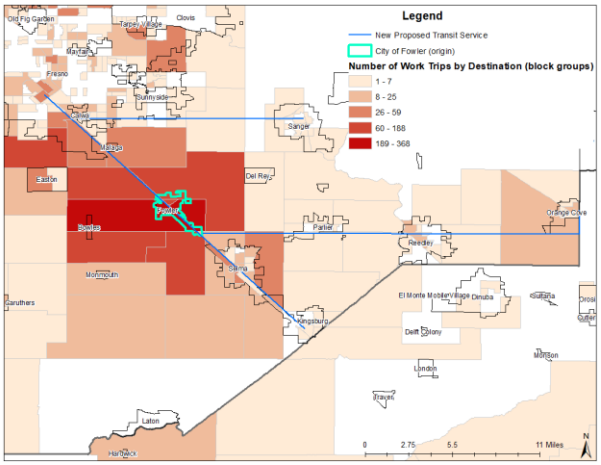
Many trips to and from Fowler are staying local in Fowler, Malaga and Selma.

Figure 15: Trips by Origin (Block Group) that end in Fowler (20,000 Trips)



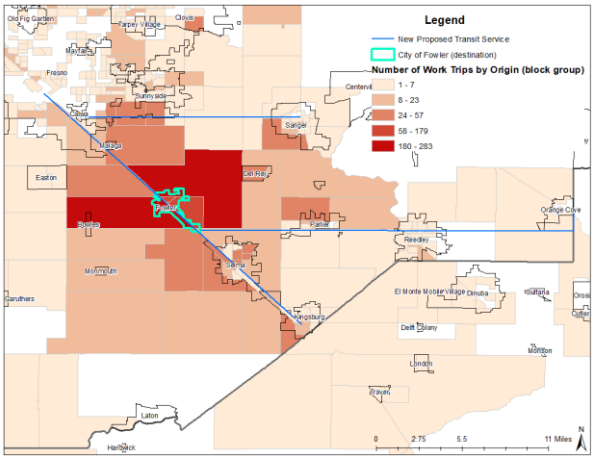
Source: Data-Replica, Map – Walker Consultants.

Figure 16: Work Trips by Destination (Block Group) that end in Fowler (3,470 Trips)



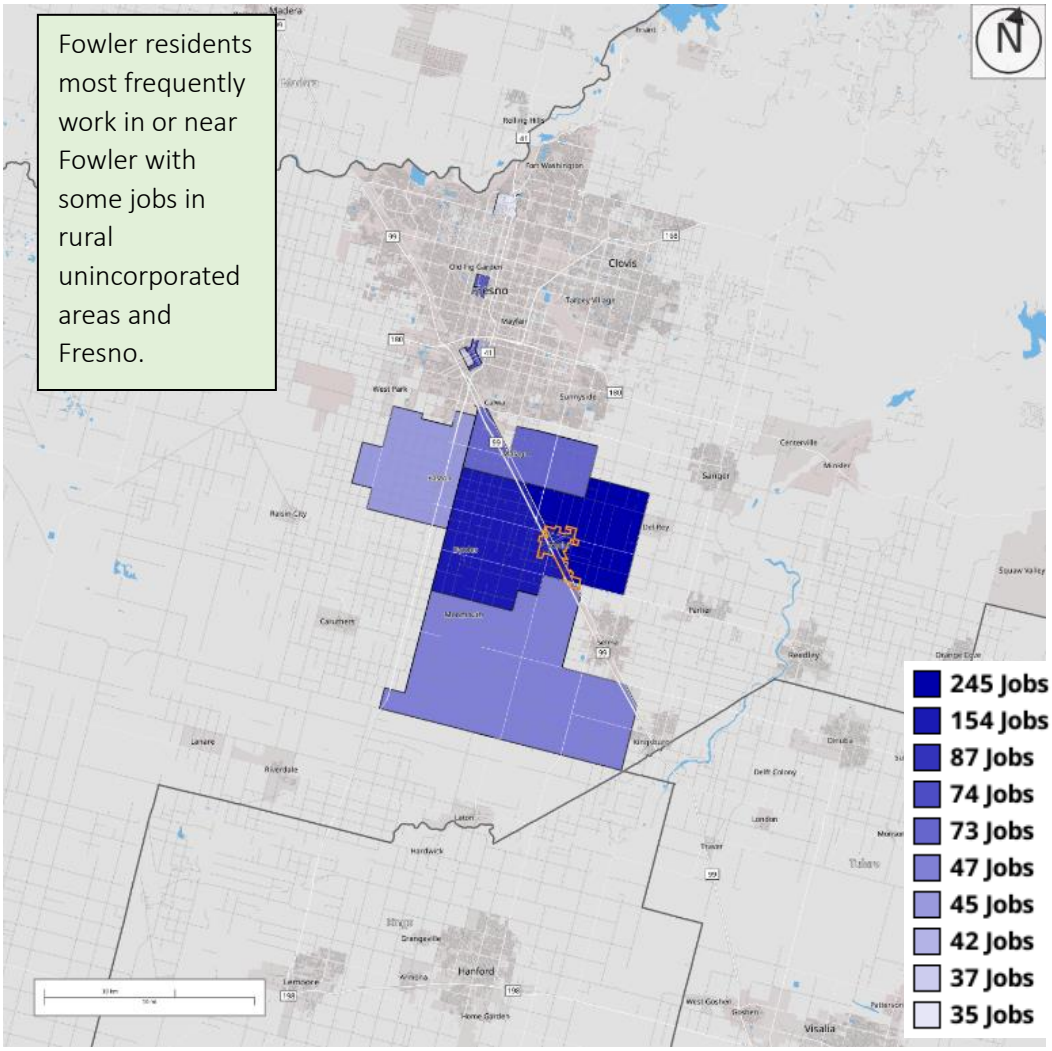
Work trips starting in Fowler most frequently end in/near Fowler and Fresno.

Figure 21: Work Trips by Origin (Block Group) tha originate in Fowler (3,080 Trips)



Work trips ending in Fowler most frequently originate in/near Fowler.

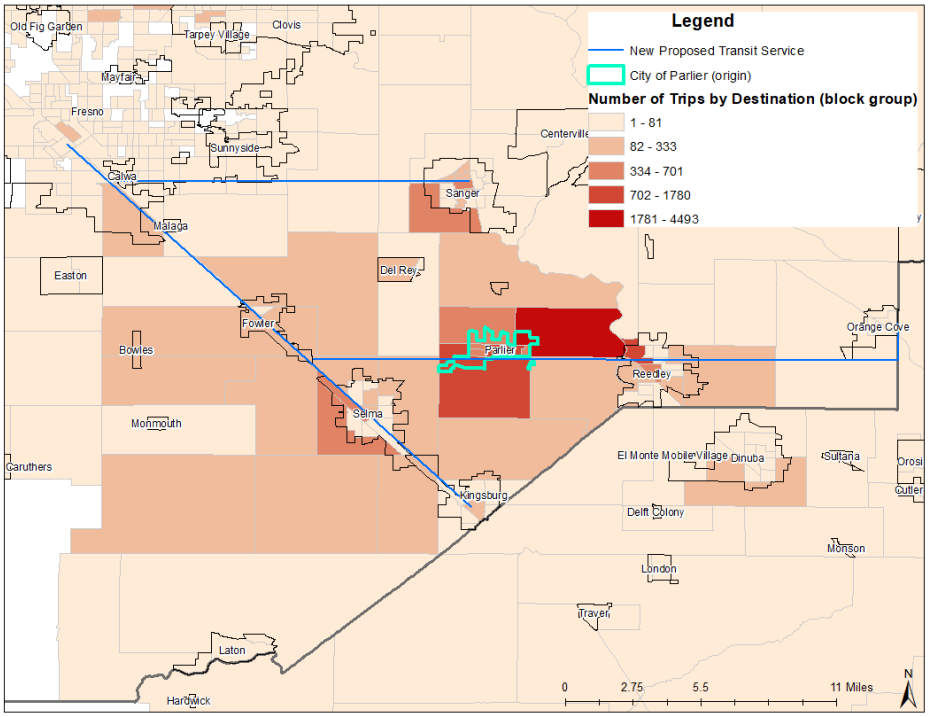
Figure 17: Jobs by Destination (Top Ten Census Tracts) for Workers living in Fowler (2,728 Workers)



Source: United States Census Bureau OnTheMap.

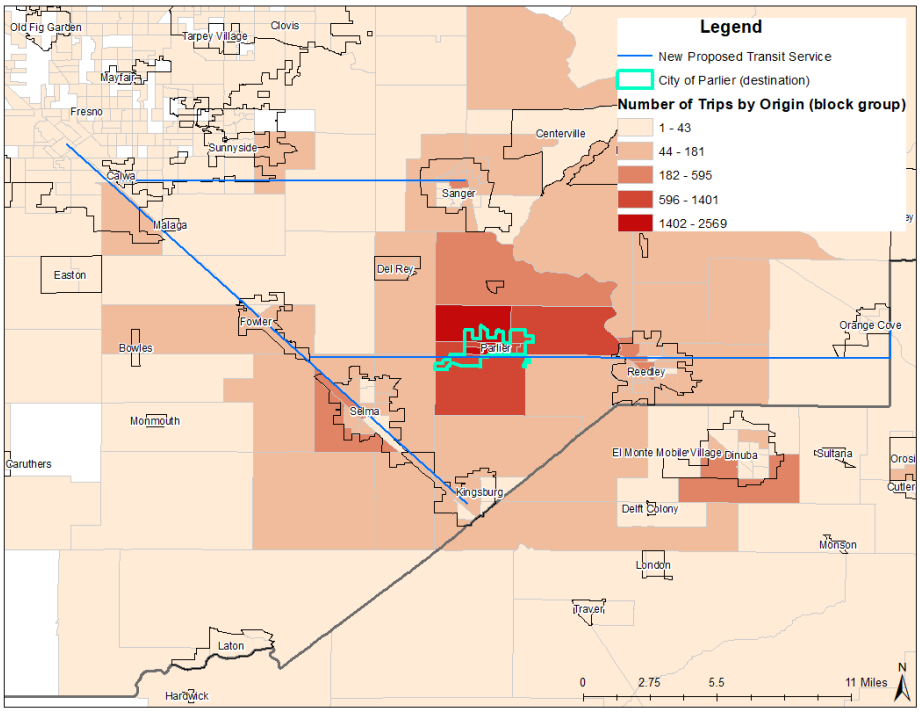
Parlier

Figure 18: Trips by Destination (Block Group) that originate in Parlier (28,600 Trips)



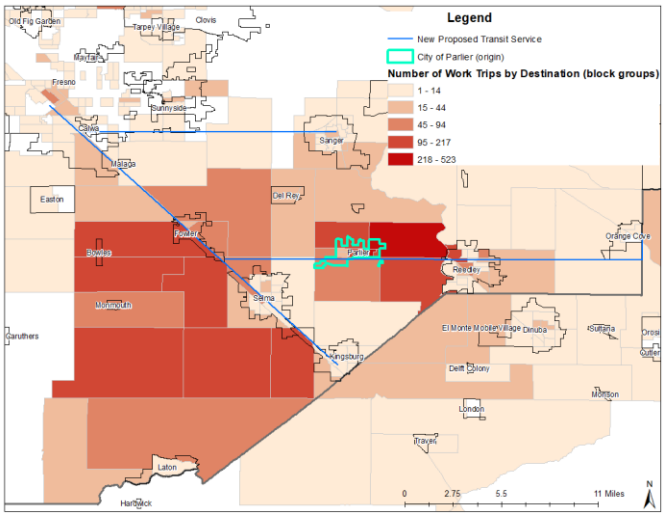
Many trips to and from Parlier are staying local in Parlier and Reedley.

Figure 19: Trips by Origin (Block Group) that end in Parlier (23,200 Trips)



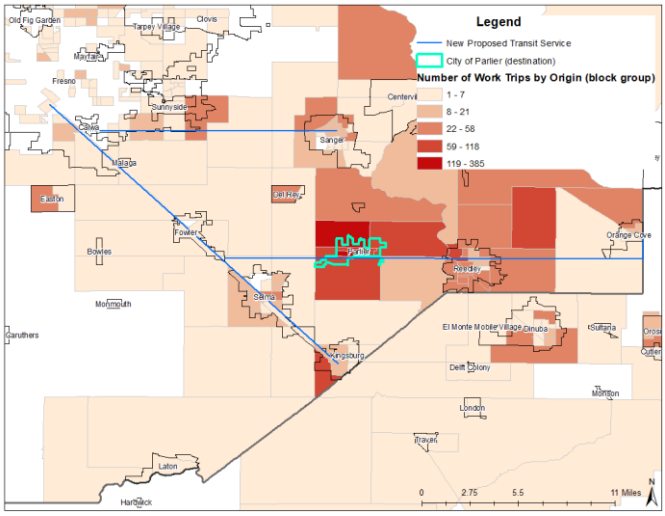
Source: Data-Replica, Map – Walker Consultants.

Figure 25: Work Trips by Destination (Block Group) that originate in the Parlier (5,550 Trips)



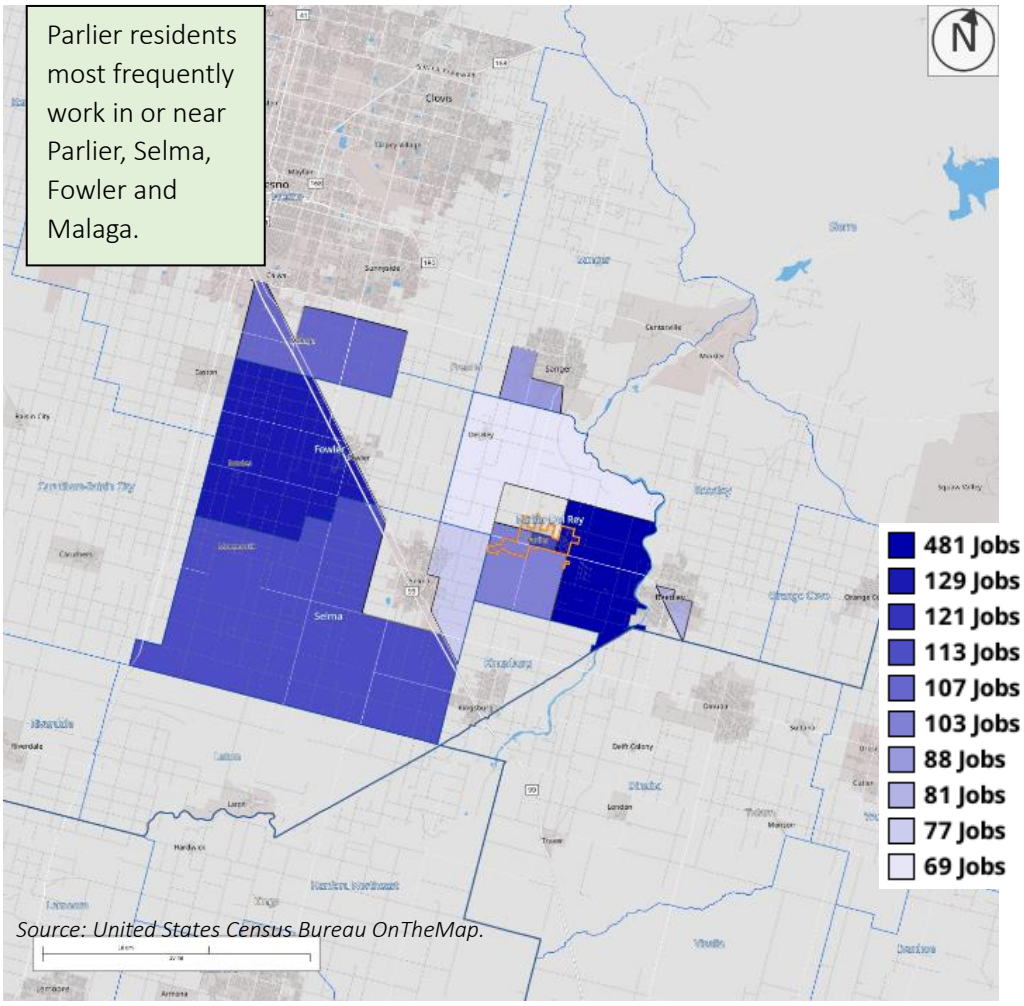
Work trips starting in Parlier most frequently end in/near Parlier and Reedley or west of SR 99.

Figure 20: Work Trips by Origin (Block Group) that end in Parlier (3,720 Trips)



Work trips ending in Parlier most frequently originate in/near Parlier, Reedley, and Kingsburg.

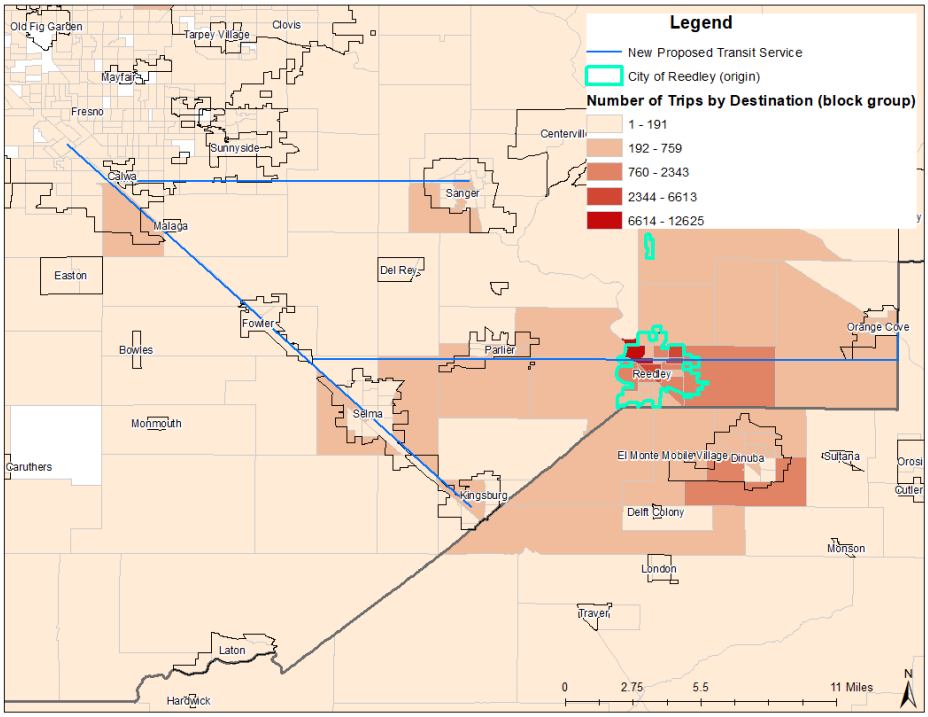
Figure 21: Jobs by Destination (Top Ten Census Tracts) for Workers living in Parlier (5,004 Workers)



Source: United States Census Bureau OnTheMap.

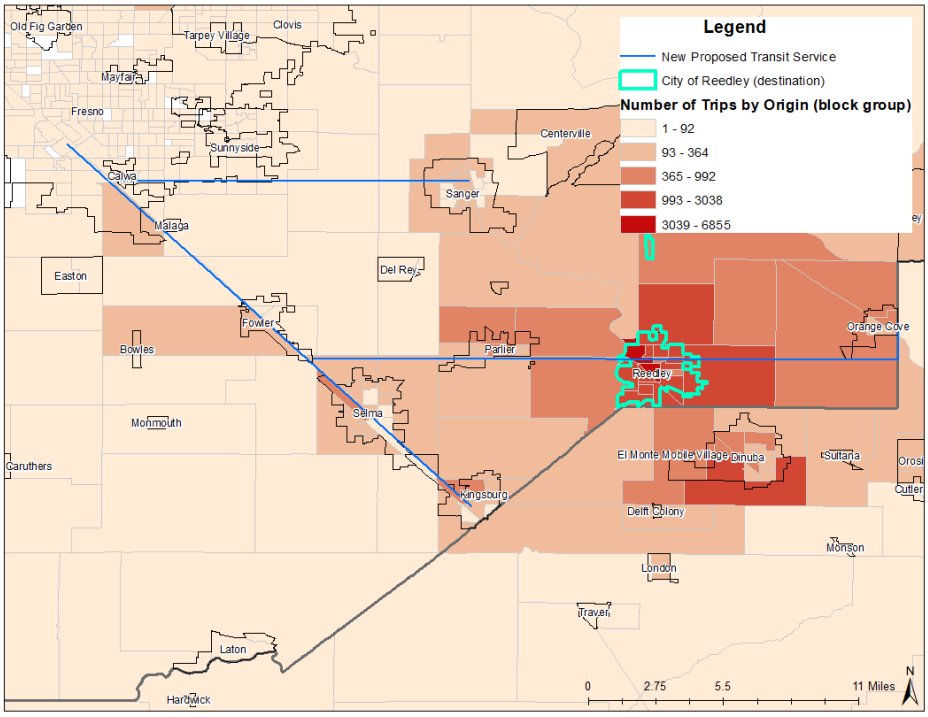
Reedley

Figure 22: Trips by Destination (Block Group) that originate in Reedley (67,000 Trips)



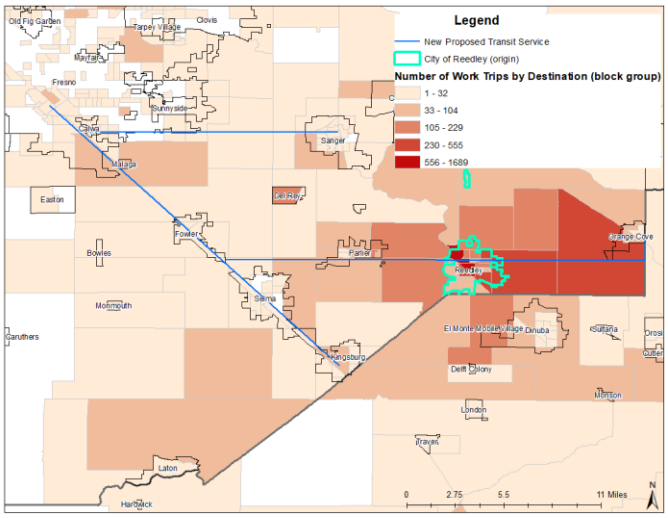
Many trips to and from Reedley occur in Reedley and Dinuba.

Figure 23: Trips by Origin (Block Group) that end in Reedley (71,400 Trips)



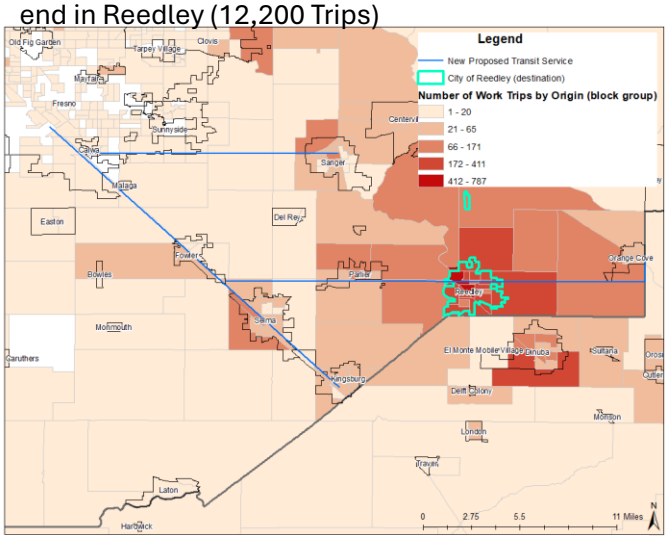
Source: Data-Replica, Map – Walker Consultants.

Figure 30: Work Trips by Destination (Block Group) that originate in Reedley (11,000 Trips)



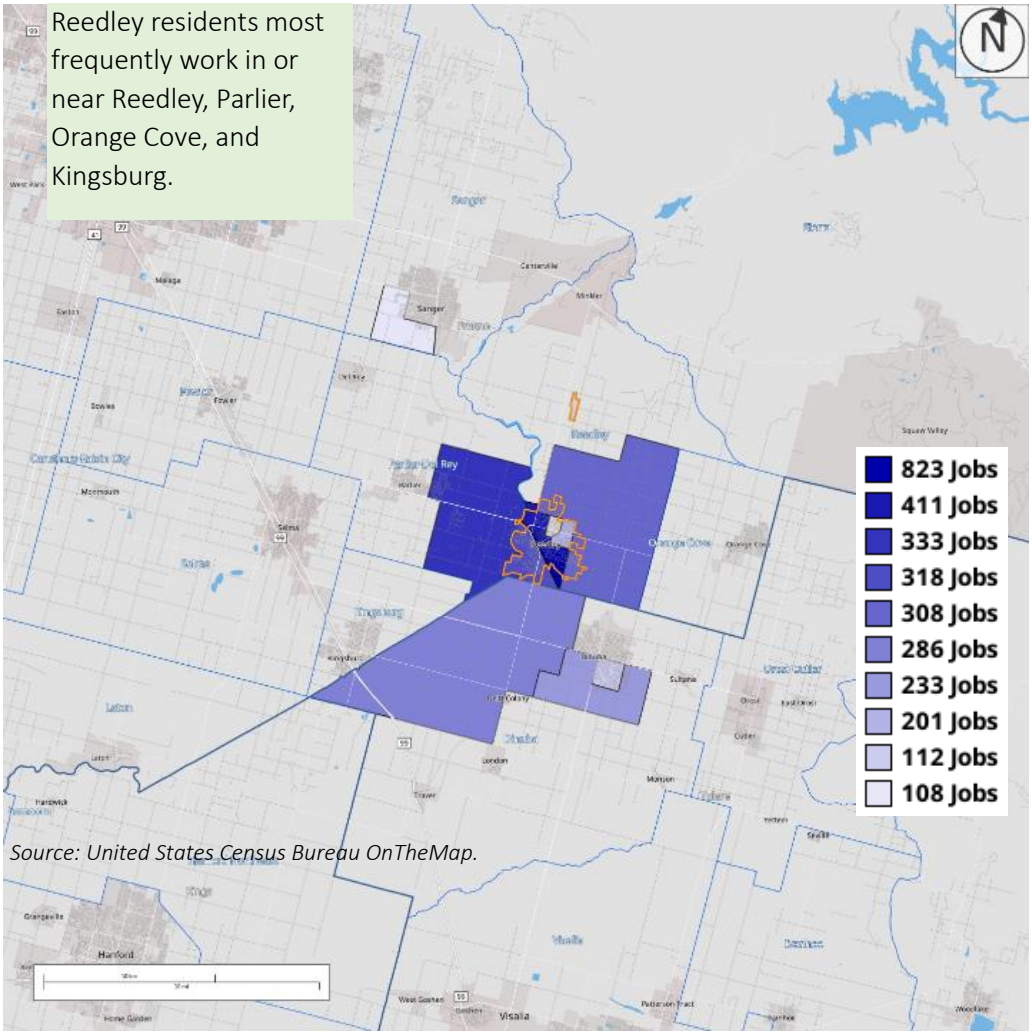
Work trips starting in Reedley most frequently end in/near Reedley and Orange Cove.

Figure 24: Work Trips by Origin (Block Group) that end in Reedley (12,200 Trips)



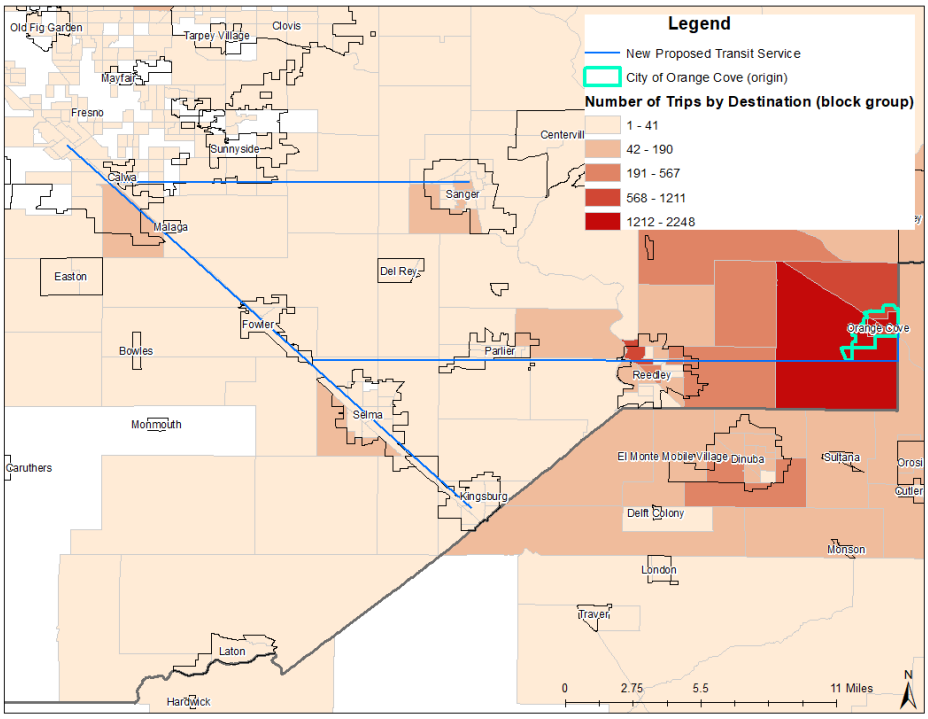
Work trips ending in Reedley most frequently originate in/near Reedley and Dinuba.

Figure 25: Jobs by Destination (Top Ten Census Tracts) for Workers living in Reedley (9,743 Workers)



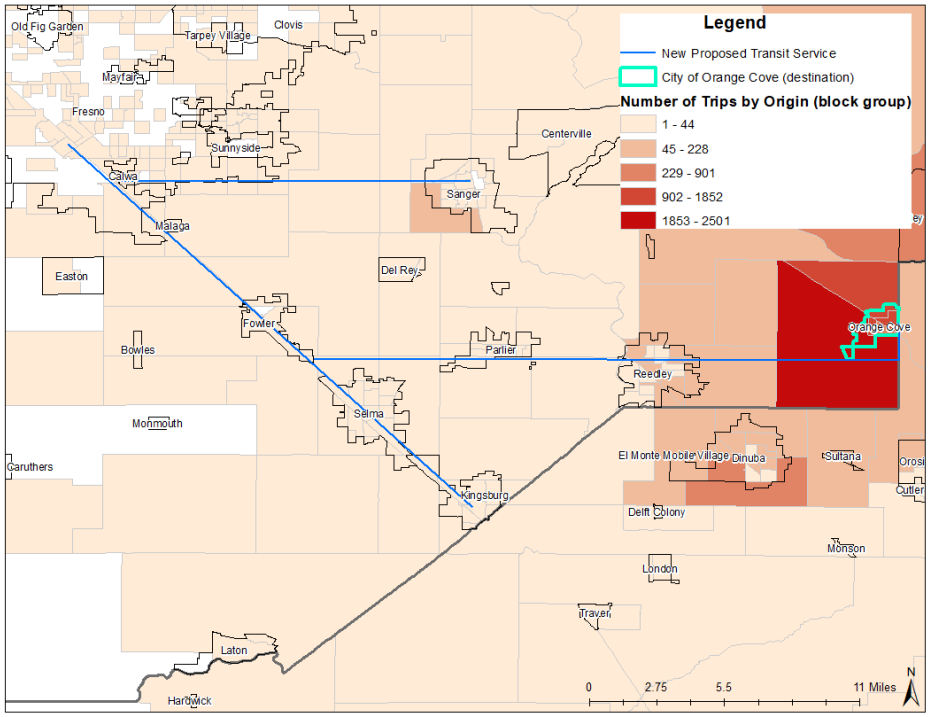
Orange Cove

Figure 26: Trips by Destination (Block Group) that originate in Orange Cove (18,300 Trips)



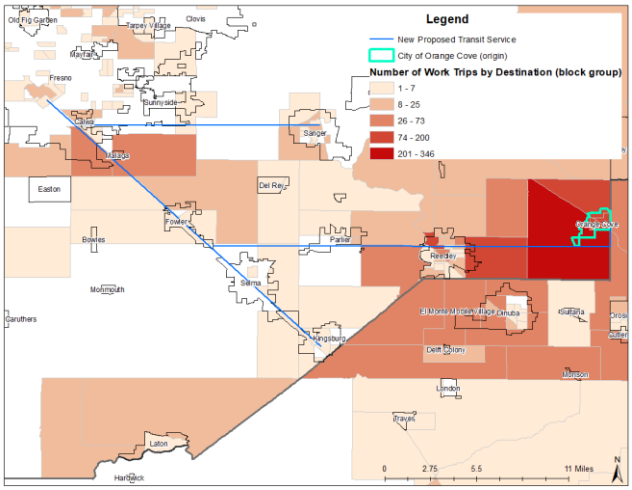
Many trips to and from Orange Cove occur in or near Orange Cove and Reedley.

Figure 27: Trips by Origin (Block Group) that end in Orange Cove (14,200 Trips)



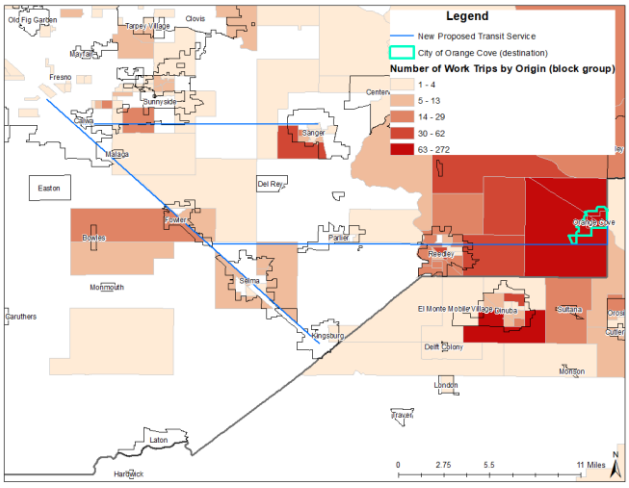
Source: Data-Replica, Map – Walker Consultants.

Figure 28: Work Trips by Destination (Block Group) that originate in Orange Cove (3,290 Trips)



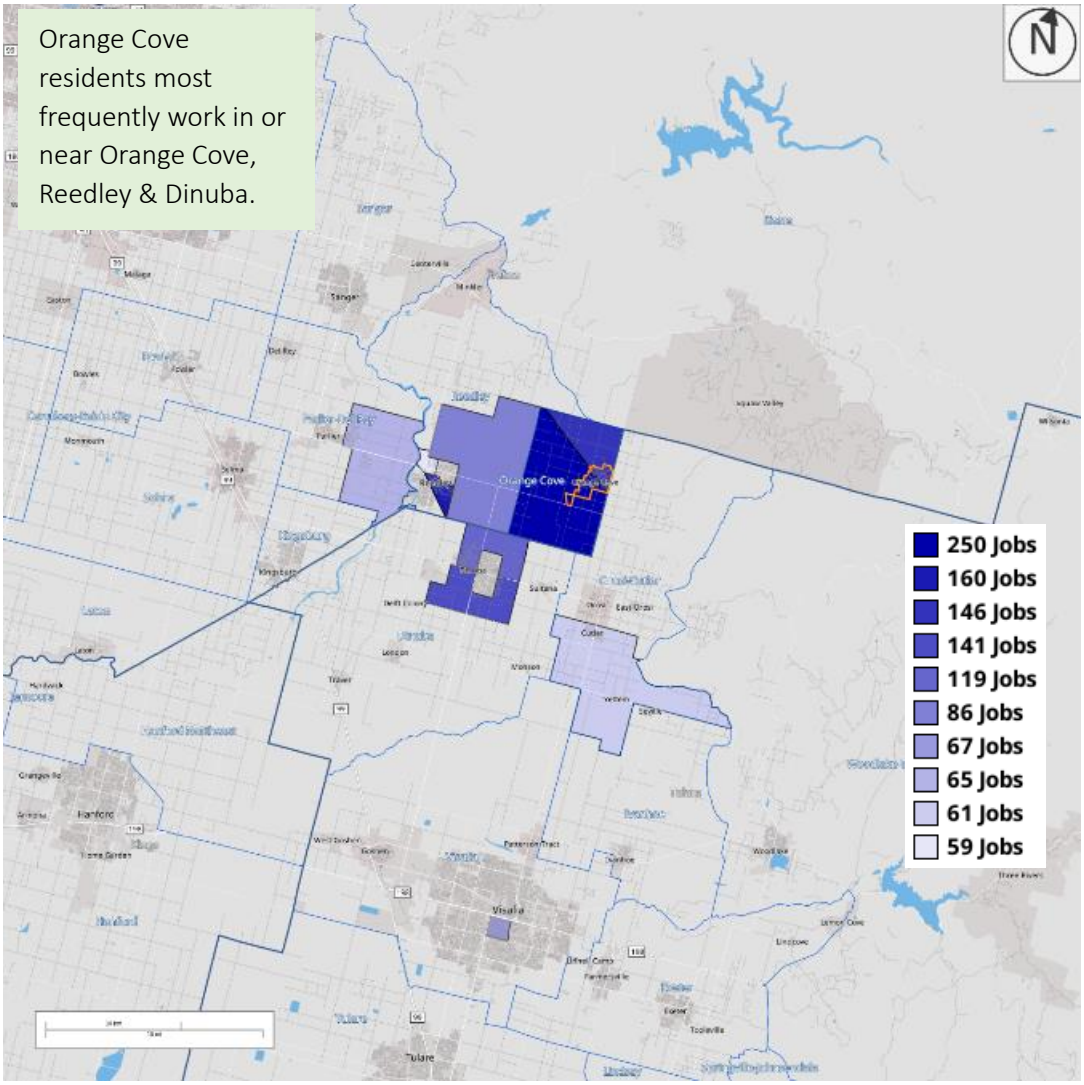
Work trips starting in Orange Cove most frequently end in/near Reedley and Orange Cove.

Figure 36: Work Trips by Origin (Block Group) that end in Orange Cove (2,140 Trips)



Work trips ending in Orange Cove most frequently originate in/near Orange Cove, Dinuba, and Sanger.

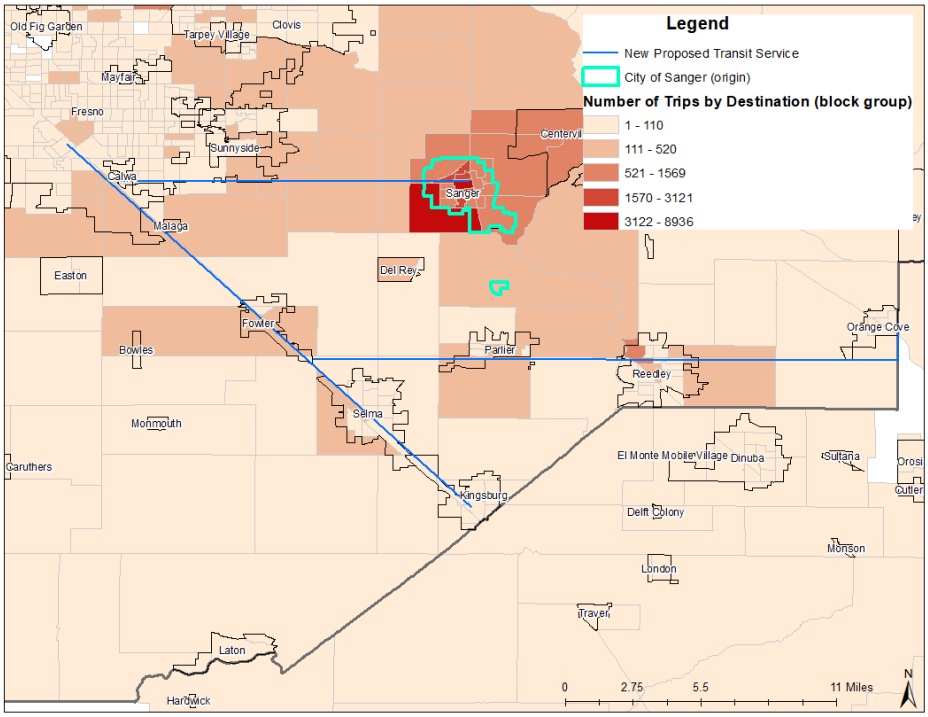
Figure 29: Jobs by Destination for Workers living in Orange Cove (3,399 Workers)



Source: United States Census Bureau OnTheMap.

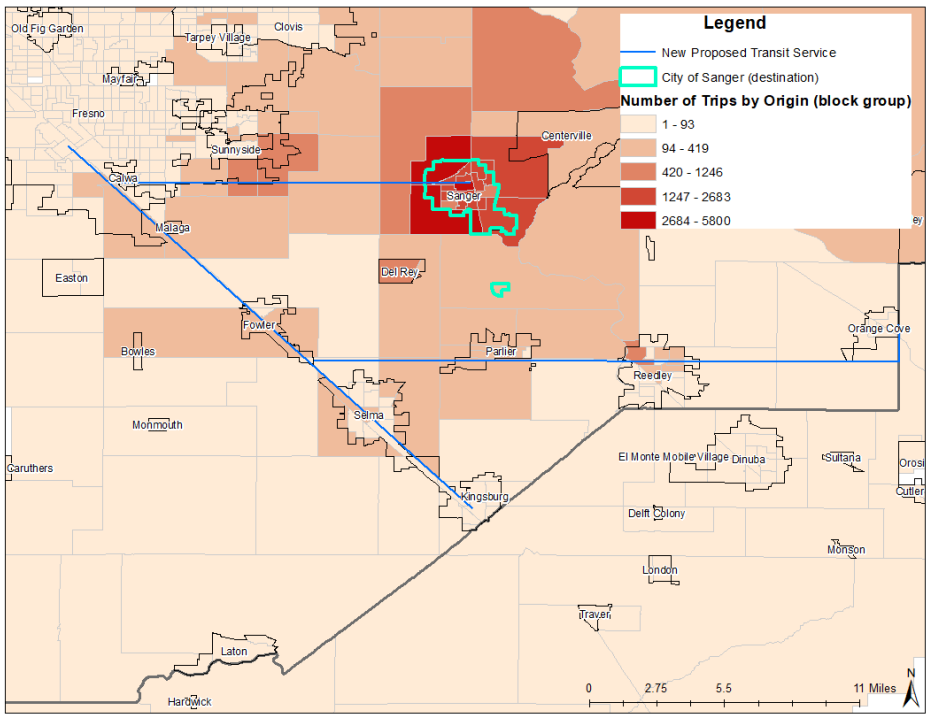
Sanger

Figure 30: Trips by Destination (Block Group) that originate in Sanger (62,700 Trips)



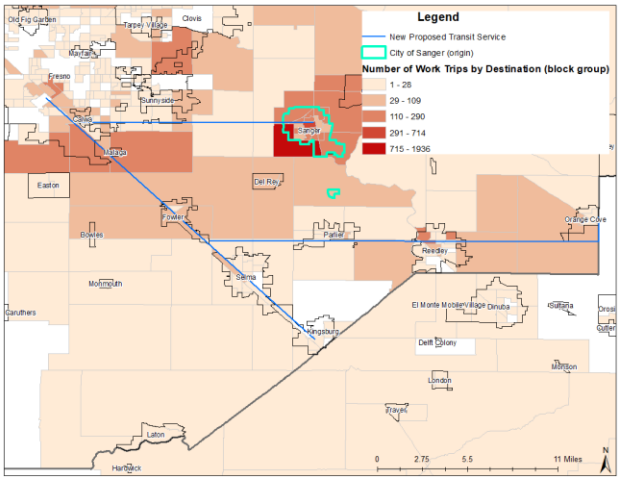
Many trips to and from Sanger occur in or near Sanger.

Figure 39: Trips by Origin (Block Group) that end in Sanger (61,000 Trips)



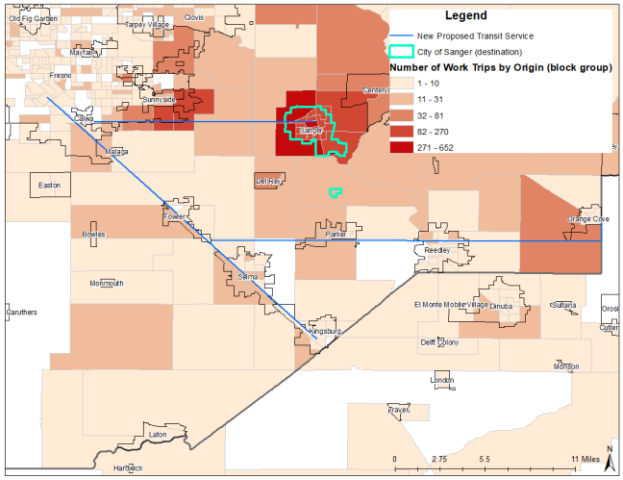
Source: Data-Replica, Map – Walker Consultants.

Figure 31: Work Trips by Destination (Block Group) that originate in Sanger (10,900 Trips)



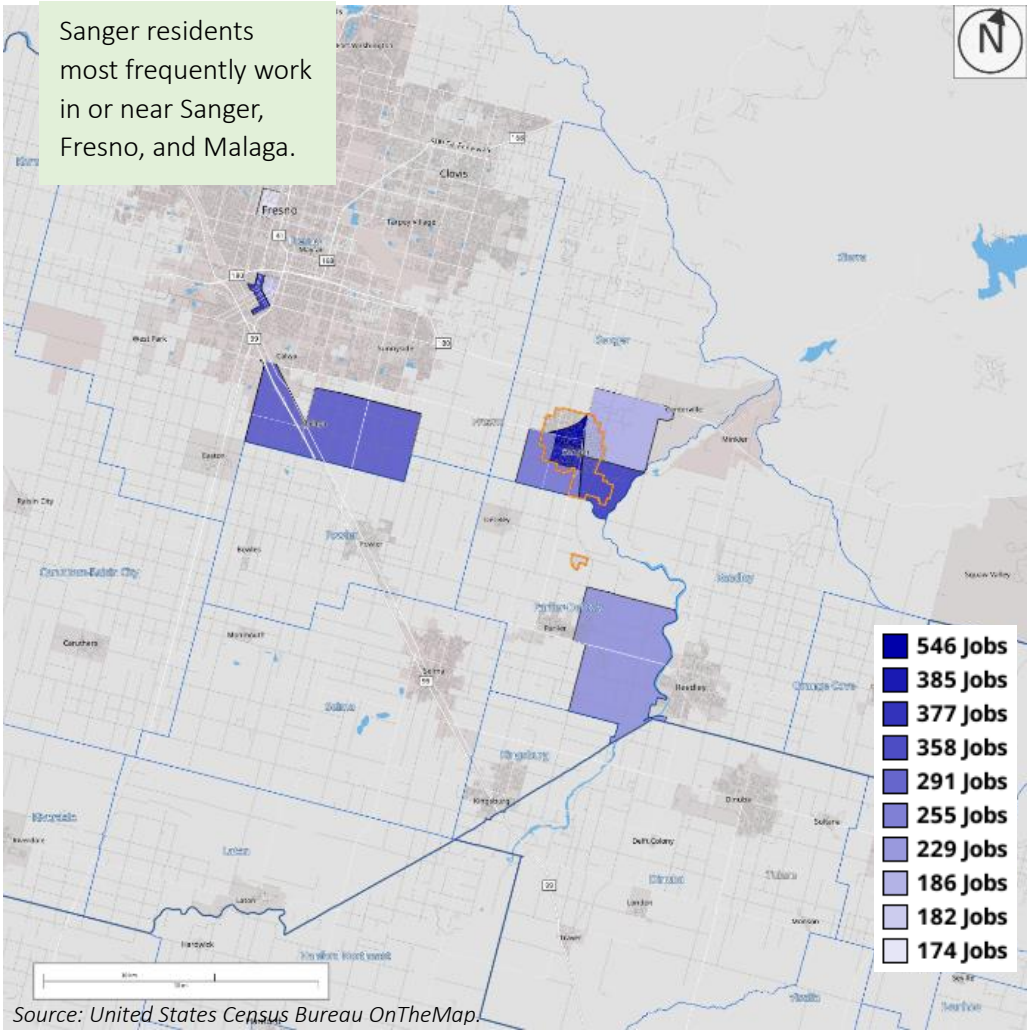
Work trips starting in Sanger most frequently end in/near Sanger.

Figure 41: Work Trips by Origin (Block Group) that end in Sanger (7,850 Trips)



Work trips ending in Sanger most frequently originate in/near Sanger and Sunnyside.

Figure 32: Jobs by Destination (Top Ten Census Tracts) for Workers living in Sanger (11,023 Workers)



Source: United States Census Bureau OnTheMap.

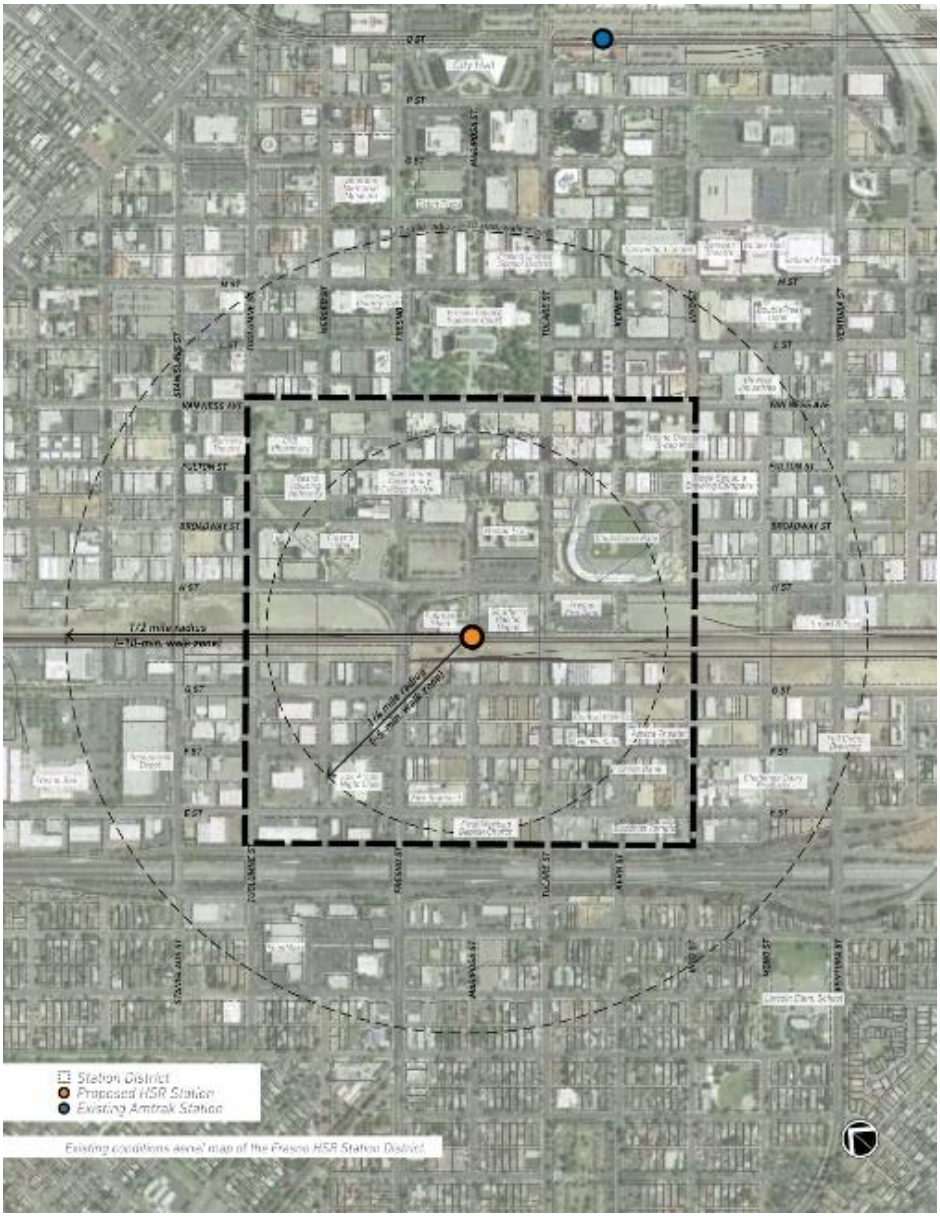
Background Plans, Studies, and Initiatives

This section discusses key plans, studies, and initiatives that will inform the planning efforts for the proposed transit service along Golden State Boulevard:

- Community Vision for the Golden State Corridor (2003)

- Golden State Corridor Complete Streets Project (under construction)
    - "Complete streets" project located on Golden State Boulevard, a 14.1 mile stretch of historic The cities of Fowler, Kingsburg, Selma, and the County of Fresno conducted a Community Vision for the Golden State Corridor
    - Recommends mass transit along the corridor, specifically light rail.
    - Highway 99.
    - Includes pavement rehabilitation, intersection signalization and turning lanes, Sidewalks, crosswalks, and median improvements, street lighting, drainage facilities,

Figure 43: High Speed Rail – Fresno Station District Master Plan (2018)



Source: Fresno Station District Master Plan.

buffered bike lanes, landscaping, and provisions for connectivity to future Active Transportation Program (ATP) projects.

- Route 99 Business Plan Final Report (2013)
  - Identifies issues that informed the need for improved transit service on the corridor.
- High Speed Rail – Fresno Station District Master Plan (2018)
  - Plan for the 200-acre area site within a five-minute walk from the future high-speed rail (HSR) station.
  - Envisions a new Intermodal Transit Center, which could be located at the HSR Station G Street, connecting HSR with car, bike, pedestrians, local transit systems, tour buses, and shuttles to the airport, college campus, and the Amtrak station.
  - Opportunity for future transit service along the Golden State Corridor to integrate with HSR and other transit services at the Intermodal Transit Center.
- City of Parlier Traffic Calming and Safety Enhancement Plan (2021)
  - Contains street design concepts to improve safety, walkability, connectivity, and placemaking along Manning Avenue, one of the spurs of the proposed transit corridor.
- Bicycle and Pedestrian Plans
  - The cities of Kingsburg, Selma, Fowler, Parlier, Reedley, and Fresno have plans to expand bicycle and pedestrian infrastructure, which are important to consider when evaluating proposed transit station locations.
- FCRTA Electrical Grid Analysis Study
  - Identifies the impacts of the anticipated increased electrification of the electric grid system and the unique challenges faced by FCRTA.
  - Understanding the electrical infrastructure and capacity is critical to planning the proposed transit service, as the service will be operated by electric-powered vehicles (bus or rail).
- FCRTA Microgrid/Resiliency Hub Study
  - The Study evaluated multi-modal community resiliency hubs (up to five sites initially) to expand transportation service.
  - The study recommended five sites, San Joaquin, Parlier, Fowler, Biola, and Lanare. FCRTA is now working to implement the study's recommendation.
- Selma Maintenance Facility (under construction)
  - FCRTA is constructing a new maintenance facility on a 7.5-acre vacant parcel in Selma for dispatch and vehicle maintenance operations that serve rural Fresno County and accommodate future transit needs.

Figure 44: Selma Maintenance Facility

Source: Zumwalt.

- Kingsburg and Fresno Resiliency Hubs
  - FCRTA is installing two resiliency hubs in Kingsburg and Fresno (Chinatown neighborhood), featuring solar carports to power Level 2 EV charging, and inductive charging stations. The hubs are strategically located in Kingsburg and Chinatown in Fresno to provide mid-route charging opportunities for FCRTA's vehicle fleet.

Figure 33: Kingsburg Resiliency Hub

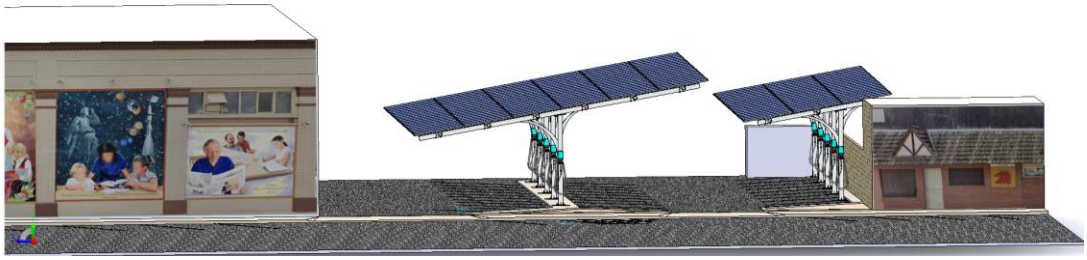
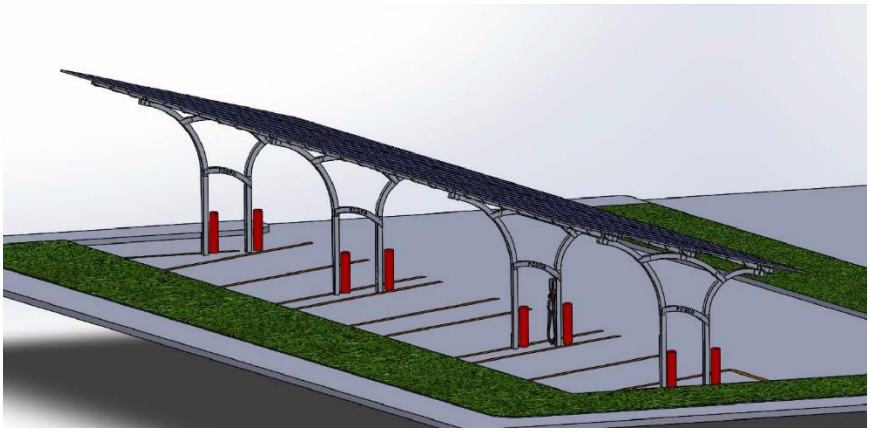


Figure 34: Fresno (Chinatown) Resiliency Hub



Source: Lean Solar

04 | Best Practices Review

04 Best Practices Review

To understand best practices in rural areas with higher-capacity fixed route and bus rapid transit service, the project team selected three transit agencies to review. These agencies were chosen because they serve rural areas and offer services that align with the study's objectives. **Error! R eference source not found.** summarizes the case study transit agencies reviewed. A complete best practices review can be found in Appendix A.

Figure 35: Case Study Agencies Reviewed

	Ben Franklin Transit	Whatcom Transportation Authority	Roaring Forks Transportation Authority	Fresno County Rural Transit Agency
Location	Tri-Cities area of Benton and Franklin Counties, WA	Whatcom County, WA	Roaring Forks Valley, WA	Fresno County, CA
Type of Service	Fixed-Route Bus Service On-demand microtransit	Fixed-Route Bus Service Advance reservation zone Service	Bus Rapid Transit	Fixed-Route Bus Service On-demand microtransit

Source: Walker Consultants.

Key Takeaways

Ben Franklin Transit

- Operates two higher frequency "Metro" bus routes which replaced prior bus fixed bus routes on high ridership corridors.
    - Provides 15-minute service all day Monday through Saturday between major transit centers and along high-demand corridors connecting higher population cities.
- To develop the Metro routes concept, BFT conducted the following analyses:
    - Ridership trends - peak and off-peak service and stop-by-stop ridership.
    - Field review - stop placement, spacing, shelters/amenities, and access.
    - Review of key destinations in corridors to be served by existing or relocated stops.
- BFT identified the following best practices regarding stop spacing and location for high-frequency routes:
    - Ideal bus stop spacing falls between 0.25 and 0.33 mile
    - The placement of stop pairs across from one another is considered a best practice.
    - Stop placement at or near intersections is considered a priority for pedestrians to access crosswalks.
    - Transit should be placed at or near key destinations like retail shopping centers, supermarkets, pharmacies, and medical offices and hospitals. Additional stops should

be located at or near key transfer points, providing riders with seamless transfers to connecting routes.

Whatcom Transportation Authority

- Operates four higher frequency "GO Lines," which are comprised of existing fixed-route service.
    - Each high frequency "GO Line" is served by one or more of WTA's existing bus lines
    - Generally, WTA's highest ridership bus routes are those routes serving its Go Lines.
    - All GO Lines are within Bellingham City limits, which serve higher density areas and heavily traveled corridors.
    - WTA's marketing materials, transit maps, and transit guides have different **branding** for GO Lines than the other fixed routes.
    - Due to increases in traffic congestion and other issues **WTA has had to make significant investments to keep the scheduled 15-minute frequencies** for certain GO Lines.

Roaring Forks Transportation Authority

- Implemented VelociRFTA BRT service between Glenwood and Aspen.
    - Service has 18 miles of dedicated or HOV lanes along its 41-mile route, off-board payment, and high-quality stations with amenities such as Wi-Fi and real-time arrival information.
    - Demonstrated that BRT can be a successful and cost-effective way to provide **fast, efficient, and reliable transit service** in areas with low population densities.
    - **Increased ridership**: Since its launch, VelociRFTA has seen a 27.6% increase in ridership. People are interested in using public transportation when it is convenient, fast, and reliable.
    - **Reduced traffic congestion**: VelociRFTA takes cars off the road, which helps to reduce traffic congestion. This is especially beneficial in the Roaring Fork Valley, which is a popular tourist destination.
    - **Improved air quality**: VelociRFTA buses run on compressed natural gas (CNG), which is a cleaner-burning fuel than gasoline or diesel. This helps to improve air quality in the valley.
    - Estimated area **economic benefit of $67-88 million in 2018**, on an operating budget of $34 million

05 | Community Outreach

05 Community Outreach

The Walker team and FCRTA staff conducted community outreach at several junctures in the project. Walker Consultants staff visited various potential station location cities along the corridor to post flyers, talk with businesspeople, and distribute surveys.

Advisory Committee

An advisory committee of stakeholders guided the project and provided feedback on service concepts to develop the recommendations. Appendix A provides more details on meeting discussions.

Key public outreach activities

- Formation of an advisory committee to guide the project
- Tabling and surveys in Chinatown Fresno
- Door-to-door visits to businesses, customers, and any people the team could intercept in Fowler and Selma
- Tabling and surveys at the Reedley College Farmers Market
- Tabling and surveys at the Kingsburg Farmers Market
- Online and paper surveys running from June 5 to August 31, 2023

Key Takeaways

Key takeaways from the community outreach include:

- The large majority, 87%, of survey respondents have not ridden public transportation in the past two weeks, suggesting low familiarity with the transit options. Some of those who have ridden

public transportation *may* have used Fresno Area Express, the Fresno intercity bus (not FRCTA service).

- Approximately 20% of survey respondents indicated they don't have access to a vehicle or share a vehicle with another person, suggesting these respondents need access to reliable and frequent transit service.
- 32% of survey respondents said a lack of transit limits their travel frequency, suggesting that people aren't attempting to use transit at all because it doesn't serve their needs, but that improved transit service might encourage some increased transit interest.
- The biggest barriers survey respondents reported to taking transit are "it takes too long" (43%), "it doesn't arrive often enough" (32%), and "it doesn't take me where I need to go" (29%). People feel that the travel times and the limited destinations are impediments to transit use.
- When asked about what survey respondents would want to see in new transit service, "travel time" (57%) and "stop locations near my home or my destinations" (50%) were the most common responses.
- Combined, over 70% of respondents said they would use the transit at least some of the time, with about 35% of people saying they would use it at least once a week. This suggests unmet demand for transit service if it were frequent, affordable, and with short enough travel times.
- Over 90% of respondents say that they would need wait times to be under 15 minutes to make transit appealing to use. This suggests that waiting times are very important to riders and that current FCRTA waiting times, which are much longer, may be unappealing.
- Over half (57%) of survey respondents said that would walk to bike to a transit stop, suggesting proximity is important to potential riders.

Chinatown neighborhood of Fresno, CA

Figure 48: Discussing Golden State Corridor transit ideas with people at Central Fish, in Fresno's Chinatown neighborhood.

- Wednesday, June 14, 2023, from 11:30am-1:30pm.
- Information table set up inside Central Fish Market, staffed by Walker employees.
- Approximately 30 paper surveys completed, and approximately six people photographed the survey QR code for the online survey.
- The restaurant was busy and Walker staff had fruitful conversations with over a dozen people.
    - Most people Walker spoke with were not transit users. Those who used services used Fresno Area Express (FAX); nobody claimed to have used FCRTA services, and many people had not heard of FCRTA.

Fowler, CA

- Wednesday, June 14, 2023, from approximately 2:00-3:30pm.
- Estimated eight flyers handed out and four surveys completed.
- Walker staff walked through downtown and by the FCRTA bus stop, handing out project flyers and surveys in several businesses and on one FCRTA bus that had three passengers aboard. Walker staff spoke with employees at The Cut Barbershop, Fowler Food Center, Fowler Floral & Gift, United Health Centers, Ace Hardware, Lee's Market, Fowler Branch Library, and the USPS. Several of the businesses agreed to post the project flyer with survey links in their front window or staff break room. Several people took the paper survey while we spoke with them. In addition to the three people on the FCRTA bus, Walker staff spoke with one other person who stated they occasionally take the bus to Fresno.
- Walker staff spoke with a front desk staff person at City Hall, who said they would help post the survey flyer on the City message board.

Figure 49: The team interviewing bus riders at the Fowler stop.

Figure 50: The project flyer posted at a store in Fo

Selma, CA

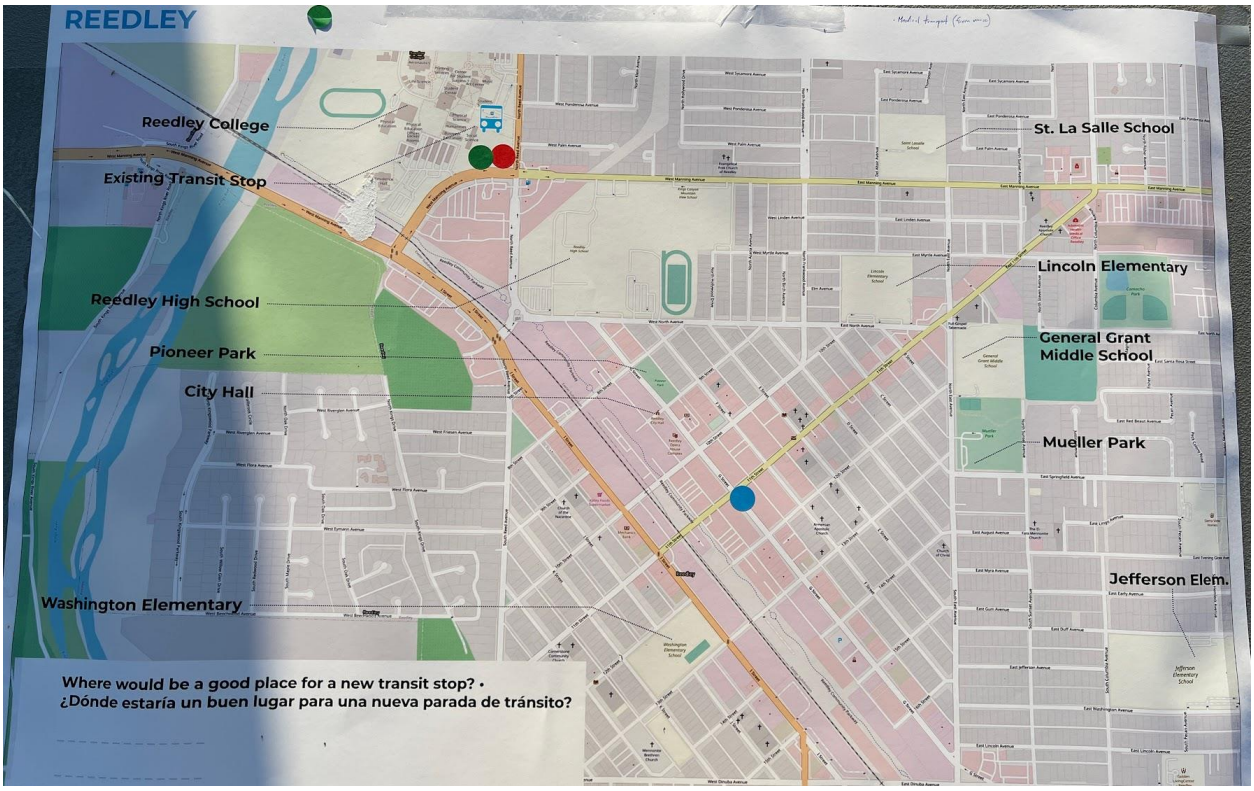
- Wednesday, June 14, 2023, from approximately 3:45-5:15pm
- Walker staff walked through downtown and handed out flyers and paper surveys at several businesses, including the Selma Arts Center, High Street Boutique, and Foster's Freeze. Staff at the latter two took the online survey while we spoke with them.

Reedley, CA

- Thursday, June 15, 2023, from 5:00-7:00pm
- Walker staff set up an information table at the Reedley College farmer's market. Figure 50 shows the setup.
- Approximately 12 people took the survey either in paper or online form at the Reedley event.
- Several people voted on the map to identify where they think a future FCRTA SR 99 Corridor bus stop should be located. See Figure 51 for results. Two votes were for the Reedley College campus, near where transit currently stops. One vote was for downtown Reedley.

Figure 50: Outreach table setup at the Reedley College Farmers Market. Exhibits include an area map, project information board with links to the online surveys, paper surveys, and project factsheets that people could take with them.

Figure 51: Reedley results for voting on good places for a new or improved transit stop.



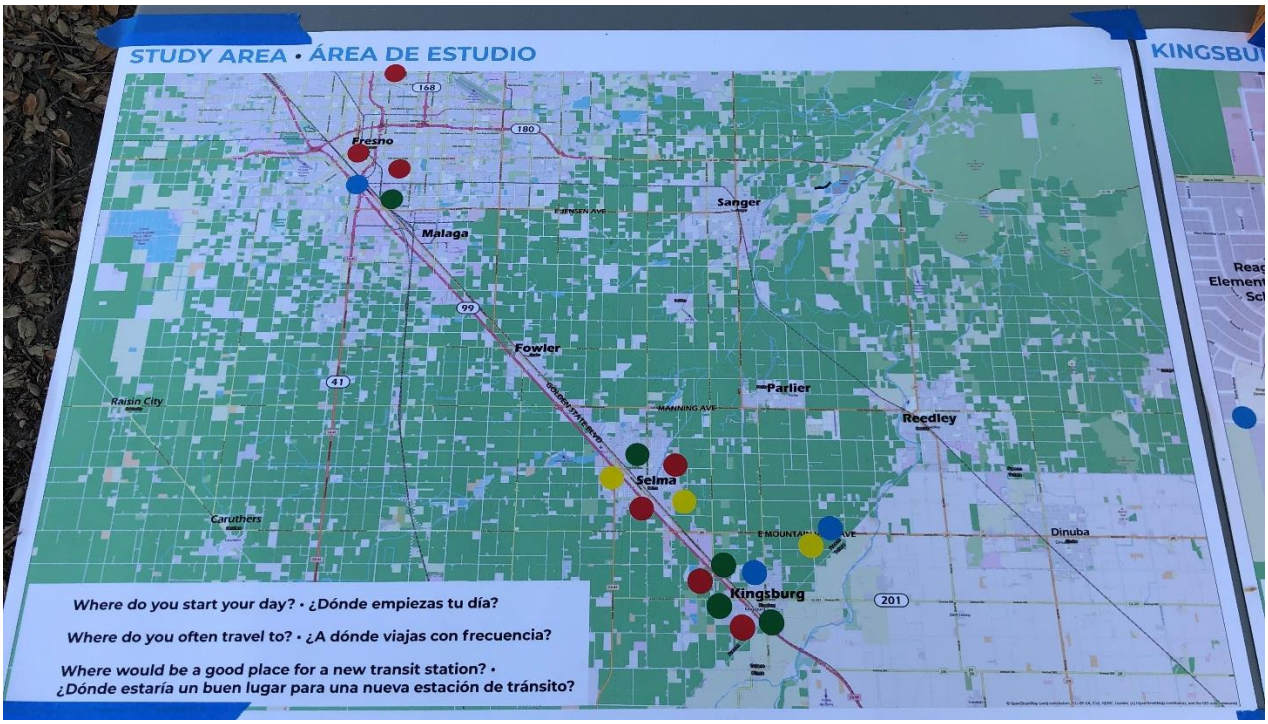
Kingsburg, CA

- Thursday, June 15, 2023, from 5:00-7:00pm
- Walker set up an information table at the Kingsburg farmer's market.
- Approximately 15 people took the survey either in paper or online form at the Kingsburg event.

Figure 52:: The team discussing transit needs with community members at the Kingsburg Farmers Market.

Figure 53: People at the Kingsburg Farmers Market put dots where they would prefer a new transit station.

Figure 54: People at the Kingsburg Farmers Market put dots along a Golden State Corridor map to show where they live and where they often travel to.



Community Survey

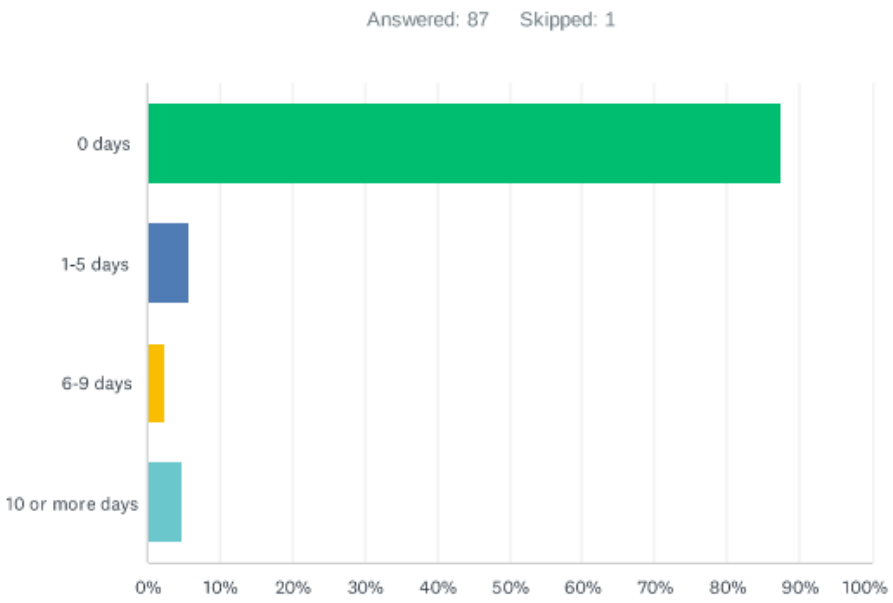
The project team distributed a survey about transportation habits and potential use of improved transit service on SR 99. The survey ran online and on paper copies from June 5 to August 31, 2023.

- 88 people completed the survey. 42 people completed the survey online (44 in English and 2 in Spanish) and 46 people completed the survey on paper (all in English). The project team entered the paper survey results into SurveyMonkey online to consolidate responses into a single platform.
- Interesting responses are summarized below.
- The summary results are provided in the PDF inserted at the end of this document.

Questions 1, 2, 5, and 6 ask people, respectively, where they live, work, go for medical services, and run errands. Fresno and Selma, as the largest cities, are listed the most. Kingsburg is also a common residence, place of work, and place for medical and commerce.

Question: In the past 14 days how many times have you ridden public transportation?

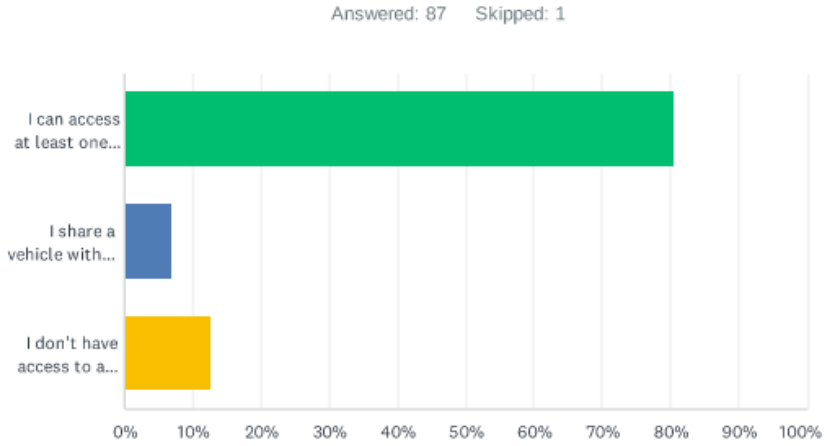
- The large majority, 87%, have not ridden public transportation in the past two weeks, suggesting low familiarity with the transit options. Some of those who have ridden public transportation *may* have used Fresno Area Express, the Fresno intercity bus (not FRCTA service)



ANSWER CHOICES	RESPONSES	
0 days	87.36%	76
1-5 days	5.75%	5
6-9 days	2.30%	2
10 or more days	4.60%	4
TOTAL		87

Question: Which of the following best describes your current access to a motorized vehicle?

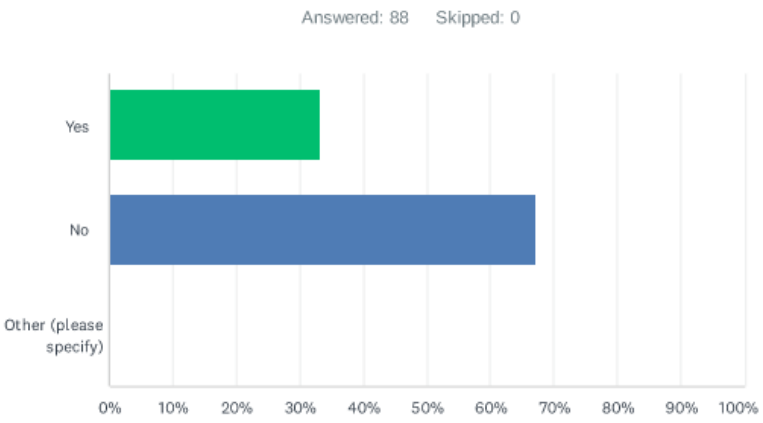
- While the large majority, 80%, have consistent access to at least one vehicle, 20% share a vehicle or do not have access to a vehicle.



ANSWER CHOICES	RESPONSES	
I can access at least one vehicle at any time	80.46%	70
I share a vehicle with other people	6.90%	6
I don't have access to a vehicle	12.64%	11
TOTAL		87

Question: Does a lack of transit keep you from traveling more often?

- 32% of respondents said a lack of transit limits their travel frequency, suggesting that people aren't attempting to use transit at all because it doesn't serve their needs, but that improved transit service might encourage some increased transit interest.

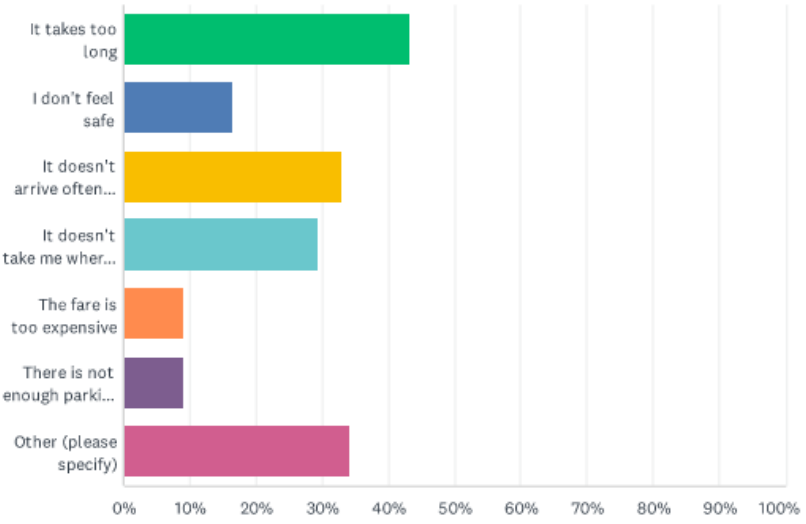


ANSWER CHOICES	RESPONSES	
Yes	32.95%	29
No	67.05%	59
Other (please specify)	0.00%	0
TOTAL		88

Question: Do you experience any barriers that keep you from riding transit, or riding transit more often? (select all that apply).

- The biggest barriers are “it takes too long” (43%), “it doesn’t arrive often enough” (32%), and “it doesn’t take me where I need to go” (29%). People feel that the travel times and the limited destinations are impediment to transit use.

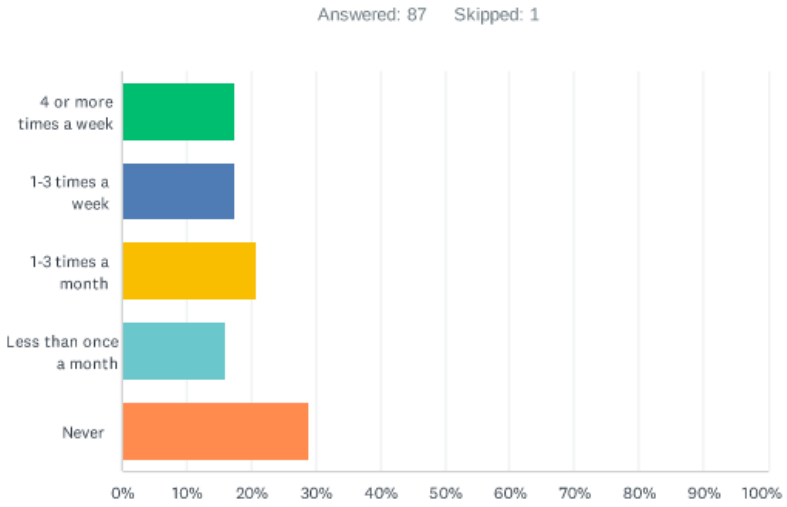
Answered: 79 Skipped: 9



ANSWER CHOICES	RESPONSES	
It takes too long	43.04%	34
I don't feel safe	16.46%	13
It doesn't arrive often enough	32.91%	26
It doesn't take me where I need to go	29.11%	23
The fare is too expensive	8.86%	7
There is not enough parking near the stations	8.86%	7
Other (please specify)	34.18%	27
Total Respondents: 79		

Question: If there were new transit on the Golden State Corridor that ran frequently and all day long, how often do you think you would use it?

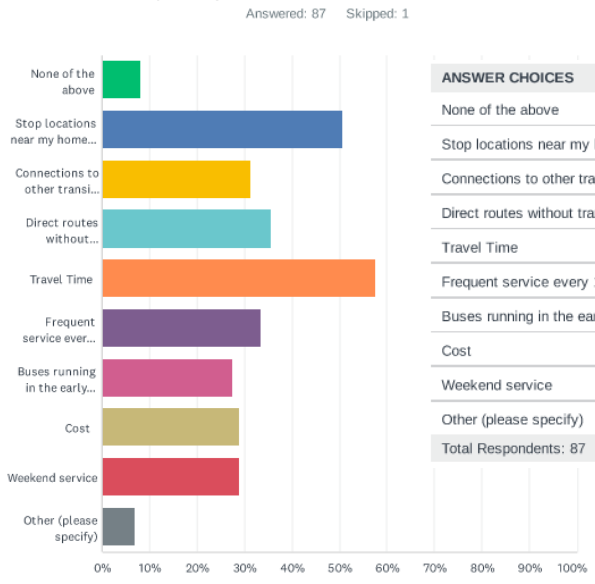
- Combined over 70% of respondents said they would use the transit at least some of the time, with about 35% of people saying they would use it at least one a week.
- This suggests unmet demand for transit service if it were frequent, affordable, and with short enough travel times.



ANSWER CHOICES	RESPONSES	
4 or more times a week	17.24%	15
1-3 times a week	17.24%	15
1-3 times a month	20.69%	18
Less than once a month	16.09%	14
Never	28.74%	25
TOTAL		87

Question: What matters most to you about transit (select up to three options?)

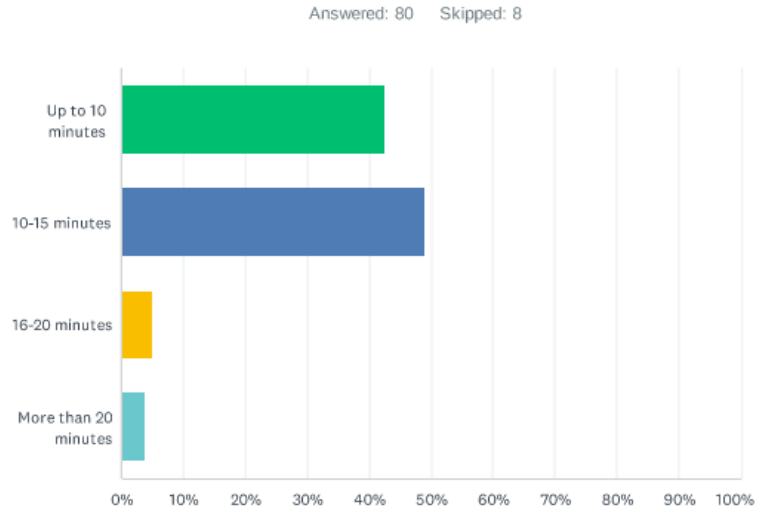
- "Travel time" (57%) and "Stop locations near my home or my destinations" (50%) were the most common responses.
- Connections to another transit service, direct routes without transfers, frequency of 15 minutes or less, early morning and late evening service, cost, and weekend service were also selected by any respondents.



ANSWER CHOICES	RESPONSES	
None of the above	8.05%	7
Stop locations near my home or my destinations	50.57%	44
Connections to other transit services	31.03%	27
Direct routes without transfers	35.63%	31
Travel Time	57.47%	50
Frequent service every 15 minutes or less	33.33%	29
Buses running in the early morning and late evening	27.59%	24
Cost	28.74%	25
Weekend service	28.74%	25
Other (please specify)	6.90%	6
Total Respondents: 87		

Question: How long would you be willing to wait for transit?

- Over 90% of respondents say that they would need wait times to be under 15 minutes to make transit appealing to use. This suggests that waiting times are very important and that current FCRTA waiting times, which are much longer, are unappealing.

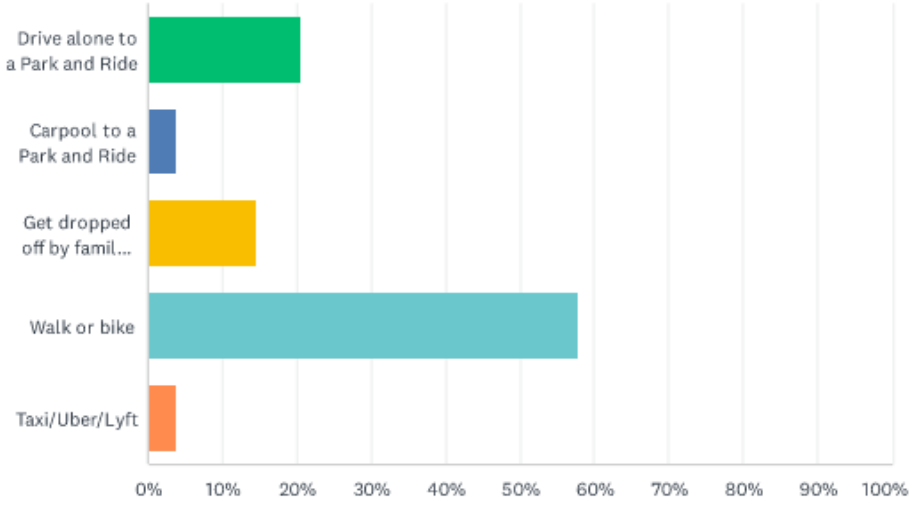


ANSWER CHOICES	RESPONSES	
Up to 10 minutes	42.50%	34
10-15 minutes	48.75%	39
16-20 minutes	5.00%	4
More than 20 minutes	3.75%	3
TOTAL		80

Question: If you rode transit, how would you get to the stop?

- 57% of respondents said “walk or bike,”14% said “get dropped off by family or friends,” and 20% said “Drive alone to a Park and Ride”
- This suggests most people anticipate using transit only if it is within walking or biking distance, and that families and friends may be able to support mixed travel by different people by having some people use a car and other people get dropped off at the transit stop.

Answered: 83 Skipped: 5



ANSWER CHOICES	RESPONSES	
Drive alone to a Park and Ride	20.48%	17
Carpool to a Park and Ride	3.61%	3
Get dropped off by family or friends	14.46%	12
Walk or bike	57.83%	48
Taxi/Uber/Lyft	3.61%	3
TOTAL		83

06 | Service Alternatives Development & Evaluation

06 Alternatives Development and Evaluation

Fixed-Guideway Transit Options

Walker evaluated the suitability for bus rapid transit (BRT), light rail transit (LRT), and hybrid rail transit to serve the Golden State Corridor. This section reviews the following:

- How the potential service options align with project goals
- Demographic and growth data to support required densities and feasibility
- Local land use and zoning to support required densities and feasibility
- Cost and financial feasibility
- Operational feasibility
- Construction feasibility
- Ridership models

Bus Rapid Transit (common abbreviation BRT, NTD reporting abbreviation is RB)

The Institute for Transportation and Development Policy (ITDP) describes BRT as "a high-capacity bus-based transit system that delivers fast, reliable, high quality, safe, and cost-effective services at a relatively low cost. BRT can help cities deliver on inclusive access for its residents, helping to reduce their time spent on travel, while helping the governments meet climate, equity, and economic growth goals."

ITDP also developed a BRT standard the organization uses to assess BRT systems using infrastructure, operations, and maintenance criteria**. At a minimum, a BRT corridor must include dedicated right-of-way and a busway, off-board fare collection at stations, bus priority at intersections, and level platform boarding at stations.** Other factors in BRT evaluation include branding, wayfinding, and signage; frequency of service; station spacing, and other core features of rapid transit systems. NTD defines BRT as a fixed-route bus system that operates at least 50% of its service on fixed-guideways with defined passenger stations, traffic signal priority or preemption, short headway bidirectional services for a substantial part of both weekdays and weekend days; low-floor vehicles or level-platform boarding, and separate branding of the service. The Orange Line in Los Angeles and San Francisco's Van Ness Bus Rapid Transit are examples of BRT.

Transit agencies in North America have developed a lower tier of BRT often referred to as arterial rapid transit (ART). ART routes have most of the NTD-defined BRT features except that they operate predominately in mixed-traffic. Fresno's FAX Q, along with MetroRapid in Los Angeles, are examples of ART.

Figure 55: Raleigh BRT Rendering

Image Source: GoRaleigh

Light Rail Transit (common abbreviation LRT, NTD reporting abbreviation is LR)

Light-rail transit (LRT) is rapid transit that operates electric-powered single cars or short trains on fixed rails. LRT typically operates shorter trains and often has at least some mixing with street traffic that cannot exist on subway or metro rail systems. LRT is powered through an overhead line (catenary) that is supplied continuously along the route to the vehicle through a pantograph (subway and metro systems are most commonly powered through a third rail along the tracks). LRT most commonly operates with sets of two or three cars but can operate longer trains (subway and metro lines operate with at least four cars but most commonly with six to eight or more cars). Modern light rail systems typically operate with low floor vehicles that allow level boarding in or along urban streets at a level slightly higher than a street curb (floor height varies, but 12" to 14" above top of rail is typical in North America).

Figure 56: Minneapolis Light Rail

Image Courtesy of MinnPost

Hybrid Rail Transit (no common abbreviation, NTD reporting abbreviation is YR)

Hybrid rail is a rail service that, like commuter rail, operates on rail lines that typically serve freight and are connected to or part of the national railroad system. Hybrid rail is distinct from commuter rail in that it commonly operates a two-way, all-day service that is more frequent than most commuter rail routes using vehicles that are similar in size and capacity to light rail. Hybrid rail vehicles are most commonly diesel multiple unit (DMU) trains, while commuter rail typically consists of locomotive-hauled passenger cars, though electric multiple unit (EMU) systems are common in the Northeast Corridor and Denver.

Figure 57: Chicago Metra Operates on Freight Rail Tracks

Image Courtesy of Railway-News

Project Goals and Assessment Criteria

To assess the feasibility of various transit options, the team developed a menu of criteria to assess which service would most support the project's goals, which include the following

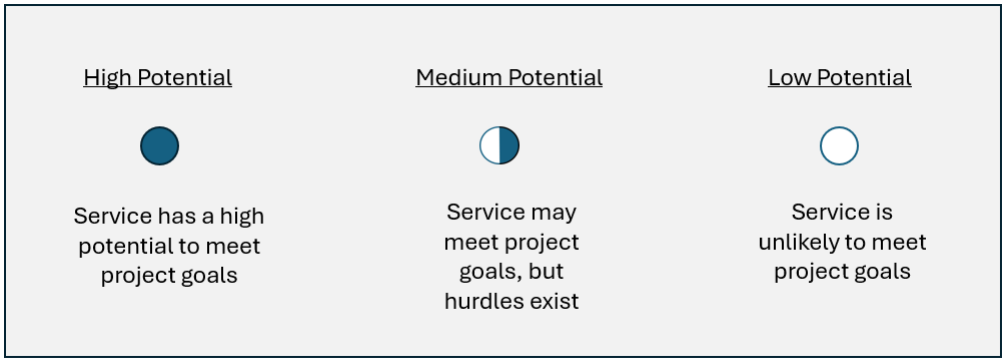
1. Increase efficiency and transit use to benefit the community
- Improves transit service with by enhancing existing transit and/or providing higher frequency
- Increases access to more than 10 activity centers such as health care facilities, schools, and grocery stores
- Ridership forecasts support the initial investment in the service

2. Increase equity, environmental sustainability, and economic opportunity
- Zoning enables transit-oriented development and economic development opportunities to support the investment
- Provides new or expanded services in disadvantaged communities

3. An implementable, community supported project
- At least 50% of survey respondents express support for new service on the corridor
- Can be implemented in the near term with long-term expansion opportunities
- Has an achievable level of capital and operations costs with opportunity to meet farebox recovery requirements
- Right of way is wide enough to permit construction and FCRTA is ready to operate

Figure 58 describes how each of the alternatives meets the goals of the study. The ranking scale uses a high, medium, and low potential to meet the project goals. The project team reviewed data related to demographics, growth, land use, and cost to assess the feasibility of various transit options on the corridor. This section describes the analysis that determined the potential of each service to meet project goals as shown in Figure 60.

Figure 58:Potential for Each Service Option to Meet Project Goals



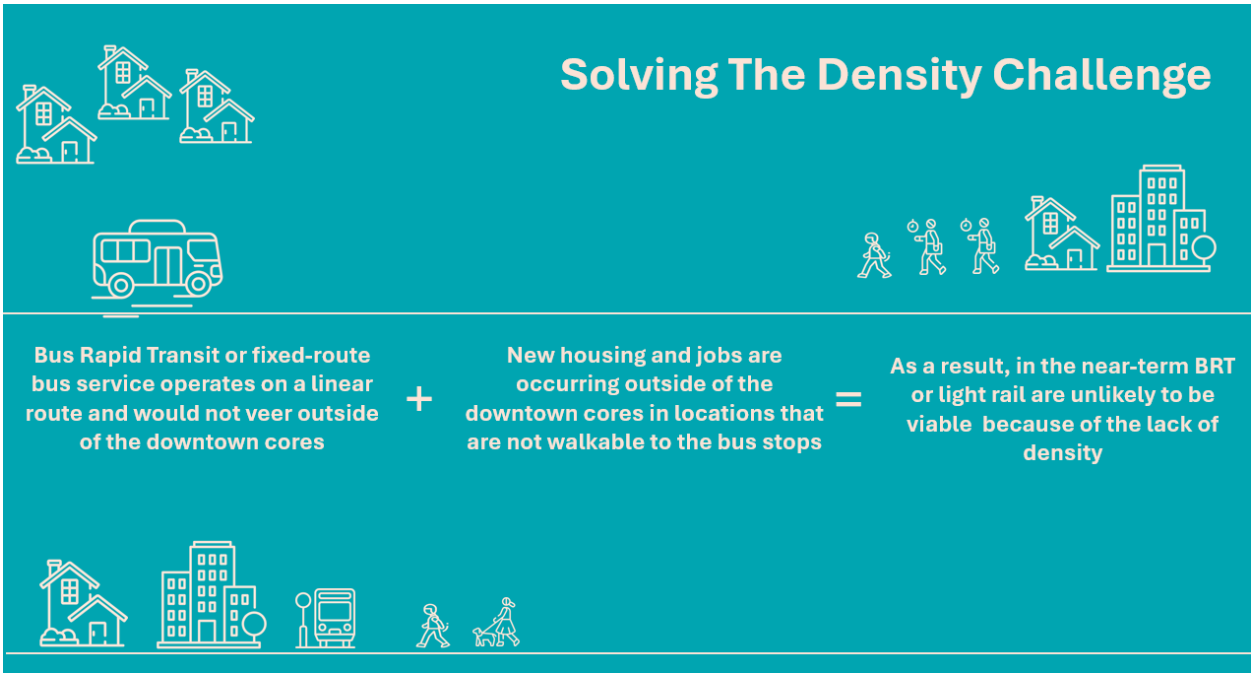
Service	Light Rail	Bus Rapid Transit	Hybrid Rail
Improves Transit Service			
› New higher frequency	●	●	●
› Enhances Existing Service	○	◑	○
Increase Access			
› Access to more than 10 activity centers	●	●	●
Implementation			
› Can be implemented in the near-term with longer-term expansion opportunities	○	○	○
Community Support			
› Support from over 50% of community	●	●	●
Cost Effectiveness			
› Project has an achievable level of cap & operations costs/opportunity for farebox recovery	○	○	○
Ridership Potential			
› Ridership forecasts support the initial investment in service	○	○	○
Construction & Operations Feasibility			
› Right of way permits construction and FCRTA is ready to operate	○	○	○
Economic Development			
› Zoning enables TOD and economic development opportunities to support the investment	○	◑	○

Demographics and Growth

Although the corridor is growing in some locations (e.g., new housing and jobs), Census demographic data for 2010 and 2020, and estimates through 2023 show a slight population increase), the regional travel demand model developed and maintained by Fresno Council of Governments (FCOG) shows limited future growth. This is likely because most of the population and job growth in the corridor is expected to occur outside of the downtown cores. Within the travel demand model, only Kingsburg shows any significant change in growth, with an 18% increase in population and a 10% increase in employment. This ratio of population to employment growth suggests an increased trend toward out-of-city commuting to jobs. Growth in Selma is flat, with a 1% decline in population and no change in employment. Similarly, growth in Fowler shows no change in population and a 1% growth in employment. These rates of growth reflect existing city boundaries and the city fringes, which are more difficult to serve with transit.

This growth pattern makes it challenging to operate a viable transit option on the corridor, as illustrated in Figure 59 .

Figure 59: The relationship between growth on the corridor and operating viable transit



Land Use and Zoning

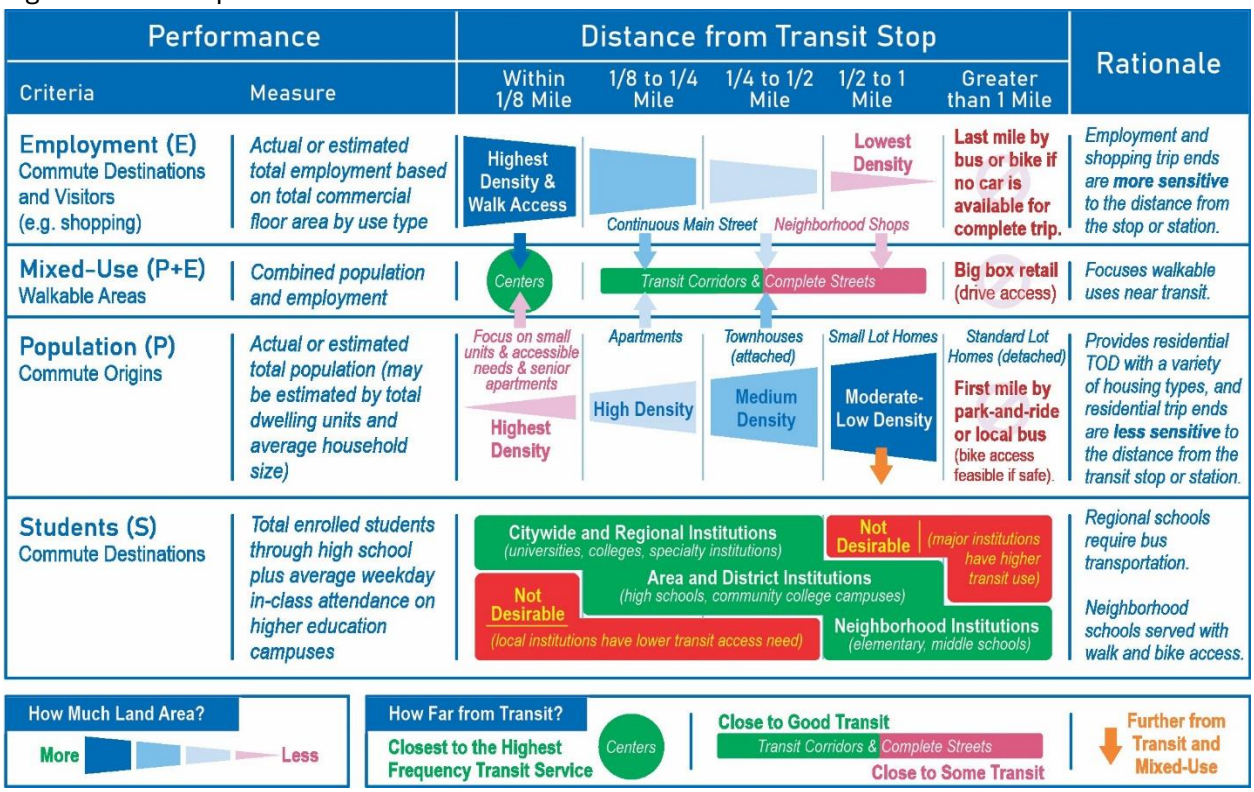
Walker also assessed land use and zoning in the corridor. The evaluation revealed that the current actual density is significantly lower than the maximum allowable density in the zoning codes. However, even the maximum allowable density permitted by the zoning code is lower than the level of density needed to support a viable frequent bus service and a fixed-guideway corridor.

Toward the end of the study, and after Walker's land use evaluation, Kingsburg, Selma, and Fowler all updated their General Plans and zoning codes. This section retains the original evaluation, and a summary evaluation of the adopted land use changes in the three cities is provided at the end of this section.

Walker assessed transit feasibility according to a framework of proximity (distance) to a transit stop. Figure 60 illustrates a concept where higher densities of employment, education, and visitor and shopping destinations are close to transit to illustrate how each affects transit ridership. In this model, smaller residential areas are located immediately near transit stations and are built at a much higher density than single-family and small-scale homes. As density declines, there is a circular effect:

- Declining densities of the main hub reduce the viability of higher capacity trunk lines to outlying station areas.
- Declining densities of outlying station areas require commuter parking facilities.
- As a result of reduced density and a lower number of people within walking distance of the stations, service is reduced

Figure 60: Conceptual Model for Transit Station Area Land Use



Source: The Planning Studio LLC

Figure 61 expands on the concept illustrated in Figure 60 by identifying the minimum level of density by transit service type. Highly productive rail transit service depends on a high-density main hub (a major downtown) with high-density residential and mixed-use areas along outlying station areas.

Figure 61: How Much Density Should Be Near Transit in a High Ridership System

Criteria	Measure	Main Hub of a High-Capacity Transit Line *(Multiple stops)*	Within 1/8 mile of a Station	Secondary Hub on a High-Capacity Transit Line *(Multiple stops)*	1/8 to 1/4 mile of a Station	1/4 to 1/2 mile of a Station	1/2 to 1 mile of a Station	Greater than 1 mile from a Station	
Station Area Transit Density	Density of Combined **Population + Employment + Student** (P+E+S) per Acre	160 *P+E+S / Acre* *Typical Density for a large downtown*	80 *P+E+S per Acre* *Typical Density for a mid-sized downtown or a large suburb employment center*	60 *P+E+S per Acre* *Typical Density for a smaller downtown or a suburban employment center*	40 *P+E+S per Acre* *Typical density for an "inner suburb," typically a streetcar suburb*	20 *P+E+S per Acre* *Typical density for an "inner suburb," typically a historic interurban corridor*	15 *P+E+S per Acre* *Modern mixed multi-family and single-family neighborhoods with schools and shopping centers*	10 *P+E+S per Acre* *Modern single-family areas with neighborhood schools and shopping centers*	5 *P+E+S per Acre* *Large lot suburban neighborhoods*
Transit Density Thresholds for Maximizing Transit	Defined by the density and extent of mixed uses within walking distance of high-capacity transit	MAJOR CENTER *Subway/Metro* *Commuter Rail/Bus* *Light Rail Transit* *Bus Rapid Transit* *Streetcar* *Frequent Bus* *Services that run every 5 minutes or less is common*	CENTER *Commuter Bus* *Light Rail Transit* *Bus Rapid Transit* *Streetcar* *Frequent Bus* *Services that run every 5-15 minutes is common*	HIGH DENSITY MIXED-USE AREA *As a standalone downtown: bus rapid transit or frequent bus (typically every 10-15 minutes on key routes)* *As a secondary center: may have any higher capacity mode connecting to a Major Center or Center*	MEDIUM DENSITY-MIXED USE AREA *Typically, a light rail, streetcar, or frequent bus corridor, but may have higher capacity modes connecting to a Major Center or Center*	LOW DENSITY MIXED-USE AREA *Typically, a bus rapid transit or frequent bus corridor (service 15-20 minutes all day), but may have higher capacity modes connecting to a Major Center or Center*	SUBURBAN HIGH DENSITY *Basic or frequent bus service in peak periods (every 15-30 minutes) with a basic level of midday service (30 minutes)*	SUBURBAN MEDIUM DENSITY *Basic local bus service in peak periods (15-30 minutes) with infrequent midday and late evening service; fixed-route service may be a candidate for microtransit as a replacement*	SUBURBAN LOW DENSITY *Typically, a commuter community with park-and-ride access to commuter bus or rail; area may be better suited for microtransit to provide basic access*

Focuses commercial destinations closest to stations, while allowing for higher density residential uses to taper from highest density near stations to lower density uses farther away from the station (the "transect" concept).

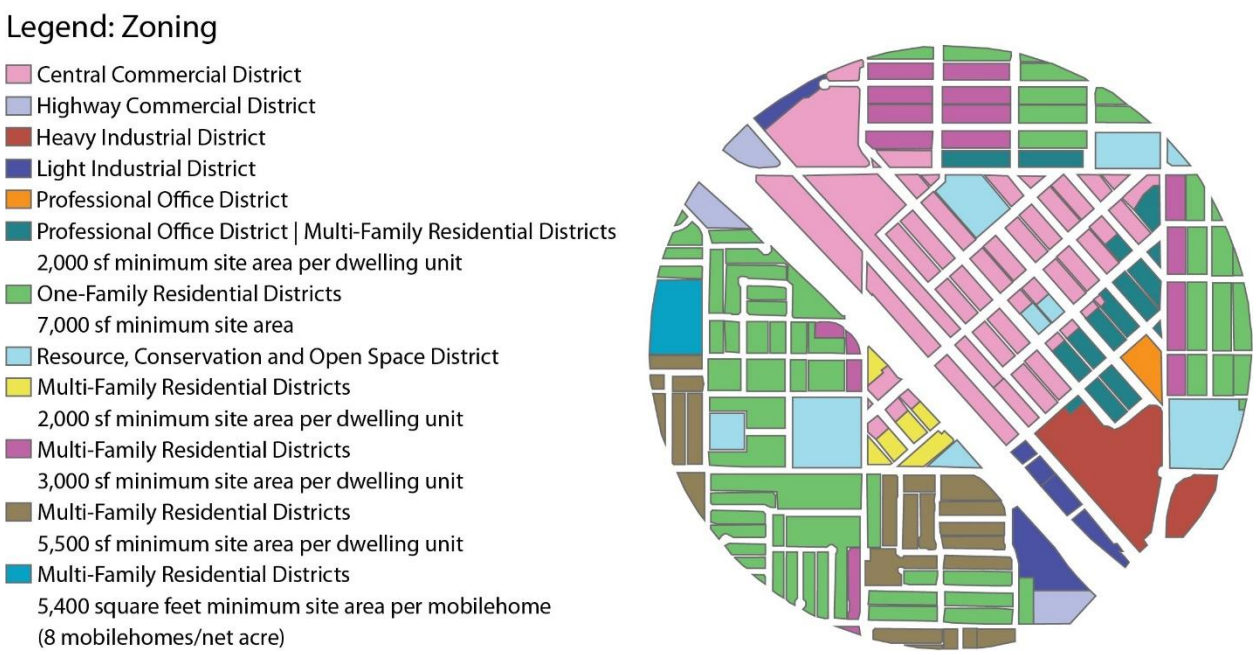
Source: The Planning Studio LLC

To review land use and density in the cities along the Golden State Corridor, the current and future growth forecasts were compared to the theoretical maximum density permitted under current zoning. Figure 63 shows the existing land use developed and the estimated development capacity. Growth forecasts show modest density increases in Fresno and Kingsburg, no change in Fowler, and a decline in Selma. Several key challenges related to land use and transit viability in the corridor include the following:

- Significant presence of single-family zoning over other types of zoning within one-half mile of potential transit stops. Figure 62 shows an example at a potential Draper Street Station, where within one-half mile many of the parcels are zoned for single family residential.
- Less mixed-use (commercial/residential) zoning.
- Minimum lot size requirements for commercial, multi-family residential, and mixed uses. Since lots in areas close to transit stops are typically smaller than the minimum size requirements for mixed-use and multi-family developments, these walkable and transit-friendly land uses can only be built along city fringes away from transit.
- Parking and minimum parking requirements consume much of the land that would be walkable to the transit stops. Minimum parking requirements are an even greater challenge for commercial downtowns where existing buildings require on-street parking, even those in form-based code areas, since any major expansion of those buildings effectively requires that modern

off-street parking requirements become applicable. Not only do the minimum parking requirements inhibit transit-oriented uses, but they can also reduce the feasibility of redevelopment of non-conforming uses.[2]

Figure 62: Draper Street Station Surrounding Zoning Regulations



[2] Recently, the State of California adopted AB 2097, which eliminates parking minimums near a major transit stop, which is defined as an existing rail or bus rapid transit station or the intersection of two or more major bus routes with a frequency of service intervals of 20 minutes or less during peak commute periods. However, the recommendation is this study does not support this level of service for the near term, so the existing requirements still apply.

Figure 63: Existing and Forecast Density in Transit Station Areas[3]

Transit Station *½ Mile*	2019 Density *Population + Employment + Students*	2035 Density *Population + Employment + Students*	Maximum Potential *Buildout with Existing Zoning*	Minimum Parking *Required for Maximum Buildout*	Zoning and Land Use within ½ Mile of Transit Stop						
					Single-Family Zoning	Multi-Family Zoning	Commercial Zoning	Industrial Zoning	Rights-of-Way	Other	Parking *(Illustrative only)*
Fresno *Downtown and HSR Station*	21,792 total 43.4 / acre 32% of max.	27,498 total 54.7 / acre 40% of max. 26% growth	68,842 total 137.0 / acre	57,084 0.8 parking spaces per user	0%	0%	54%	10%	35%	1% (P)	N/A
Fowler *7th and Merced*	2,943 total 5.9 / acre 18% of max.	2,943 total 5.9 / acre 18% of max. 0.002% growth	16,466 total 32.8 / acre	13,663 total 0.8 parking spaces per user	22%	9%	21%	13%	34%	1%	94 acres (19%)
Fowler *FBC Rezoning*			16,595 total 33.0 / acre	>= 12,959 total							89 acres (18%)
Selma *2nd and Whitson*	7,391 total 14.7 / acre 36% of max.	6,765 total 13.4 / acre 33% of max. 8.5% decline	20,732 total 41.2 / acre	16,654 0.8 parking spaces per user	21%	15%	20%	6%	36%	2%	115 acres (23%)
Selma *FBC Rezoning*			26,800 total 53.3 / acre	21,106 total							145 acres (29%)
Kingsburg *Simpson and Draper*	5,114 total 8.6 / acre 37% of max.	5,752 total 9.6 / acre 42% of max. 12.5% growth	13,711 total 27.3 / acre	11,377 total 0.8 parking spaces per user	19%	15%	19%	7%	35%	5%	78 acres (16%)
Kingsburg *FBC Parking Review*			20,929 total 41.6 / acre (from P)	<= 2,478 R <= 1,991 FBC >= 2,125 C/I							45 acres (9%)

Based on current zoning, where every single-family residence has the allowed ADU 15 50% average household size

"per user" = resident + employee + student

Total area

Zoned land uses are inclusive of parking

Notes: Fresno zoning is centerline to centerline; ROW applied at 35% typical Fresno allows a pay-in-lieu of within parking districts – (P) represents parking-only sites (e.g. not directly associated with land use)

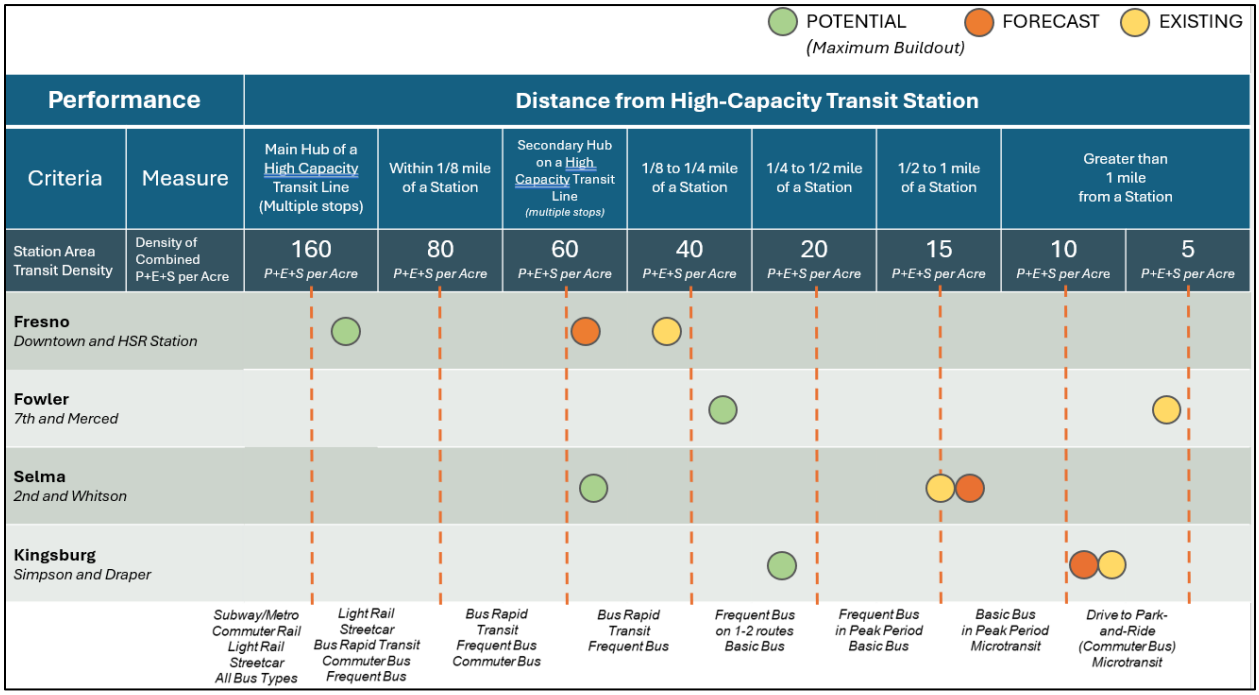
Open Space, Land in Reserve, etc.

Parking is part of zoned land uses and = parking + access at 300sf/space

Finally, Figure 64 illustrates existing and forecasted land use densities within one-half mile of stations along the Golden State Corridor relative to their ability to support various levels of transit service. Within existing and forecasted land uses, population, employment, and density, a rail solution is not feasible. A rail solution is also not feasible within the expected FCRTA budget capacity. A rail solution could become feasible with full buildout of land use at its maximum potential density beyond the time horizon for this project, but cities in the corridor would still need to address the spatial orientation of mixed-use, high density residential, and commercial development that currently focuses those uses away from potential transit corridors

[3] Based on data from the Fresno Council of Governments.

Figure 64: Transit Viability of Existing and Forecast Density in Station Areas[4]



The corridor land use analysis supports Walker's prior evaluation of peer light rail, hybrid rail, and bus rapid transit systems. The high cost to build and operate any type of rail system was well above FCRTA's budget capacity. Although lower in cost, even bus rapid transit would prove a challenge within FCRTA's financial capacity.

Zoning Code Updates

During the course of this study, Fowler and Selma adopted updated zoning codes. Walker reviewed the zoning modifications adopted by the two cities and reviewed the form-based code requirements that had been adopted in Kingsburg in 2015. The summary of these changes and their potential impact on transit-oriented density is discussed below:

Fowler

Fowler adopted a form-based code (FBC) for its downtown area and applied a reduced level of minimum parking required for development. In addition, Fowler expanded its minimum parking exemption area, but the parking exemption and areas remain a relatively small portion of the one-half mile transit catchment area. The FBC zoning changes primarily apply to non-residential development, and the most significant impact is a potential reduction of five (5) acres of parking (from a total of 94 acres to 89 acres) from the prior zoning code to the current revised zoning code within the 502-acre half-mile transit catchment area. Assuming the parking reduction is used for an increase in commercial development under the FBC zoning category, the total population/employment/student (PES) of the transit catchment area in a maximum build-out scenario increases by 129 (16,466 under prior zoning, and 16,595 under the revised zoning). This

[4] Based on data from the Fresno Council of Governments.

modest change would not have a notable impact on potential transit ridership, and the maximum transit density in Fowler is lower than the other cities in the corridor (33.0 PES per acre).

Selma

Selma adopted zoning revisions that primarily allow for an increase in the number of residential units from one single-family dwelling to two, in addition to an accessory dwelling unit. Given the residential dominance in the half-mile transit catchment area in Selma and the other cities in the corridor, this modification could, over time, have a significant impact on transit density. Selma did not, however, revise its minimum parking requirements; however, Selma did adopt a comprehensive approach toward providing bicycle parking in commercial uses. The change in residential zoning maintains the minimum parking required for residential dwelling units, which increases the total parking in the transit catchment area from 115 acres (23%) to 145 acres (29%). Given minimum lot sizes, however, the increased parking would be accommodated on existing lots (e.g. yard area) and would not utilize land that would otherwise be available for development. The changes to Selma's residential zoning has the potential to increase the PES from 20,732 to 26,800 within the transit catchment area, resulting in an increase in density from 41.2 PES/acre to 53.3 PES/acre. While this gives Selma the highest transit density in a maximum build-out redevelopment scenario, the increase in parking may undermine active transportation and transit modes and result in little new transit ridership.

Kingsburg

Although Kingsburg has not revised its zoning code recently, the city did adopt a form-based code with reduced parking requirements and maximum parking limits. In the prior analysis, the Fresno Council of Governments (FCOG) land use component of the travel demand model was applied, but it had not been updated with the revised zoning and updated growth forecast. As part of this review, the Kingsburg zoning code revisions were evaluated for a revised maximum density and parking reductions. The prior total PES for the one-half mile transit catchment area in Kingsburg at maximum buildout allowed for a total PES of 13,711, a transit density of 27.3 PES/acre. The more significant change comes from Kingsburg's parking reduction, which consumed 78 acres (11,377 spaces) in the transit catchment area but could be reduced by approximately 42% to 45 acres, assuming that the maximum parking of the FBC is built and no more than the minimum required parking in other zoning areas is built. Redevelopment of excess parking alone could increase PES to 20,929 for a transit density of 41.6 PES/acre within the Kingsburg transit catchment area.

Summary

Reducing and eliminating minimum required parking, especially in walkable areas near transit stops, and increasing density across all land use types are necessary steps toward creating a viable and cost-effective transit service. Fowler and Kingsburg have taken steps to reduce land area required for commercial parking, while Selma has increased potential residential density. The FBC zones in Fowler and Kingsburg have further potential to incorporate mixed use types, including residential over commercial in the downtown areas. However, the cities maintain a range of regulatory tools that inhibit significant increases in development densities, notably minimum lot sizes, maximum building coverage on lots, and setbacks for many, even if not all land use types.

Fixed-Guideway Transit Options

Next the project team evaluated the suitability for bus rapid transit (BRT), light rail transit (LRT), and hybrid rail transit to serve the Golden State Corridor based on financial, operational, and infrastructure feasibility. This comparative analysis shows that the study area lacks the population and employment densities of other fixed-route guideway transit systems that received federal funding. Given the high investment costs, this is an important comparison, given the competitive nature of federal funding.

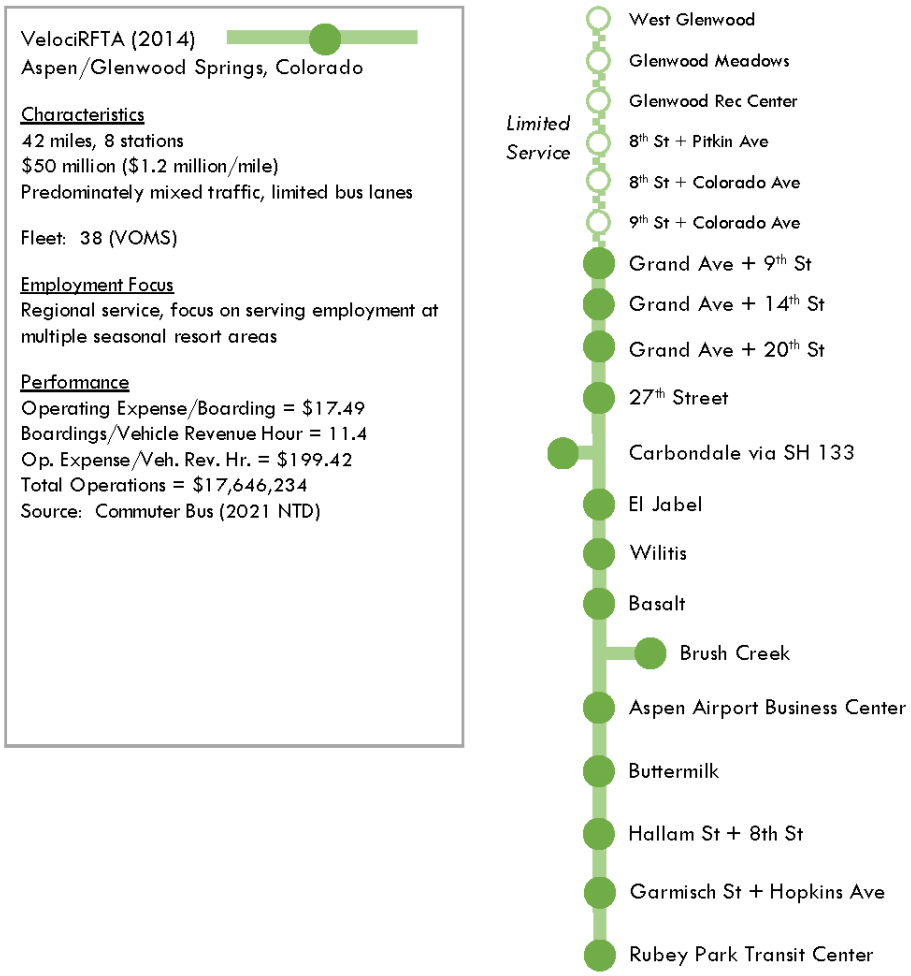
Cost Comparisons

Walker identified and reviewed the following recent BRT, LRT, and hybrid rail transit corridors for to develop a cost comparison, an important metric given the limited availability of state and federal funding:

- The one comparable rural BRT route in the United States, (Glenwood/Aspen, CO in Figure 65).
- Two recent and modest LRT routes were compared (Phoenix, AZ and Norfolk, VA in Figure 66).
- Two hybrid rail routes were compared (one older route in Austin, TX and a newer route in Sonoma-Marin, CA in Figure 67).
- A network of three connected hybrid rail routes planned or operated by three different transit agencies (Dallas/Denton/Fort Worth, TX in Figure 68).

As shown in Figure 65, BRT operating costs per vehicle revenue hour are typically comparable to those of standard fixed-route bus service, while the cost per passenger in a rural context is typically higher than in a denser urban setting at almost $200 per vehicle revenue hour. Not directly reflected in the data is that average BRT operating speeds are higher, resulting in a lower total cost of BRT service than would typically be delivered on a standard fixed-route bus route.

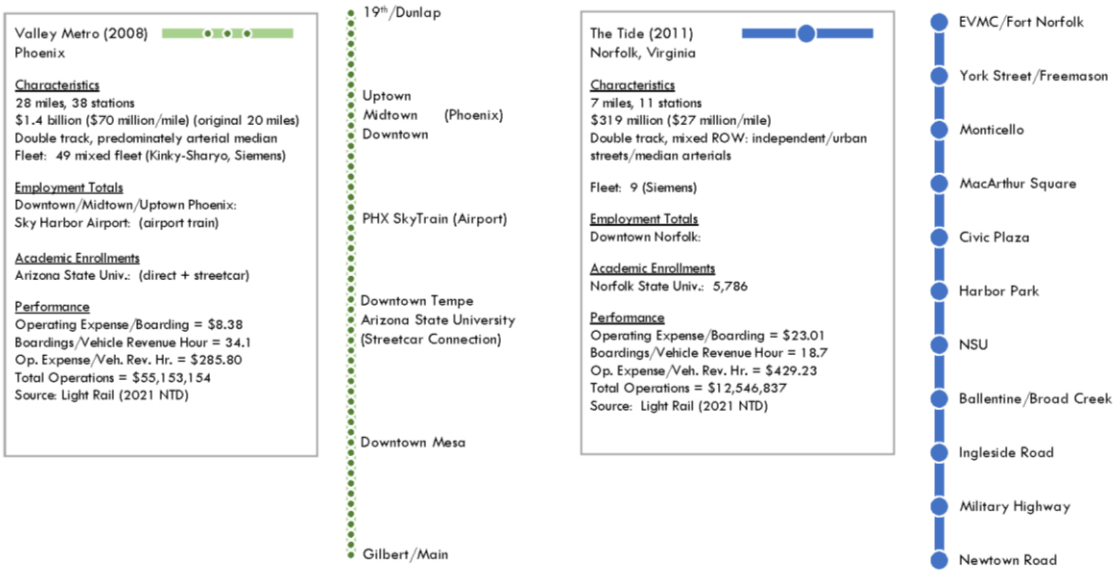
Figure 65: Bus Rapid Transit Comparison



Source: The Planning Studio LLC with Census (2020), National Transit Database (2019)

Figure 66 illustrates that for the agencies the team reviewed, there is a higher cost to operate LRT than BRT, though operating cost per vehicle revenue hour can vary widely among LRT systems. Valley Metro LRT's (Phoenix, AZ) operating cost is $285.80 and The Tide (Norfolk, VA) is $429.23 per vehicle revenue hour.

Figure 66: Light Rail Transit Comparison



Source: The Planning Studio LLC with Census (2020), National Transit Database (2019)

As shown in Figures 67 and 68 hybrid rail operating costs per vehicle revenue hour for the reviewed agencies are typically even higher than LRT and have a much wider cost range. For example, SMART in Sonoma-Marin, CA is at almost $1,870 per vehicle revenue mile and in Denton, TX, $145 per vehicle revenue mile. Operating costs for hybrid and commuter rail are often influenced by ownership and usage rights related to freight rail services, coupled with the very different regulatory requirements under Federal Railroad Administration (FRA) jurisdiction.

Figure 36: Hybrid Rail Transit Comparison

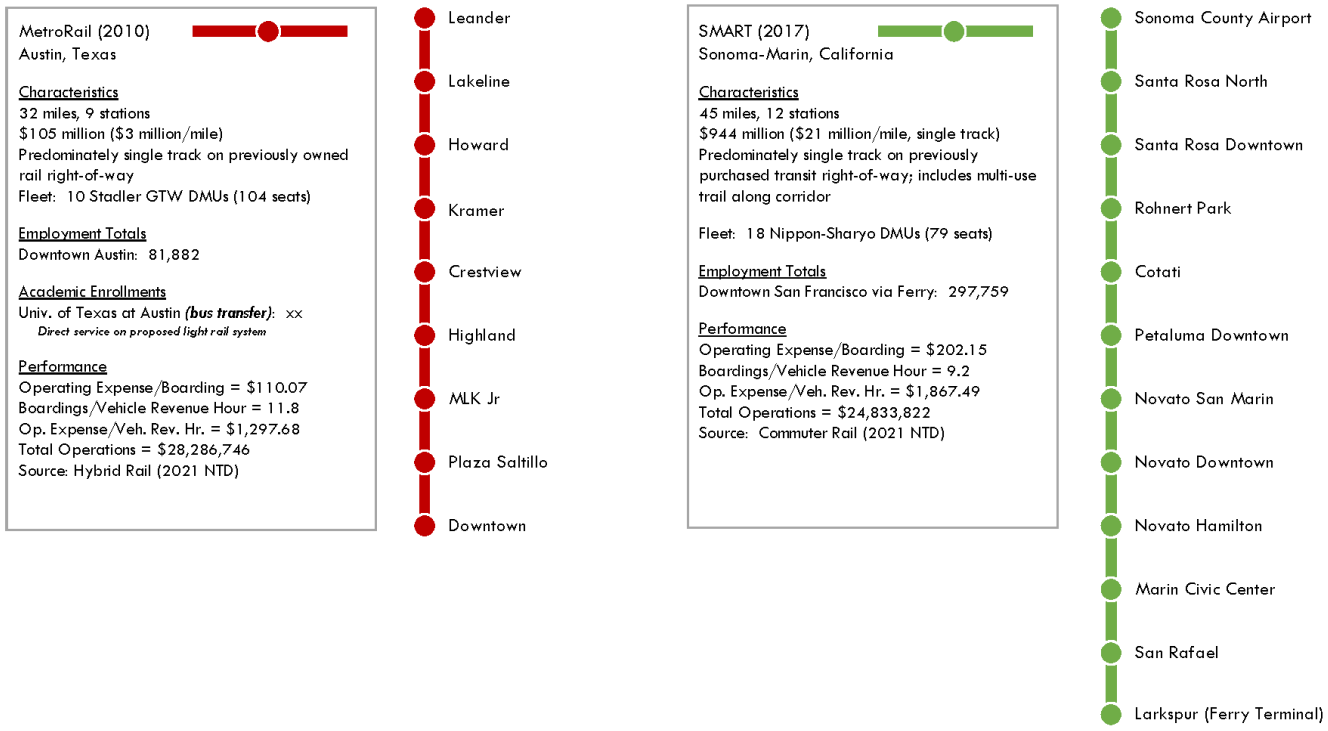
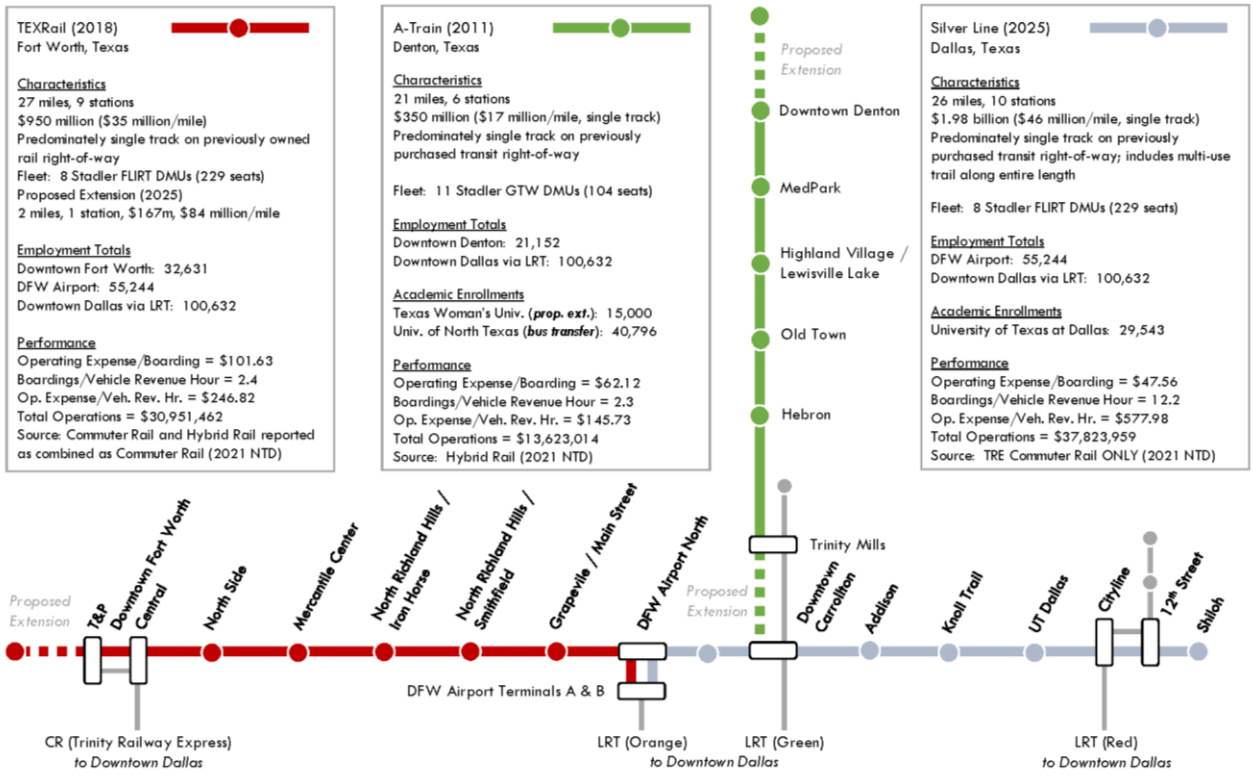


Figure 68: Hybrid Rail Network Comparison

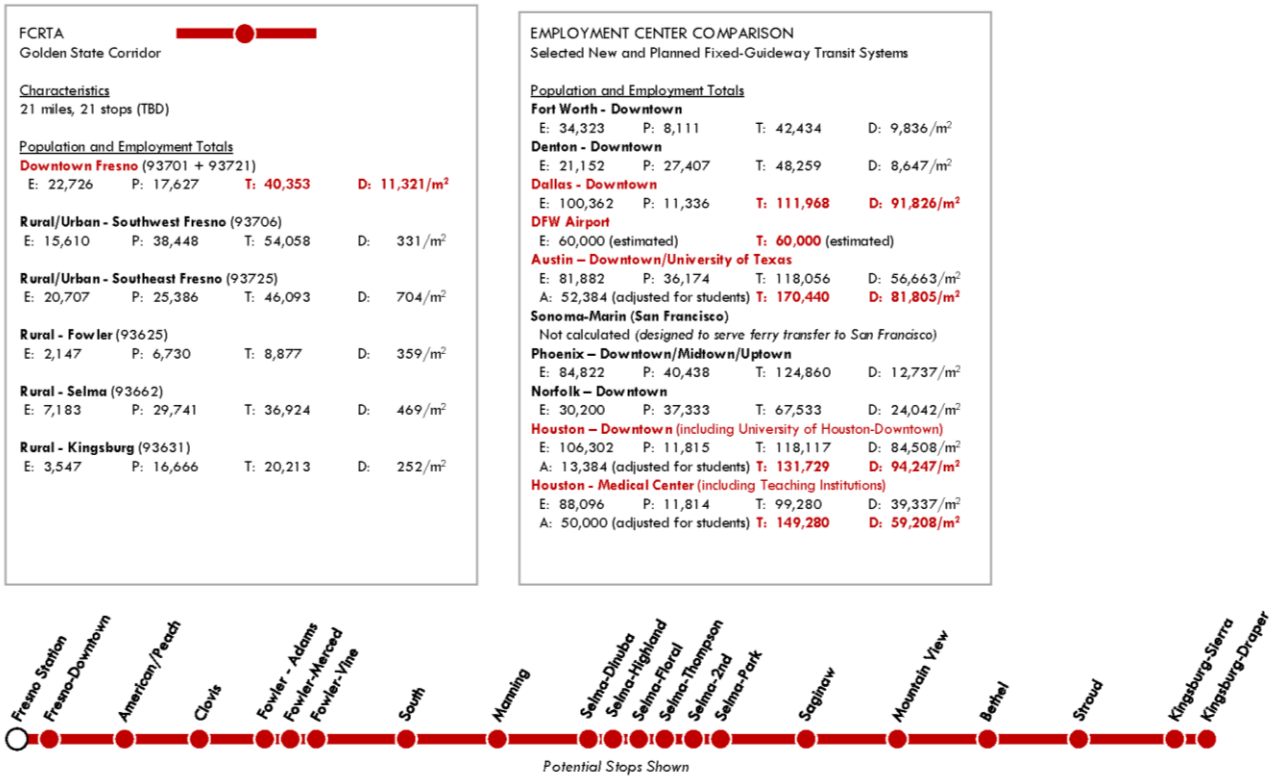


Source: The Planning Studio LLC with Census (2020), National Transit Database (2019)

Figure 69 illustrates estimated development densities, total population, and total employment along the proposed Southeast/Golden State corridor and those in the LRT and hybrid rail cities comparison. Houston is added as a highly productive LRT route that at just under 13 miles, is about half the length of the Southeast/Golden State Corridor and shorter than most peer comparisons (except Norfolk at 7 miles). The estimated development densities along the Southeast/Golden State Corridor are all much lower than the comparison cities.

This comparative analysis shows that the study area lacks the population and employment densities of other fixed-route guideway transit systems that received federal funding. Given the high investment costs, this is an important comparison, given the competitive nature of federal funding.

Figure 69: Development Density Comparison in the Southeast/Golden State Corridor



Source: The Planning Studio LLC with Census (2020), National Transit Database (2019)

Evaluation of Transit Options

Transit options for the Golden State Corridor were evaluated in three screens:

- Modal Options (Screen 1) to consider the feasibility of LRT, HRT, and BRT
- BRT Infrastructure Options (Screen 2)
- BRT Service Options (Screen 3)

SCREEN 1: Evaluation of Modal Options

The Screen 1 evaluation considered Light Rail Transit (LRT), Hybrid Rail Transit (HRT), and Bus Rapid Transit (BRT) as potential options to improve mobility in the Golden State Corridor.

The Screen 1 evaluation looked at three major components:

- Cost and Cost Effectiveness
    - The likely range of costs factored the per-mile capital cost based on comparison projects to identify the low-to-high implementation cost ranges for the proposed 22-mile Golden State Corridor.
    - The comparative projects include full corridor projects that began operations between 2003 and 2023 but excluded any extensions to existing lines. Operating costs include the current cost per vehicle revenue hour and cost per passenger boarding – also in the low-to-high scales – in the evaluation based on 2021 National Transit Database (NTD) data.
- Service Utility and Utilization (likely market and potential ridership)
    - To estimate the feasibility of each mode, transit-level densities and ridership were based on the comparison project review, demographics, and land use (the total density of population, employment, and academic enrollments).
    - Golden State Corridor demographics were identified at the Census Tract level and compared against typical industry benchmarks for transit feasibility. In addition, the scale and density of population, employment, and academic enrollments in the primary destination (downtown and, where applicable, secondary institutional destinations) were identified in each of the peer cities and modal examples to establish the ranges for the transit commute market.
- Technical Feasibility (available right-of-way, design feasibility, and operating environment)
    - Evaluation at a high level to identify whether each of the modal options was feasible for corridor implementation.

The results of this Modal evaluation (Screen 1) are presented in Table 70. As illustrated, the only option to carry forward for further screening is bus rapid transit.

Figure 70: Modal Evaluation Screen 1

COST AND EFFECTIVENESS	FRESNO	LIGHT RAIL			HYBRID RAIL			BUS RAPID TRANSIT		
		LOW	HIGH	POTENTIAL	LOW	HIGH	POTENTIAL	LOW	HIGH	POTENTIAL
Low-High Range of Recent Projects										
Total Capital Cost (22 mile corridor)		$319m	$1.4b	VERY LOW	$105m	$1.98b	LOW	$50m	$178m	MED
Capital Cost per Mile		$27m	$70m	VERY LOW	$3m	$46m	LOW-MED	$1.2m	$38m	MED
Operating Cost per Veh. Rev. Hour		$285.80	$429.23	VERY LOW	$145.73	$1,867.49	LOW-MED	Same as MBDO or MBPT		MED
Operating Cost per Passenger		$8.38	$23.01	VERY LOW	-	-	-	Same as MBDO or MBPT		MED
SERVICE UTILITY AND UTILIZATION		LOW	HIGH	POTENTIAL	LOW	HIGH	POTENTIAL	LOW	HIGH	POTENTIAL
Total Population, Employment, and Academic Enrollments										
Total PEA (ZIP Code)	206,518	Not Compared			Not Compared			System Design and		MED
Total PEA Density (ZIP Code)	500	Not Compared			Not Compared			Context Differs from		MED
Activity Center Scale (PEA in CBD)	40,353	67,533	281,009	VERY LOW	48,259	170,440	LOW	Peer Cost Comparisons		MED-HIGH
Activity Center Density (PEA)	11,321	12,737	94,247	VERY LOW	8,647	81,805	LOW	-		MED-HIGH
Likely Ridership		1,255	5,746	-	585	1,617	LOW-MED	-		TBD
Establish Range										
FEASIBILITY		QUALITATIVE		POTENTIAL	QUALITATIVE		POTENTIAL	QUALITATIVE		POTENTIAL
Engineering and Design		Adequate ROW		HIGH	UPRR Mainline (Transit		VERY LOW	Divided Highway ROW		HIGH
Operational		Typical LRT Context		HIGH	Agency ROW Typical)		VERY LOW	Bus Lanes or Pullouts		HIGH
FEASIBILITY		**ELIMINATE OPTION**			**ELIMINATE OPTION**			**CARRY OPTIONS FORWARD**		

Light Rail: The evaluation of LRT led to **"Very Low Potential"** ratings in terms of Cost (high), Cost Effectiveness (low), and Service Utility and Utilization (land use and demographics). Although LRT is feasible in the corridor, rating as "Very High" in terms of design and right-of-way, an LRT project would lack the population, employment, density, and scale of commute destination typical of other LRT project contexts. Fresno's central business district (CBD) is substantially smaller than the smallest peer city CBD, and the likely outcome would be a high capital cost with very low ridership and very low cost-effectiveness measures.

Hybrid Rail: The evaluation of hybrid rail led to **"Low Potential" or "Low-Medium Potential"** ratings in the "Cost and Cost Effectiveness" and the "Service Utility and Utilization" rantings. The Fresno CBD is closer in size, though still smaller than the smallest of the HRT CBDs served, and the CBD density is higher. However, all of the hybrid rail projects evaluated utilized railroad right-of-way (ROW) owned by the transit agency or another government agency, and all of those railroad corridors had low or negligible freight volumes.

The railroad ROW in the Golden State Corridor is a busy mainline owned and operated by the Union Pacific Railroad. To date, freight railroads have only permitted standard commuter rail to operate on mainline tracks or on new tracks built within the freight rail corridor rights-of-way. Operating commuter rail on the tracks of a Class I railroad involves a significant local investment across a spectrum of cost categories, from securing easements to initial track improvements to ongoing dispatch and maintenance costs. Commuter rail was not directly compared since the implementation (capital) costs of commuter rail are extremely high and can take many years to negotiate with freight railroads. Operating costs of commuter rail are also higher than for LRT or BRT and may also be higher than hybrid rail once the costs for track usage rights are considered. Therefore, HRT was rated "Very Low Potential" in Technical Feasibility.

Bus Rapid Transit: Whereas LRT and hybrid rail are required to operate on tracks in specific corridors, BRT can operate on dedicated bus lanes, on a busway, on managed lanes, such as carpool or high-occupancy vehicle (HOV) and high-occupancy toll (HOT) lanes, or mixed traffic. This allows BRT to be designed, implemented, and operated with a much higher degree of flexibility than is possible for rail modes.

This flexibility also leads BRT to have a wide range of capital costs, ranging from a low that is much lower than LRT to a high that is closer to the midpoint of LRT costs and above the midpoint of hybrid rail costs.

Regional and commuter-oriented BRT and commuter bus services operating within a managed lanes are most successful in longer corridors with lower population densities than LRT. Most BRT and commuter bus systems on managed lanes serve larger CBDs, but one rural BRT example (Aspen, CO) provides a very low capital cost per mile exists among the peers evaluated.

After reviewing the capital and operating costs of rail options, flexibility of BRT, along with demographic characteristics of peer systems, **FCRTA and the project Advisory Committee determined that bus-based service was the most appropriate transit solution to move forward for further analysis in Screens 2 and 3:**

- BRT "Cost and Cost Effectiveness" ratings were generally "Medium Potential," since there is potential for a lower cost BRT but also potential for added design and construction requirements based on specific requirements of the corridor.
- BRT "Service Utility and Utilization" were rated "Medium Potential" or "Medium-High Potential," since the flexibility of bus services operating in a BRT corridor can be adjusted and designed to

The VelociRFTA BRT system in Colorado is the only rural BRT that exists in North America, and it was implemented as a modest, low-cost system that could serve as a model for the Golden State Corridor. However, there are several key differences in the land use and demographic context:

Nearly all origins and destinations are within walking distance of the VelociRFTA route; this contrasts with the more widely dispersed populations in Fresno County, where many towns are some distance away from the corridor.

The VelociRFTA route connects seasonal workers between several areas of lower-cost housing areas and high-cost employment destinations (ski resorts); in contrast, employment destinations in Fresno County are widely distributed throughout the county.

The high concentration of riders at stations along the VelociRFTA corridor means that most riders have direct access to a frequent corridor with only a smaller number needing to transfer to or from other buses; in contrast, riders on the Golden State Corridor would likely transfer from off-corridor routes in the smaller cities to the BRT service, then again to local buses and intercity trains in Fresno to reach their final destinations.

meet more widely dispersed populations through feeder services and BRT route branches operating in mixed traffic.
- BRT "Technical Feasibility" was rated as "High Potential" given the available ROW within the highway corridor to support BRT improvements.

SCREEN 2 - Evaluation of BRT Infrastructure Options

Three general infrastructure options were identified for the BRT Infrastructure Options screen (Screen 2), including:

- Dedicated Busway
- Partial Use Lane (e.g. a Managed Lane or a shared Bus and Right Turn Lane)
- Mixed Traffic BRT with select improvements to improve travel time (such as queue jump lanes and transit signal priority)

SCREEN 3 - Evaluation of BRT Service Options

The study team considered the three infrastructure options (as detailed in Screen 2), and developed two service options for detailed modeling by the Fresno Council of Governments in the 2035 horizon year:

- Model Baseline (Do Nothing) where no BRT improvements were made and existing and committed transportation conditions remained in place with future growth through 2035
- Model Variation 1 a "Standalone Frequent Route" modeled as BRT implemented by 2035

Comparing the Screen 2 evaluation allowed the team to assess the effectiveness of BRT compared to the current service while still considering BRT infrastructure options, such as using a partial lane or mixed traffic to improve ridership.

Assessment of Suitable Transit Options

The project team worked with the Fresno Council of Governments to develop two initial model forecast runs.

Model Run: Baseline

The first model forecast, the "Baseline Transit System" (right), maintains the existing transit system with minor modifications into the future. Presumably, as long as population and employment increase near the existing transit system, then transit ridership will grow, and transit services will become more productive. Alternatively, if population and employment remain static along the existing transit system, then transit ridership growth will remain static (e.g. growth either does not occur, or growth occurs on urban outskirts away from the existing transit system). The results of the Baseline Transit System model run revealed that growth is stagnant in the region; therefore, transit ridership shows only nominal improvement in ridership.

The model takes into account the limited opportunities for growth within the current zoning code. Consistent with the analysis of local zoning for transit-supportive density and mixed uses, transit-oriented growth generally cannot occur in existing downtowns along the Southeast/Golden State Corridor due to zoning code restrictions. Further, future growth is occurring outside of the downtowns where it can be most effectively served by transit.

Model Definition

Baseline Transit System in Forecast Year ("Do Nothing")

WHAT: Baseline model run for 2022 and 2035.

WHERE: No major transit network changes except to add high-speed rail connections when service opens.

WHY: Determine forecast route-level weekday ridership to serve as a baseline against existing actual ridership. The future year "do nothing" scenario tests current system performance against future growth, while transit alternatives will be tested to determine improvements in transit ridership.

Model Run Variation 1: Frequent Route

The second model run was centered on BRT or a BRT-like Frequent Route alternative (right), with service every 15 minutes during peak times. The purpose of this alternative was to understand the unserved demand in the corridor. That is, this variation tested the extent to which service improvements alone would increase transit ridership.

Model Variation 1 tested high quality BRT and was intended to precede further variations if the model revealed an increase in ridership.

Model Definition

Model Variation 1 in Forecast Year ("Frequent Route")

WHAT: Test a Frequent Route option with nominal BRT infrastructure improvements in the corridor.

WHERE: Existing transit network in the future year with existing FCRTA Southeast Route alignment and stops.

HOW: Apply modified FAX Q BRT parameters (e.g. dwell times and travel time reduction by an equivalent reduction factor that applies to BRT, as compared to local routes). Apply 15-minute peak (typical 6am-3pm and 3:30pm-6:30pm) and 30-minute off-peak headways with a service span of 6am-10pm.

WHERE: Existing SE Corridor route is replaced with a BRT route that remains on Golden State Blvd. and serves limited stops at:

- Simpson/Earl in Kingsburg
- Simpson/Draper in Kingsburg
- Simpson/Sierra in Kingsburg
- Golden State/Bethel
- Golden State/Mountain View
- Whitson/Park in Selma (deviates from corridor)
- 2nd/Front in Selma
- Whitson/Branch in Selma (returns to corridor)
- Whitson/Stillman in Selma
- Whitson/Floral in Selma
- Whitson/Highland in Selma
- 7th/Fresno in Fowler (deviates from corridor)
- 7th/Merced in Fowler
- 7th/Mariposa in Fowler
- 7th/Adams in Fowler (returns to corridor)
- Golden State/Chesnut (station access improvement required)
- HSR Station via G Street (exit to/enter from

WHY: Rural BRT service frequency is modified from FAX Q

However, Model Variation 1 showed only nominal differences in ridership from the Baseline Transit System. This suggests that any further transit system modifications in the model would also be unlikely to increase transit ridership.

Model results are shown in Table 3. After presenting the results to FCRTA and the Advisory Committee, the consensus moving forward was to focus on a more modest and phased set of network wide transit service improvements in the Southeast/Golden State Corridor, coupled with longer-term infrastructure improvements.

Figure 71: Current and Forecast Annual Transit Ridership

	Existing Transit Ridership (2019)	Baseline Transit Ridership (2035)	Model Variation 1 Ridership (2035)
Transit Ridership (per day)	14	32	105

Source: Fresno Council of Governments (FCOG)

FCRTA and the Project Advisory Committee concluded that, ultimately, BRT is a local solution for what is a regional congestion issue on State Route 99. Therefore, a longer-term, gradual investment in bus infrastructure on the managed lane improvements planned by Caltrans for the SR-99 corridor could allow FCRTA to enhance its transit network while supporting Caltrans' congestion reduction efforts.

Alternatively, or in addition to the proposed bus improvements on the managed lane system, FCRTA could work with Fresno County to add bus contraflow lanes or shoulder bus lanes along the eastern side of Golden State Highway. The adjacent rail corridor to the east limits local highway access and creates a condition where a southbound contraflow bus lane, a northbound peak shoulder bus lane, and median platform stations could be a viable and relatively low-cost option to build a busway in the corridor. These projects would likely take place incrementally over long period that extends beyond FCOG's existing long-range planning horizon. In the shorter term, FCRTA should focus on building transit ridership through both conventional and creative solutions (discussed in the next section, "A Network Approach to Addressing Mobility").

07 | Service Recommendations

07 Service Recommendation

Based on the analysis, the following detail the service recommendations:

- Near Term:
  - Increase fixed-route frequency on the Southeast route from three to six trips per day.
  - New microtransit service in towns along the corridor to serve local trips, beginning in Fowler and rolling out to Kingsburg, Selma, Malaga, and Calwa. Microtranist trips would connect to the fixed-route Southeast service to provide continuing service to the City of Fresno.
- Long Term:
  - When ridership meets thresholds, implement Bus Rapid Transit on SR99/Golden State Corridor.
  - Potentially align BRT with a managed lane on SR 99.

A Network Approach to Addressing Transit Mobility

A key observation is that FCRTA's transit system only completes a network connection with FAX, The City of Fresno's urban bus system. The FCRTA system does not provide the route design or schedules necessary for the rural transit system to create a network that facilitates movement to and from rural destinations. This is a key consideration, because data shows that residents in the rural areas are traveling to and from destinations within the rural areas, not necessarily from a rural area to the City of Fresno. For example, total trips in Kingsburg by origin and destination are primarily going to locations in and around Kingsburg, as well as nearby Selma, not the City of Fresno. For further data on travel behavior on the corridor, see the Existing Conditions section.

Figure 72: Total Trips by Destination (Block Group) that originate in Kingsburg (36,100 Trips)

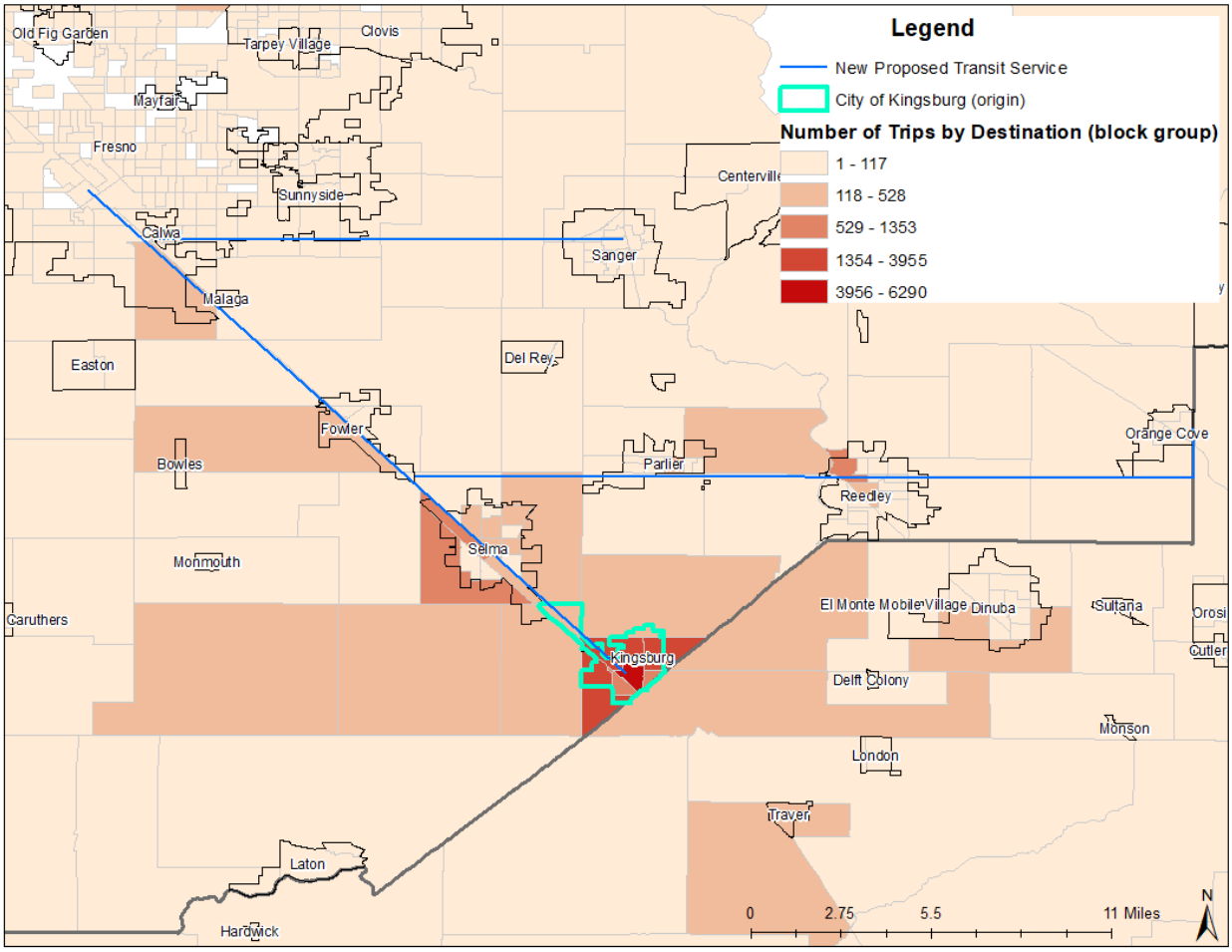


Figure 73: Total Trips by Origin (Block Group) that end in Kingsburg (34,700 Trips)

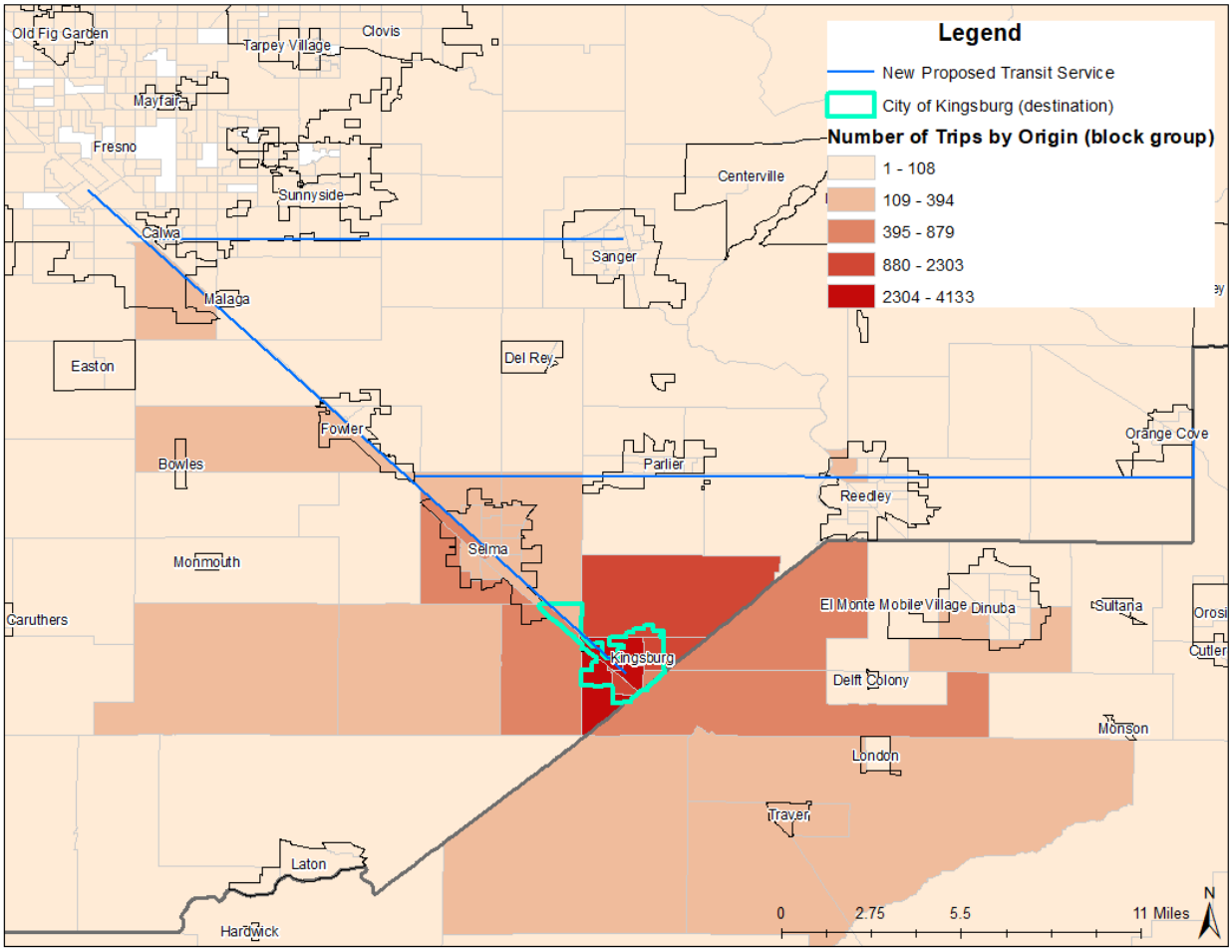
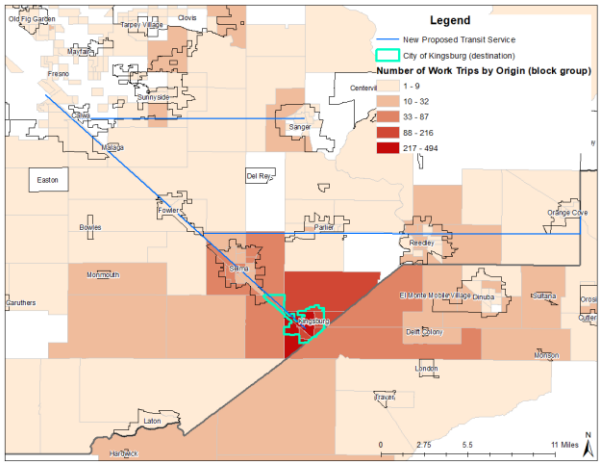
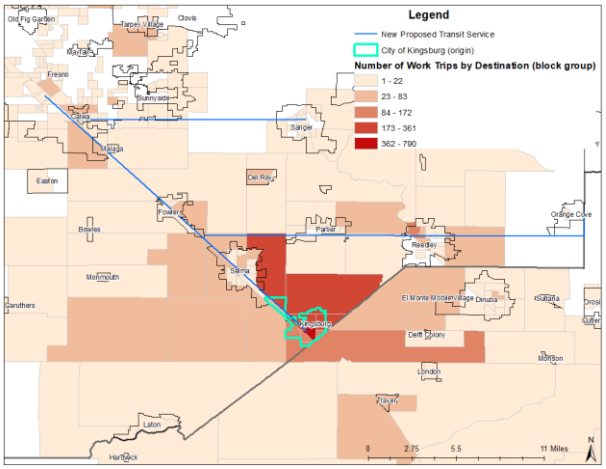


Figure 74: Work trips starting in Kingsburg most frequently end in/near Kingsburg or Selma (4,400 trips)



Work trips starting in Kingsburg most frequently end in/near Kingsburg or Selma.

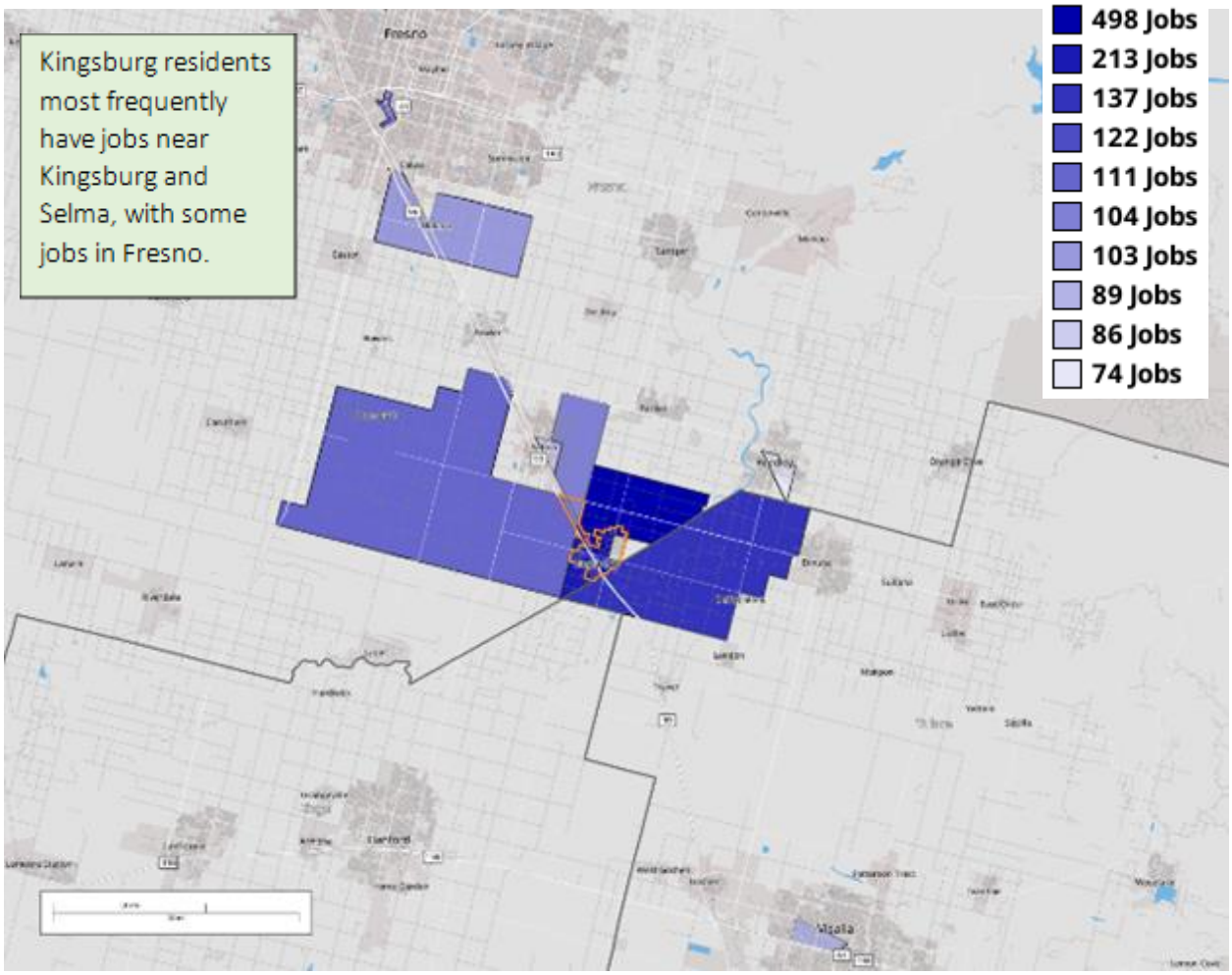


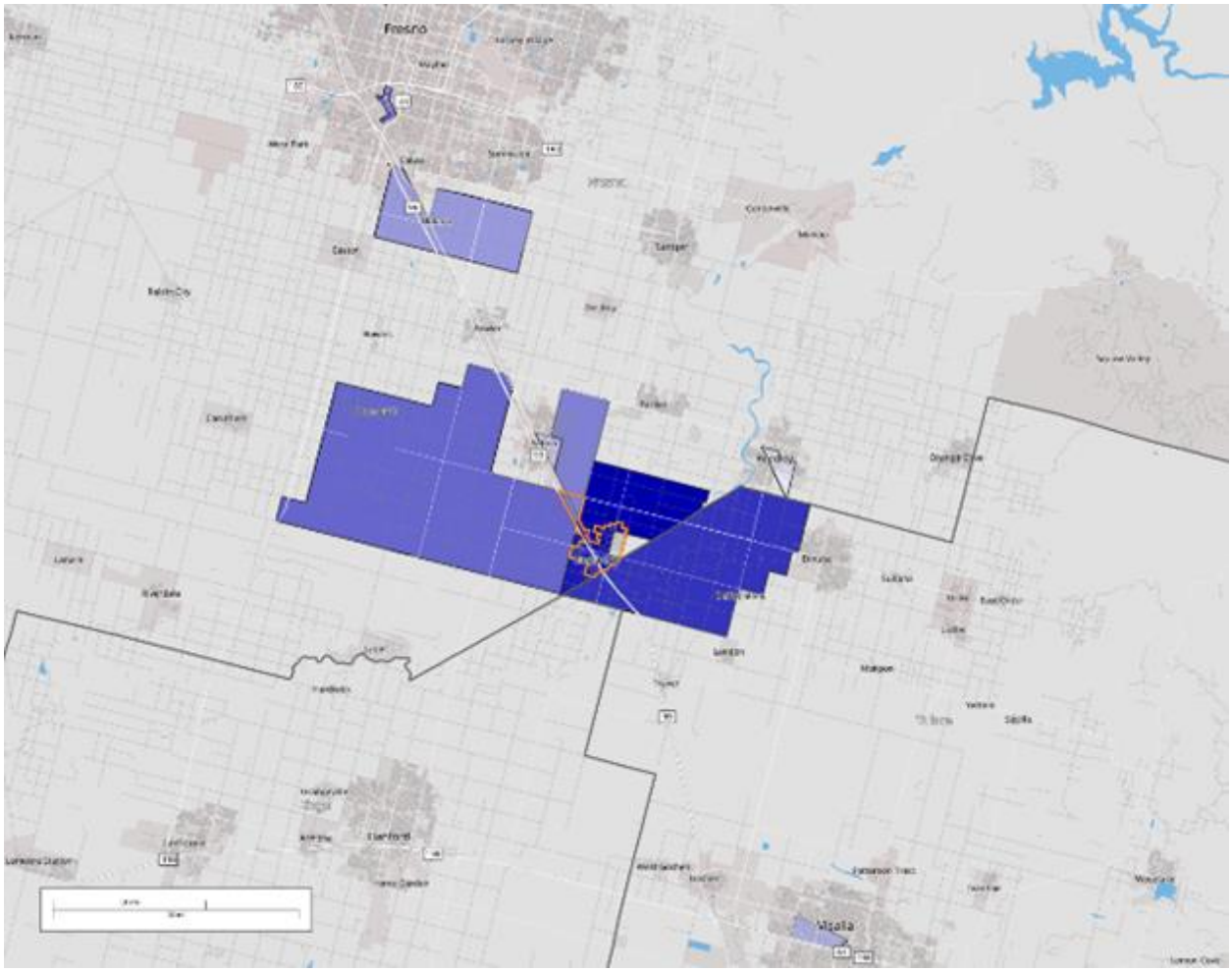
Work trips ending in Kingsburg most frequently originate in/near Kingsburg.

Figure 75: Work trips ending in Kingsburg most frequently originate in/near Kingsburg

Source: United States Census Bureau OnTheMap.

Figure 76: Jobs by Destination (Top 10 Census Tracts) for Workers Living in Kingsburg (5,464 Workers)





A key goal for FCRTA is to build a network of routes and on-demand services to support short-distance passenger movements in areas with higher rural populations that have clusters of transit destinations. Traditional fixed-route transit routes should be considered where the highest levels of population and employment can be served, while on-demand services should provide connections from areas of lower population density and dispersed populations to key fixed-route transit hubs.

A combined fixed-route/on-demand network can only be functional to passengers in two ways: through services that are frequent enough that passengers do not need to rely on schedules or worry about missing a connection, or through well-coordinated transfers that are timed to minimize transfer wait times. Currently, FCRTA generally has the fleet and facilities necessary to expand services but lacks the operational and labor resources to support more than minor expansions of service.

The Path Forward: Service Concepts

The project team identified challenges and opportunities to move forward and provide improved transit service on the corridor:

Current Service	Challenges and Opportunities
Existing FCRTA Southeast Route on Golden State Boulevard • Three daily round trips • Works for existing rural service but not optimized for peak commute times	• Challenges due to ridership model projections that do not currently support BRT investment costs • Opportunity as the corridor has a number of closely-spaced and larger population centers either directly along the corridor or that can be connected to the corridor through a transfer • Travel patterns show origins and destinations to and throughout the rural areas

Modal Components of a Network

A successful transit route should serve multiple trip purposes (work, school, shopping, medical, recreation, and other personal trips) in both directions and be reliable as a mode of transportation. Due to challenges with density and ridership, FCRTA's service area is an expansive region with relatively few and small population centers that require long and time-consuming transit travel times to reach Fresno. The Southeast/Golden State Corridor, however, has a number of closely-spaced and larger population centers either directly along the corridor or that can be connected to the corridor through a transfer.

The project team identified two service concepts applicable directly on the Southeast/Golden State Corridor:

- Corridor Service: Traditional fixed-route transit with an improved service frequency of the existing Southeast route complemented by an app-based on-demand local microtranist service
- Spur Service: Hybrid local on-demand/fixed-route scheduled transfer connection designed for communities close to but not directly on the Southeast/Golden State Corridor.

Recommended Schedule Improvements to Existing Fixed Route Service

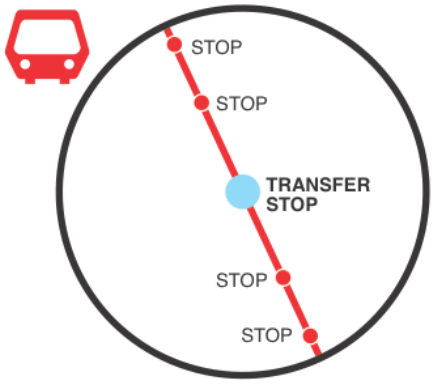
The existing service on Golden State Boulevard, the Southeast route, currently operates three daily round trips, but the service is not optimized for peak commute times. The first component to implementation of this service concept is the recommended schedule improvements to the Southeast route to make a range of trip types possible in the Southeast/Golden State Corridor.

The first phase of the service plan would leverage existing transit services and connections along the Southeast/Golden State Corridor, first improving Southeast Transit route frequencies, then adding zone-based on-demand service in each of the cities to connect to the Southeast Corridor. Minor adjustments to connecting services to Kingsburg-Reedley service would be made to provide timed transfers at Fowler to provide Fresno-Reedley connections.

The schedule improvements for the existing Southeast fixed-route service include:

- The first phase provides for service to be improved to a two-hour headway with a scheduled transfer to off-corridor services beginning with a demonstration in Fowler (blue) at the midpoint of the route.
- As commute trips increased, FCRTA would add additional blocks to expand service in the morning and afternoon peaks with a modest extension of service into the evening period (yellow).

Figure 77: On-Demand Services in Southeast/Golden State Corridor Communities



Schedule	Block 1-1		Block 2-1		Block 1-2	
Kingsburg	6:35	8:25	7:35	9:25	8:35	10:25
Selma	6:45	8:15	7:45	9:15	8:45	10:15
Fowler	7:00	8:00	8:00	9:00	9:00	10:00
Fresno FAX	7:20	7:40	8:20	8:40	9:20	9:40
Fresno Amtrak	7:25	7:35	8:25	8:35	9:25	9:35

Continuing Trips	
Block 1-3	10:35 - **12:25**
Block 1-4	**12:35 - 2:25**
Block 1-5	**2:35 - 4:25**
Block 1-6	**4:25 - 6:25**
Block 3-1	**5:25 - 7:25**
Block 2-7	**6:25- 7:25**
Block 3-2	**7:35 - 8:25**

Blocks and Stops with Off-Corridor Timed Transfers (Initial Service with On-Demand Connections)

Peak Period Commute Trips and Extended Night Service (To Meet Peak Period Commute Ridership Demand)

Block 2-1 One-Way Kingsburg-Fresno (6:35 - 7:25 to Meet Reverse Commute Demand) **OR** Full Route Trip (5:35 - 7:25 to Meet Early AM Fresno Commute Demand)

On-Demand Microtransit Service

A second component of the initial phase is local on-demand microtransit service that connects to the improved fixed-route Southeast service. This will provide connections to and from the improved fixed-route service while also meeting local transportation needs through an on-demand microtransit. The service components of the on-demand local microtransit include:

- On-demand microtransit vehicles operate for defined periods of local zone travel.
- Trips must end approximately 15 minutes before the vehicle enters a fixed-route mode (on the Southeast route) to give time for final pick-ups and drop-offs up to the end of the local availability period.
- Passengers wanting to transfer to the fixed-route service would schedule an on-demand trip to the designated transfer point before the end of the pick-up and drop-off period.
- The bus would then travel to the designated transfer point and pick up any passengers boarding the fixed-route component of the service.

The service allows for a single transfer every two hours (e.g. to meet all Southeast Corridor trips with one vehicle in operation. If higher demand warranted a two-vehicle operation, the service would likely be redesigned into a single vehicle providing on-demand service and a second vehicle providing fixed-route service. In single-vehicle operation, the vehicle must be ADA-compliant with an overlay of ADA complementary paratransit service. In dual-vehicle operation, the fixed-route service must be operated by an ADA-accessible vehicle, but the on-demand service may be a standard sedan as long as there is an overlay of ADA-complementary paratransit.

This concept follows a “many-to-few” service design allows at least some trips by multiple passengers to be aggregated and, therefore, be more reliable and predictable. In essence, this focuses the priority on the transit transfer but allows important local trips to be made without restriction. In contrast, a “many-to-many” service approach where passengers can go to and from anywhere in a zone tends to result in fewer aggregated trips, lower service productivity, increased wait times for passengers, and reduced reliability. However, the zone’s geographic size, total population and employment, and density also affect the operating characteristics of an on-demand service. Managing both service opportunities and restrictions is a critical function of on-demand service design. Figure 78 shows the trade-offs to implementing on-demand microtransit service.

Figure 78: Trade-Offs in On-Demand Microtransit Service Design

Right-Size the Zone ***Consider the Geographic Size of Zone***	**Too Small** ***Fewer potential trips lead to the potential for underutilized service***	**Too Large** ***Longer travel times for passenger trips and between passengers results in longer wait times, reduced reliability***	**Just Right** ***To the extent feasible, design to a 15-minute travel time centered around the primary transit transfer and destinations***
Zone Density ***Consider both density and spatial distribution of destinations in a zone***	**Too Low** *Often results large zones to reach a population, but impacts service with longer wait and travel times*	**Too High** *System becomes overburdened with ridership and may siphon riders from fixed-route buses and shorter trips that could be made on foot or bicycle*	**Just Right** *On-demand zones should be designed to serve areas where fixed-route bus service is not viable but can connect to a relatively high frequency fixed route*
Mix of Land Uses ***Maximize the potential trip types within a zone***	**Too Residential** *Few functional trips can be made on transit other than social (visiting friends/relatives) and the fixed-route connection*	**Too Commercial** *Business district and shopping zones would have limited utility outside of commute hours (station transfers) and lunch or special event trips*	**Mixed-Use** *To maximize riders in a low density area, suburban on-demand zones should co-locate the transit connection with core shopping and medical services*
Transit Connection ***Connecting to other transit modes is important, but so is the location of that connection***	**End of Line** *Zones that extend a fixed-route operating on a 30- or 60-minute (or greater) headway can result in travel and wait times so long that the service fails to meet performance and cost-effectiveness goals*	**Closest Stop** *Closest stop service may generate long wait for passengers at locations that lack utility. On-demand and fixed-route services should not "over-compete," but a modest level of "convenient redundancy" can increase the perception of reliability and support ridership growth*	**Major Hub** *Any two or more transit connections located at a mixed-use transit hub offer the opportunity for passengers to be more "productive" during their transfer waits. "Productive" time may include stopping for a coffee or shopping for groceries. Rail and bus hubs are commonly located in mixed-use areas, and this should also apply to on-demand connections*

Figure 79: Recommended Service Concept for the Golden State Corridor
The table below explains the new service concept.

Corridor Service

- **Increase the frequency of Southeast fixed-route**
  - Improved service schedule, every two hours
  - As demand increases, add additional service blocks to expand service in AM/PM peaks and evenings
- **App-based on-demand local service that connects to Southeast route**
  - Connects to and from the Southeast route to serve local transportation needs
  - On-demand microtransit service zone - one end of the trip within a geographical zone and designated stop location
  - Phase 1: Transfer point in downtown Fowler (mid-point)
  - Expand transfer points as the service grows
    - Fresno
    - Malaga
    - Calwa
    - Selma
    - Kingsburg
  - Allows for a transfer every two hours with one vehicle. If there is higher demand:
    - 1 vehicle for on-demand
    - 1 vehicle for fixed route

Spur Service

- **On-demand local microtransit service** with connection to fixed-route
- **Schedule transfer connection to Southeast route** for communities close to, but not directly on the corridor
  - Parlier, Reedley, Orange Cove, Sanger
  - Phased, connection point starting in downtown Fowler

Alternating schedule pattern with scheduled trips to a fixed-route transfer location in Fowler

Defined periods of local zone travel that end 15 minutes before the vehicle enters fixed-route mode to give time for final pickup and drop-offs and end local availability

Passengers who only want to transfer to the fixed-route would schedule an on-demand trip to the designated transfer point in Fowler before the end of the pickup /drop-off period

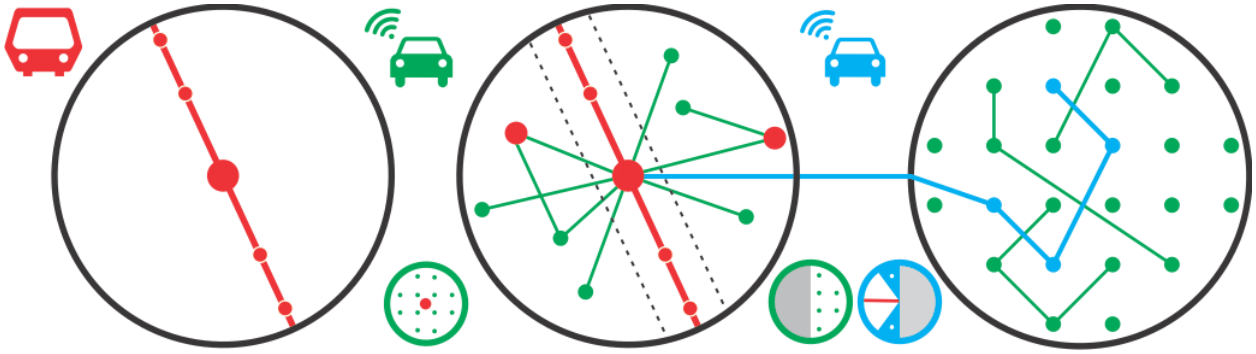
Bus would travel to the designated transfer point and pick up any passengers boarding the fixed route component of the service

The following operations must be configured for the service:

- Zone size and availability windows
- Passenger demand
- Distance to designated transfer point
- Locations of additional designated destination points in the zone
- In single-vehicle operation, the vehicle must be ADA-compliant with an overlay of ADA complementary paratransit service
- In dual-vehicle operation, the fixed-route service must be operated by an ADA-accessible vehicle, but the on-demand service may be a standard sedan as long as there is an overlay of ADA-complementary

Figure 80 illustrates both the corridor and spur service concept.

Figure 80: Corridor and Spur Service Concept



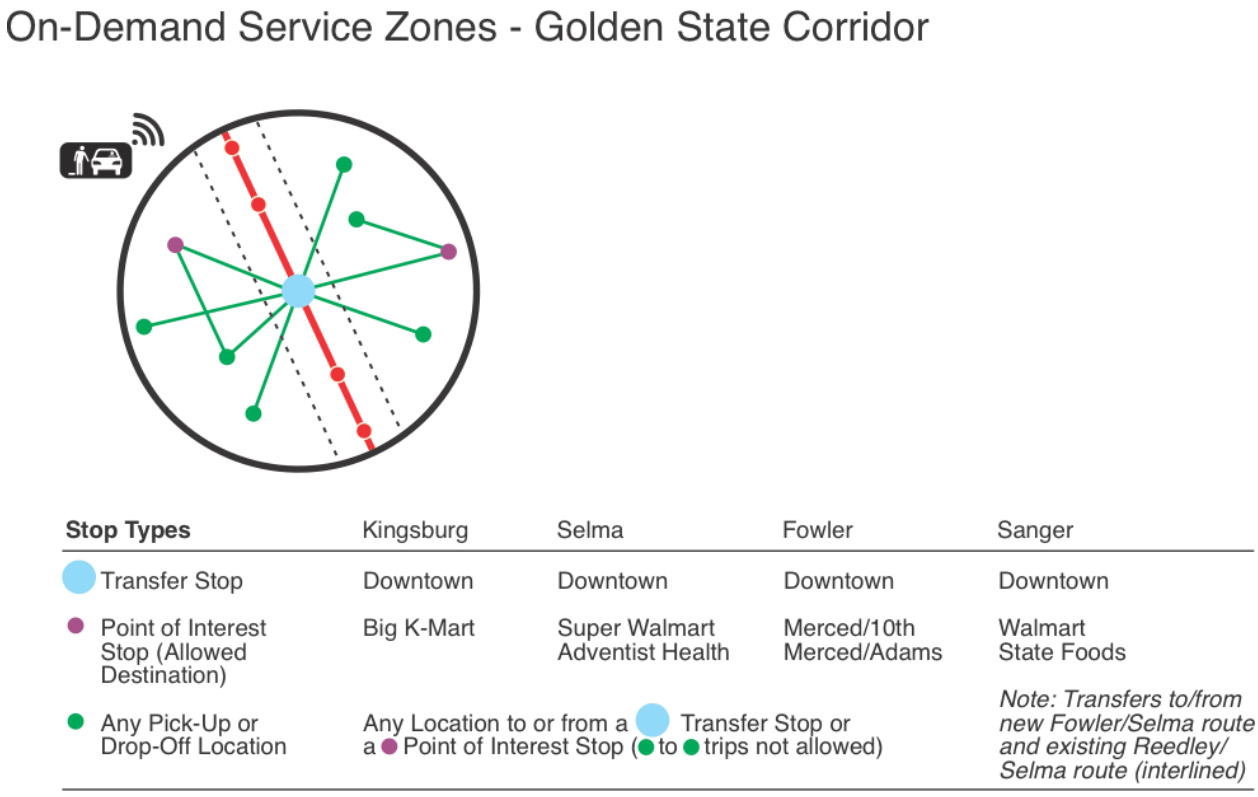
Increase Frequency on Existing South East Route

Corridor On-Demand Microtransit: Connects to SE Route

Spur On-Demand Microtransit: Connects to SE Route

Figure 81 illustrates the corridor service's on-demand zones. This shows the “many-to-few” on-demand service concept, where an on-demand service zone requires that one end of a trip within a geographic zone be at a designated stop location. The concept is that all zones along the Southeast/Golden State Corridor would be anchored by a primary transfer transit stop to fixed route (blue) and include other major retail, education, and medical destinations as major stops (purple).

Figure 81: Corridor Service: Initial Phases of Traditional Fixed-Route Bus Service Improvements



The final component, as shown in Figure 82, is a Spur Service hybrid on-demand/fixed-route service that includes a combination of an on-demand local zone for communities away from the corridor that operates on an alternating schedule pattern with scheduled trips to a primary fixed-route transfer location in Fowler.

Figure 82: Spur Service: Initial Phases of Traditional Fixed-Route Bus Service Improvements

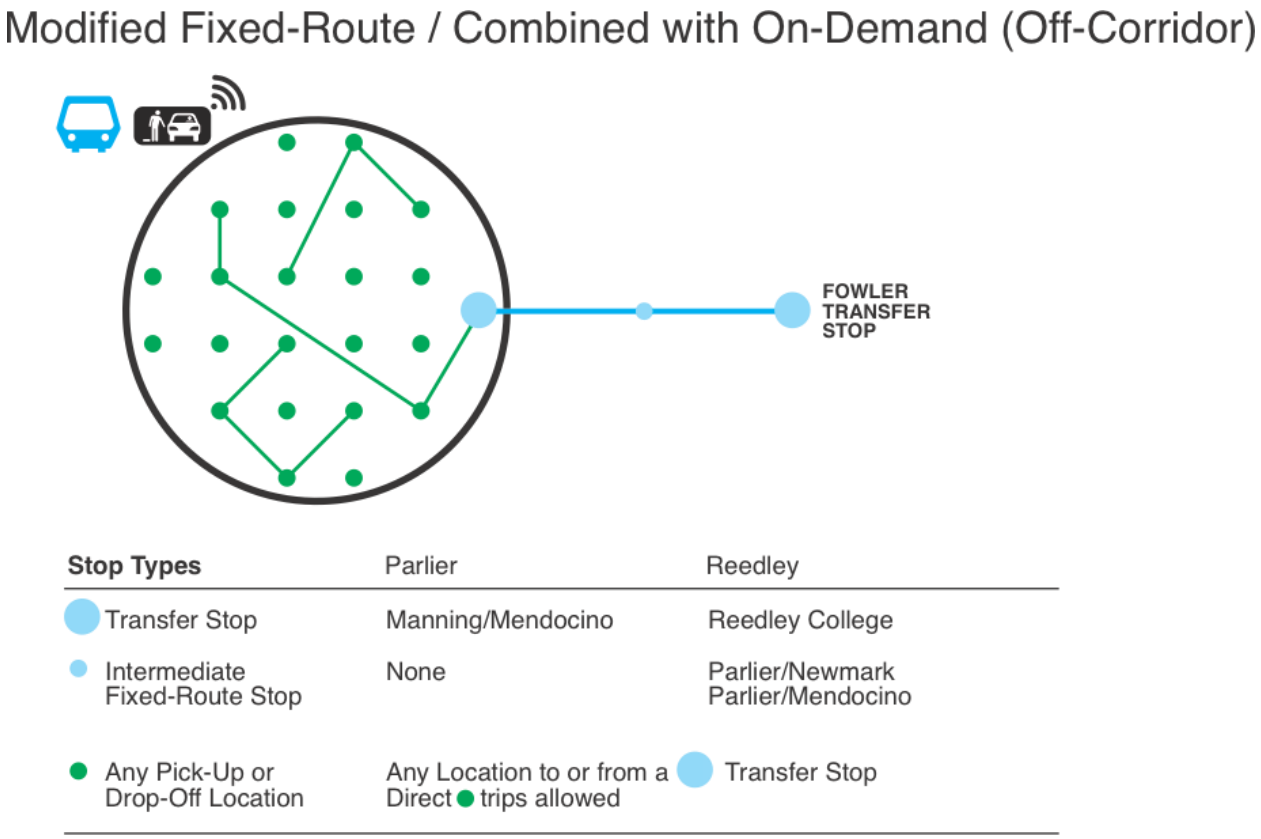


Figure 83 provides details on the service schedule**.** The operating parameters for each zone would have to be configured uniquely for that zone's specific characteristics: zone size, passenger demand, distance of zone from the designated transfer point, local on-demand service availability windows, and location of additional designated destination points within the zone.

Figure 83: Hybrid Fixed-Route/On-Demand Service Schedule Concept

Typical Operation	Parlier	Reedley
Service Span	6:30 - **7:30**	6:15 - **7:45**
On-Demand *(reservations close at 6:30)*	6:30 - 6:40	6:15 - 6:35
Departs to Fowler	6:40	6:35
Arrives in Fowler	6:55	6:55
Southeast Transfer	7:00	7:00
Departs from Fowler	7:05	7:05
Resumes On-Demand	7:20 - 7:40	7:25 - 8:35
	Pattern repeats every 2 hours with one vehicle	Pattern repeats hourly with 2 vehicles

Service Concept Rollout

This first phase of service would allow FCRTA to roll out the on-demand transit service in steps. Ideally, FCRTA would utilize a cloud-based service that includes an FCRTA configuration dashboard coupled with a user mobile app to allow most end users to request their own rides without support from a call center. The rollout could occur first as a trial zone, quickly followed by a rollout to all cities along the Southeast/Golden State Corridor. As FCRTA staff becomes proficient in the system configuration, the next phase of the rollout would occur in the off-corridor hybrid on-demand/fixed-route services in Reedley, Parlier, Sanger, and Del Rey.

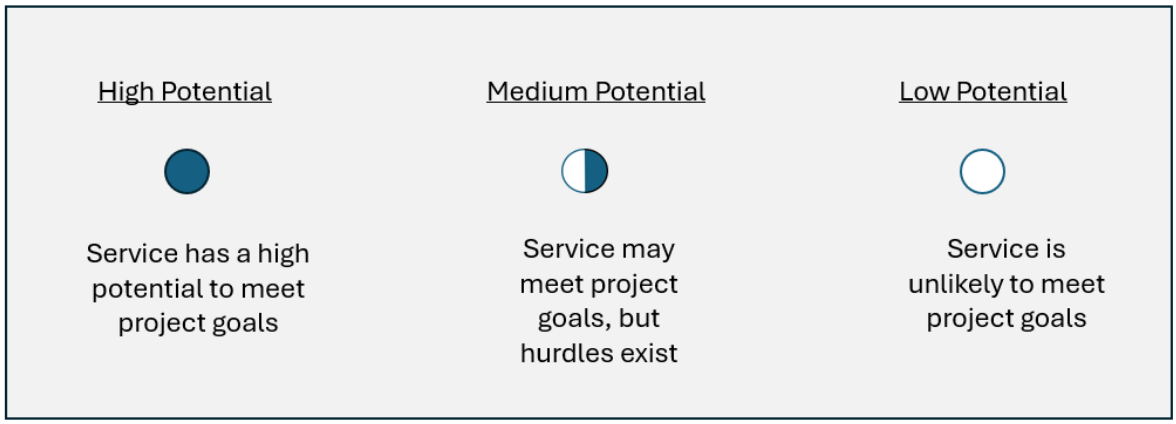
Cost Estimate[5]

- The following cost estimates are based on full-scale implementation. Service could be implemented on an area-by-area basis as a demonstration project. Expanding service from the existing three trips per day on the Southeast corridor is estimated to cost an additional:
    - Expanded Service: Five trips per weekday and three Saturday trips cost approximately $300,000.
    - Full Service: Seven trips per weekday and six Saturday trips cost approximately $400,000.
- Corridor On-Demand Service
    - Microtransit – Two six-hour shifts on weekdays from 6:15am. to 11:15am and 3:50pm to 8:50pm, and one eight-hour shift on Saturday costs approximately $340,000.
- Spur On Demand Service
    - Existing inter-city on-demand and paratransit could be modified into a hybrid service connected to expanded service on the corridor at a nominal cost using existing vehicles and hours of scheduled service in operation.

Figure 84 evaluates how the service options meet project goals again, this time adding the hybrid microtransit and more frequent service options. The hybrid microtransit and more frequent service option show a high potential to meet project goals.

[5] Costs are planning level only based on FCRTA existing revenue hour cost assumptions.

Figure 84: Potential for Each Service Option to Meet Project Goals Including Hybrid Microtransit



Service	Light Rail	Bus Rapid Transit	Hybrid Microtransit and More Frequent Service
Improves Transit Service			
› New higher frequency	●	●	●
› Enhances Existing Service	○	◑	●
Increase Access			
› Access to more than 10 activity centers	●	●	●
Implementation			
› Can be implemented in the near-term with longer-term expansion opportunities	○	○	●
Community Support			
› Support from over 50% of community	●	●	●
Cost Effectiveness			
› Project has an achievable level of cap & operations costs/opportunity for farebox recovery	○	○	●
Ridership Potential			
› Ridership forecasts support the initial investment in service	○	○	●
Construction & Operations Feasibility			
› Right of way permits construction and FCRTA is ready to operate	○	○	●
Economic Development			
› Zoning enables TOD and economic development opportunities to support the investment	○	◑	◑

Long-Term Strategy Bus Rapid Transit/Managed Lane Concept

As demand for service increases over time, the system could evolve toward a more frequent bus network built along the Southeast/Golden State Corridor spine. As ridership increases, in line with service thresholds described in Figure 87, a bus rapid transit investment may make sense. Bus rapid transit could be aligned with a potential future managed lane on State Route 99. This strategy could support the goal of reducing congestion on SR 99, which we have found to be a regional challenge with trips beginning and ending beyond Fresno County. Park and Rides would be located at points along the corridor.

Bus Rapid Transit would begin directly on the corridor, with on-demand microtransit continuing to operate in the spur areas to provide a connection (Sanger, Del Rey, Parlier, Reedley) as shown in Figure 85. As ridership grows, BRT service would expand to the spur areas, as shown in Figure 86.

Figure 85: Future BRT Service Concept: Corridor

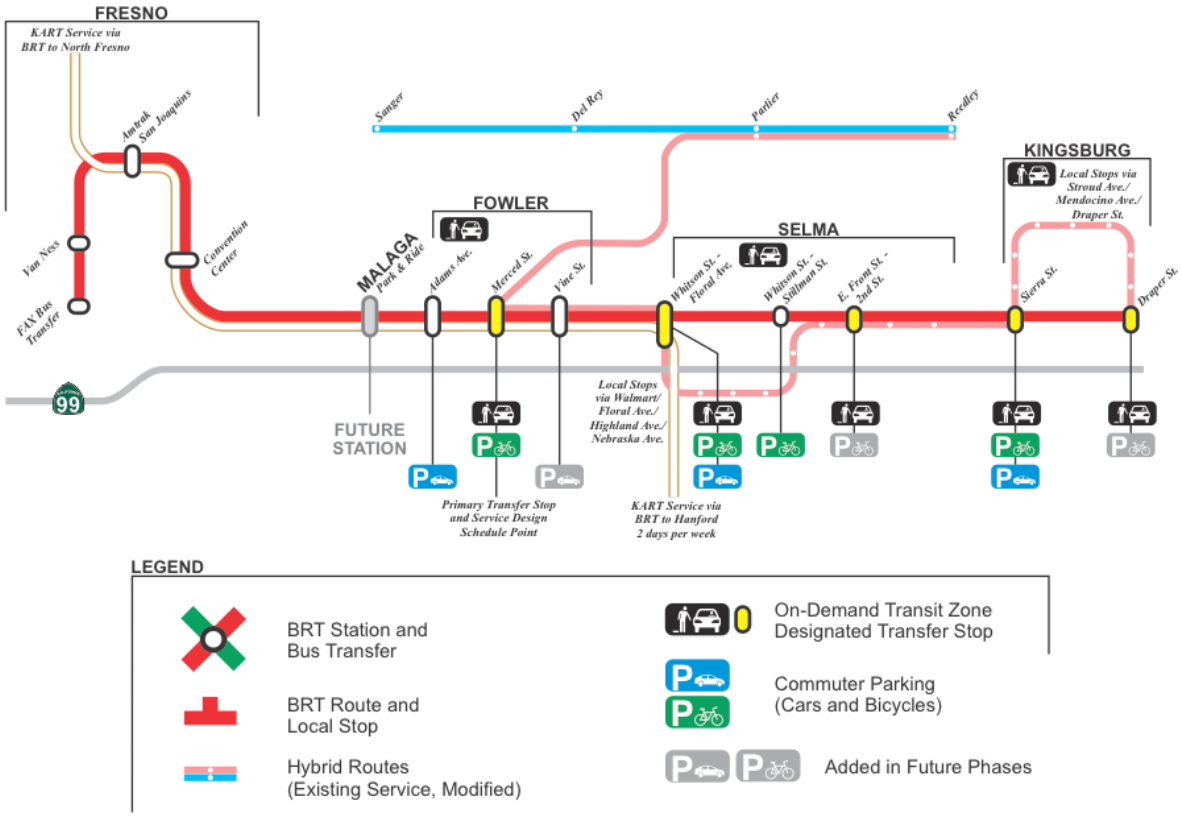
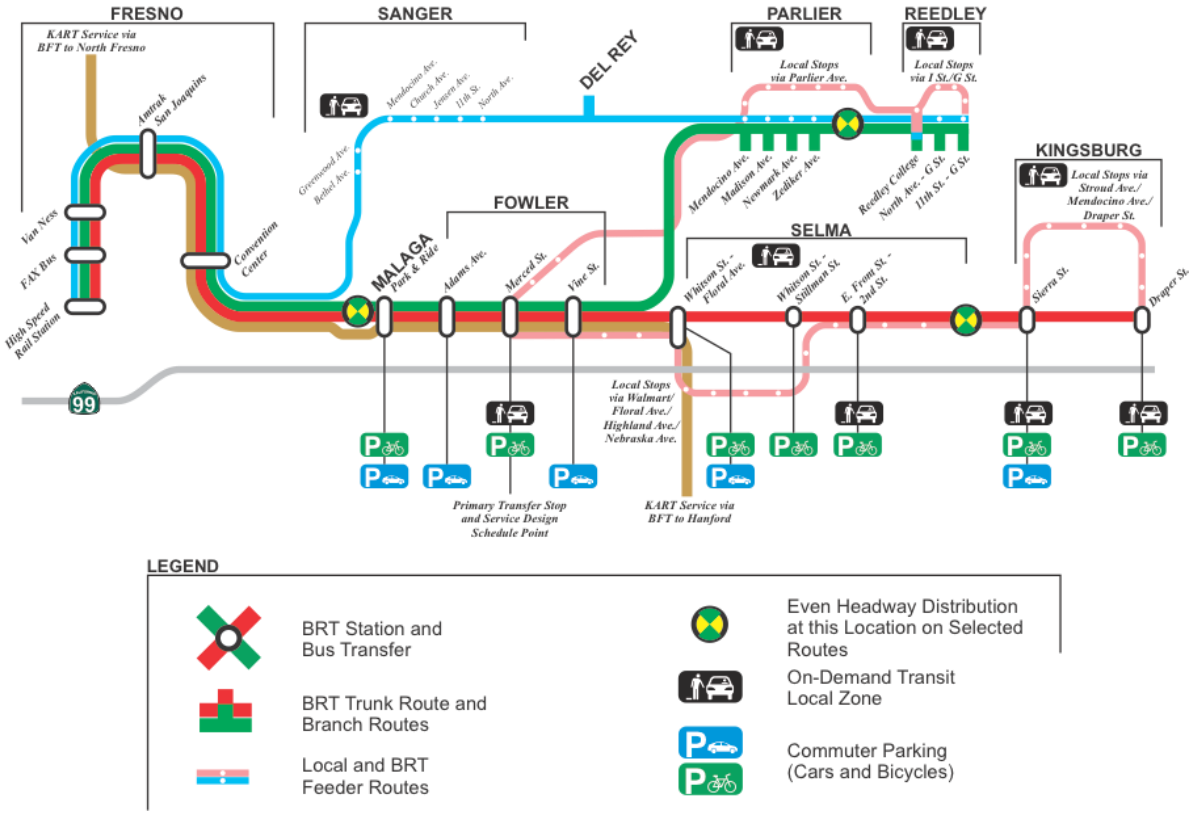


Figure 86: Future Service Concept- Expansion to Spur Areas



Service Improvement Thresholds

The combination fixed-route and on-demand microtransit concept proposed for the Golden State Corridor and surrounding communities is contemplated as a minimum investment in improved service, but it can be complicated to manage and requires trial and evaluation to be effective. Typically, fixed-route bus service is most commonly evaluated in terms of passenger boardings per vehicle revenue hour, but additional measures, such as maximum vehicle loads per trip or trip segment, can support evaluating service changes. From a passenger perspective, on-time performance and missed trips are key measures of service reliability.

On-demand microtransit performance measures, however, are less consistent across agencies, given the relative newness of the service type. Productivity measures, such as passengers per vehicle revenue hour, are used and are more commonly calculated at the lower productivity levels of paratransit service. For app-based on-demand services, however, a combination of average wait time and average travel time can help identify both the user experience and determine whether the service

is functioning well as a connection to fixed-route services. For example the following measures should be used to evaluate on-demand microtransit. FCRTA can continuously evaluate these measures as the service rolls out:

- Wait Times: Longer wait times in zones with relatively short travel times can indicate that the zone may have too few vehicles to serve the demand, but it can also signal that the zone allows too much flexibility in pick-up and drop-off locations and, therefore, provides too many scattered trip ends. As a result, the service design inhibits the efficient aggregation of passenger trips. An origin-destination analysis can determine which issue is the likely cause, and the solution may be to set limits on one trip end (e.g. limit the trip purpose to key destinations and transit transfers). In contrast, short wait times and short travel times with low service utilization may suggest that the zone is too small, is failing to meet the identified trip needs, or may be serving a very low need population.
    - Longer wait times, coupled with longer travel times, likely indicates that the zone is too large. That is, requested pick-up and drop-off locations are far apart from each other, requiring significant unproductive driving time between trips, and the length of passenger trips is also long. Zones that are too large typically operate below most desired productivity measures, resulting in a high cost per passenger. A sequenced review of trips for one or several typical days, coupled with low productivity (passenger boardings per vehicle revenue hour) will typically reveal the service and productivity issues associated with zones that are too large.
- Productivity: High productivity, short trip times but long wait times often suggests that a successful trip need has been met but that on-demand service may not be the right fit for the service. A common example involves school-related trips, where students have learned to navigate the on-demand service for their trip to and from school but the scale of demand overwhelms the on-demand service.
    - Fixed-route service is not subject to a use-based abuse of service, but on-demand service, like ADA complementary paratransit, can be designed with so much flexibility that passengers can navigate the system in a way that contributes to a higher cost per passenger or even “peculiar” situations (such as using an on-demand service to move personal belongings from one apartment to another as a way to save on the cost of renting a moving truck). In contrast, on-demand service can be tailored to meet unique benefits in specific circumstances, such as an overlay zone for senior housing to allow improved access to medical centers and grocery stores.

Unlike fixed-route service that has a defined schedule and route, or ADA complementary paratransit service restricted to eligible users, an on-demand service broadly available to the public can produce unexpected outcomes. Transit agencies should establish goals for on-demand service that allow them to react to unexpected travel patterns.

Figure 87: Typical Thresholds for Services

On-Demand Microtransit 	Passengers per Vehicle Revenue Hour (PAX/VRH)	Peak Period Passengers per Hour per Direction (PPHPD)	
		Viable Capacity	Target Capacity
	Indicative Range 2-4	2-10	4-8
	Threshold for Change *>4 PAX/VRH or travel/ wait time exceeds 15 minutes*	Vehicle Type Car or Van *3-4 PAX/Vehicle*	Typical Cost $60/VRH

ADA or Public Paratransit 	Passengers per Vehicle Revenue Hour (PAX/VRH)	Peak Period Passengers per Hour per Direction (PPHPD)	
		Viable Capacity	Target Capacity
	Indicative Range 1-3	2-10	4-8
	Threshold for Change *Evaluate local ADA service and policy if federal requirements are not being met*	Vehicle Type Cutaway *5-8 PAX/Vehicle*	Typical Cost $100/VRH

Minibus Fixed-Route 	Passengers per Vehicle Revenue Hour (PAX/VRH)	Peak Period Passengers per Hour per Direction (PPHPD)	
	Indicative Range 5-10	Viable Capacity 10-100	Target Capacity 20-40
	Threshold for Change *Demand exceeds capacity with 15-minute headways*	Vehicle Type Cutaway *18-22 PAX/Vehicle*	Typical Cost $120/VRH

Standard Fixed-Route Coach 	Passengers per Vehicle Revenue Hour (PAX/VRH)	Peak Period Passengers per Hour per Direction (PPHPD)	
	Indicative Range 10-15	Viable Capacity 20-500	Target Capacity 40-100
	Threshold for Change *Demand exceeds capacity with 10-minute headways*	Vehicle Type 30-40’ Coach *30-40 PAX/Vehicle*	Typical Cost $180/VRH

Articulated Fixed-Route Coach 	Passengers per Vehicle Revenue Hour (PAX/VRH)	Peak Period Passengers per Hour per Direction (PPHPD)	
	Indicative Range 15-20	Viable Capacity 100-750	Target Capacity 250-500
	Threshold for Change *Demand exceeds capacity with 5-minute headways*	Vehicle Type 60' Coach *60 PAX/Vehicle*	Typical Cost $200/VRH

Arterial Rapid Transit *(predominately mixed traffic)* 	Passengers per Vehicle Revenue Hour (PAX/VRH)	Peak Period Passengers per Hour per Direction (PPHPD)	
	Indicative Range 20-30	Viable Capacity 250-5,000	Target Capacity 1,000-2,500
	Threshold for Change *Speed and reliability cannot be met without dedicated bus lanes or busway*	Vehicle Type 60' Coach *60 PAX/Vehicle*	Typical Cost $220/VRH

Bus Rapid Transit *(bus lanes or busway)* 	Passengers per Vehicle Revenue Hour (PAX/VRH)	Peak Period Passengers per Hour per Direction (PPHPD)	
	Indicative Range 30-40	Viable Capacity 1,000-10,000+	Target Capacity 2,500-5,000
	Threshold for Change *Demand exceeds capacity with 3-minute headways*	Vehicle Type 60' Coach *60 PAX/Vehicle*	Typical Cost $220/VRH

Urban Light Rail Transit *(arterial with 2-3 stops/mile)* 	Passengers per Vehicle Revenue Hour (PAX/VRH) *(more turnover, shorter passenger trips)*	Peak Period Passengers per Hour per Direction (PPHPD)	
	Indicative Range 40-85	Viable Capacity 2,500-25,000+	Target Capacity 5,000-15,000
	Threshold for Change *Exceeding capacity requires added frequency or added services in the corridor*	Vehicle Type 2-Car Train *400 per Train*	Typical Cost $400/VRH

Regional Light Rail Transit *(separate right-of-way with stops every 1-3 miles)* 	Passengers per Vehicle Revenue Hour (PAX/VRH) *(less turnover, longer passenger trips)*	Peak Period Passengers per Hour per Direction (PPHPD)	
	Indicative Range 20-45	Viable Capacity 2,500-25,000+	Target Capacity 5,000-15,000
	Threshold for Change *Exceeding capacity requires added frequency or longer platforms and trains*	Vehicle Type 4-Car Train *800 per Train*	Typical Cost $400/VRH

FCRTA BRT HOV/HOT Lane (Managed Lane) Concept

Walker developed an initial bus rapid transit route concept as a standalone bus rapid transit (BRT) "light" concept for the Golden State (Southeast) Corridor of Fresno County. The model sought to test current and future transit system performance for the existing system, the Model Baseline, and the initial "BRT light" concept, referred to as Model Variation 1.

The initial output from the regional model revealed that the ridership forecast would not meet the threshold for BRT investment. However, there is latent demand for transit along the corridor. Further, congestion on SR 99 is a regional problem that requires a regional cross-county solution. As FCRTA rolls out the recommended service concept and ridership grows, it could meet thresholds where investment in BRT makes sense. FCRTA determined that Walker should continue evaluating a BRT option, including one involving a High-Occupancy Vehicle/High-Occupancy Toll (HOV/HOT) concept. This concept is often referred to as a managed lane concept. The project team reviewed these concepts with Caltrans, which controls and maintains SR 99.

The primary objective of the HOV/HOT alternative is to create a transit priority corridor on SR 99 that could serve local stops in communities along Golden State Blvd. while also integrating a park-and-ride based commuter corridor served by transit, vanpools, carpools, private ridesharing, and, at times when capacity allows, single-occupant vehicles. Operational costs of the concept could be covered, in part, by toll revenues, while the capital cost of the corridor could come from state and federal transit and highway funding sources. The managed lanes would be built on the Caltrans-owned SR 99 corridor with access points to Golden State Blvd., a highway owned by Fresno County.

Figure 88 shows the conceptual managed lane/BRT terminus in the City of Fresno (SE Fresno). The northern terminus of the project would end at Jensen Avenue in Fresno. From this location, buses would operate between the SR 99 managed lanes and Downtown Fresno via G Street, Golden State Highway, East Avenue, and a busway flyover ramp to the median HOV/HOT Lanes on SR 99. The northbound bus lane would merge with the Jensen Avenue off-ramp, while a southbound dedicated bus-only lane would provide through-movements to BRT routes continuing via East Avenue.

Figure 88: Conceptual Managed Lane/BRT Northern Terminus in Fresno

As shown in Figure 89, at Central Avenue, a partially elevated busway segment would provide bus platforms in an inline busway station configuration to bus platforms served by FAX buses on Central Avenue. A walkway with ramps would connect the FAX bus platforms below grade on Central Avenue and improve access to affordable housing in the area. Service to Malaga would be provided by FAX buses a short distance from the station.

HOV/HOT lane would begin/end south of the busway segment at this location with a merge to/from the SR 99 mainlines. Only transit and registered vanpool vehicles would be allowed to operate on busway segments, while other qualifying vehicles would be allowed access to HOV/HOT lanes.

Figure 89: Conceptual Optional or Future Malaga BRT Station

Figure 90 shows that north of Fowler, a bus-only exit would connect to N. 10th Street and include at-grade platforms at the location of a park-and-ride lot and raised intersection at N. 10th Street. HOV/HOT lanes would continue along SR99, serving eligible traffic and express buses/vanpools that bypass Fowler. Depending on roadway elevations and geometry, busway ramp access may be required to ramp down on a loop to provide the adequate length required to transition from an elevated structure over SR99 to the roadway grade.

Figure 90: Conceptual North Fowler Bus Access

Figure 91 shows that an alternative configuration for the station North of Fowler would provide busway access to N. 10th Street via T-Ramp, allowing commuter buses and vanpools to access both directions of the HOV/HOT lanes from the park-and-ride lot. Depending on roadway elevations and geometry, busway ramp access may be required to ramp down on a loop to provide the adequate length required to transition from an elevated structure over SR99 to the roadway grade.

Figure 91: Conceptual Alternative- North Fowler T-Ramp Bus Access

South of Fowler (Figure 92), a bus-only exit would connect to S. 10th Street and include at-grade platforms at the location of a park-and-ride lot. HOV/HOT lanes would continue along SR99, serving eligible traffic and express buses/vanpools that bypass Fowler. Depending on roadway elevations and geometry, busway ramp access may be required to ramp down on a loop to provide the adequate length required to transition from an elevated structure over SR99 to the roadway grade.

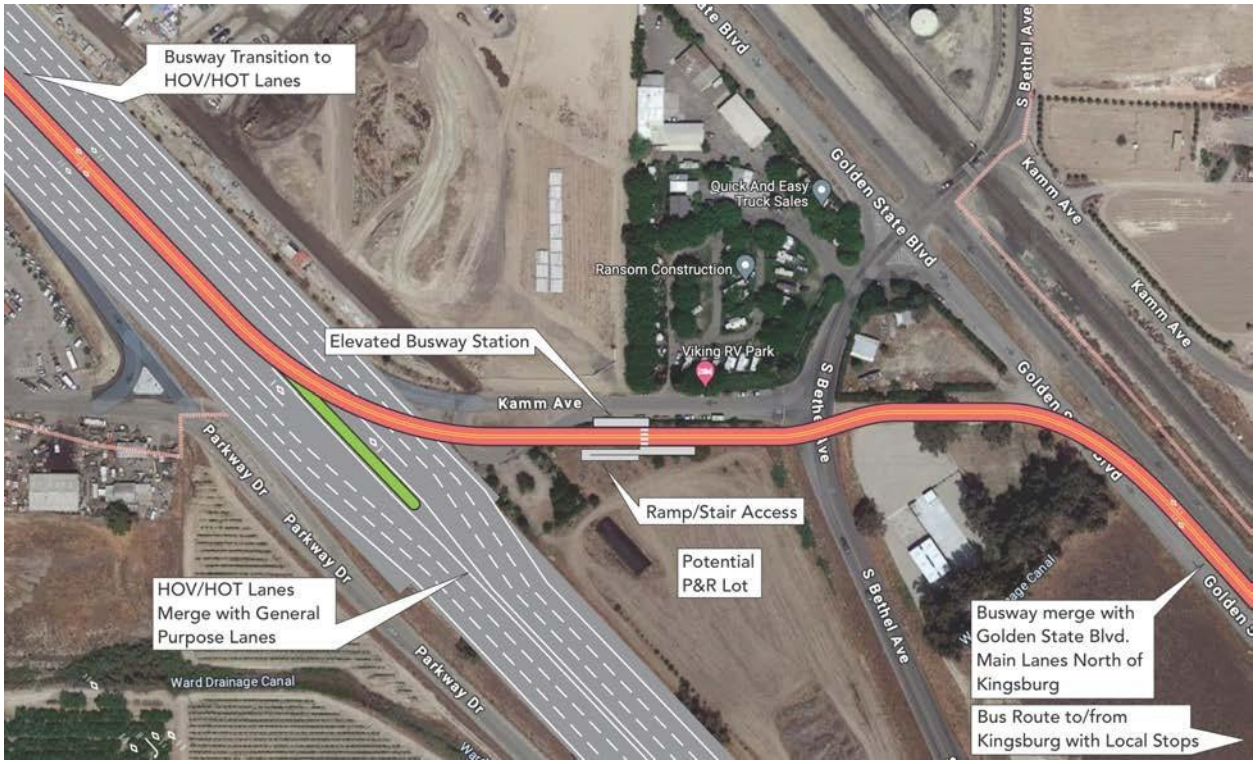
Figure 92: Conceptual South Fowler Bus Access

Figure 93 shows how BRT would operate north of Selma, where a bus-only exit would connect to access roads west of SR99 and include at-grade platforms at the location of a park-and-ride lot. HOV/HOT lanes would continue along SR99, serving eligible traffic and express buses/vanpools that bypass Selma. The example shown illustrates a longer descending ramp structure that could meet the bus platforms and connect the streets at grade. Buses operating in through-service in Selma and continuing to/from Kingsburg would exit managed lanes south of Selma and utilize local streets to reach the North Selma station. Alternatively, express buses between Fresno and Kingsburg could exit at the station and provide connections to local buses and on-demand service.

Figure 93: Conceptual North Selma Bus Access

North of Kingsburg (Figure X), a bus-only exit would connect to Golden State Blvd. via a flyover ramp with an inline busway station at the location of a potential park-and-ride lot. HOV/HOT lanes would end on SR-99 south of the busway exit.

Figure 94: Conceptual North Kingsburg Bus Access



Managed Lane - HOV/HOT and Busway Operations

The busway ramp connectors would be designed to provide transit facilities and busway stations at key access points. Only transit buses and authorized vanpools would be allowed to utilize busway ramps.

HOV/HOT lane access would serve buses, vanpools, carpools, and tolled vehicles under various rules designed to maintain operating speeds of at least 50 mph, even when the highway is severely congested. The most common approach to maintaining managed lane operating speeds is through variable tolls, an approach used in California, Colorado, Washington, and other states.

In Houston, HOV/HOT lane speeds are managed through a combination of tolls and occupancy restrictions. On the US 290 HOV/HOV "Express Lanes," for example, the lane is a single reversible lane that serves the peak period and peak congestion directions with varied access requirements by time. The lane is open daily from 5am to 11 a.m. for southbound (inbound) traffic toward Downtown Houston and from 1–8 p.m. for northbound (outbound) traffic from Downtown Houston. On weekdays from 6:30 a.m. to 8:30 p.m., 3+ carpools are allowed free of charge, but no tolled traffic is allowed. On weekdays from 4:30 p.m. to 6:00 p.m., 2+ carpools are allowed free of charge, but no tolled traffic is allowed. Transit vehicles and motorcycles are allowed at all times free of charge, and cars of any occupancy are allowed with a toll at all other times, including weekends. Trucks and vehicles with towed trailers are prohibited at all times. Total tolls per vehicle vary from $1.00 in low-volume periods to $7.00 in the 30-minute shoulder peak (e.g.

6:00 a.m. to 6:30 a.m.) before access restrictions become effective. The combination of tolls and access restrictions is designed to maintain an operating speed at or near 55mph at all times, giving transit buses and eligible users a significant travel time benefit over normal freeway traffic. Comparable toll policies and rates exist on other Houston highways, with maximum rates on other HOV/HOT facilities varying from $4.50 to $7.00.

Engineering Review

Background

Across this stretch of Golden State Boulevard and State Route 99 there are various segments with designations ranging from highway to city street. The corridor also includes multiple jurisdictions including: Fresno County, City of Fresno, Selma, Fowler and Kingsburg. In addition, the alignment abuts the Union Pacific Railroad. With the multiple jurisdictions, the proximity of the Railway, and the varying segment design designations, the corridor presents challenges for any change or expansion of the roadway.

Golden State Corridor Alignment

While reviewing the existing improvements, it was identified that most of the Golden State corridor has approximately 30' of unutilized right-of-way between the northbound and southbound lanes (median) and approximately 45' between the northbound lane and the railroad. Within these areas, the managed high-occupancy vehicle (HOV) or high-occupancy toll (HOT) lanes (two lanes each approximately 12' wide in the north and south directions) could be provided (HOV and HOT lanes are collectively referred to as managed lanes in this discussion). The corridor through Selma is significantly reduced and does not allow for dedicated HOV lanes without additional widening or an alternative alignment.

As a highway with at-grade crossings, many intersections provide limited available area in the median to accommodate the managed lane, since the median right-of-way has been used to provide left turn lanes. Moreover, accommodating turning movements with an at-grade managed presents signalization challenges, and further modifications are likely required at intersections with at-grade railway crossings using conventional highway and intersection design approaches. Any future managed lanes on Golden State would likely require significant modifications of the existing highway within the right-of-way, and alternative design approaches may be required to solve the varied challenges.

Alternative design approaches could include examples applied in other states:

- Strategically-placed grade separations for the managed lanes – A fully at-grade alignment presents space challenges within the available right-of-way, but at-grade managed lanes may perform poorly in travel time, speed and reliability, and air quality measures. Grade separations at some of the more challenging intersections could improve travel times, enhance reliability and capacity, and eliminate some of the start-and-stop movements that can contribute to increased vehicle emissions. Direct connections between managed lanes and urban streets exist in California and other states. One notable example is Houston's Westpark Tollway, a corridor that had been studied for rail transit, bus

rapid transit, and managed lanes. Ultimately, it was built as an elevated toll road with direct connections to bus park-and-ride facilities but retained space for a future at-grade light rail transit (LRT) line.

- Alternative intersection designs – A variety of alternative intersection design typologies exist to improve traffic circulation. Most require additional right-of-way and can increase obstacles for transit vehicles and users, pedestrians, and bicyclists. However, most alternative intersection designs are applied by state departments of transportation, typically outside of urban core areas where transit and active transportation receive less of a priority focus. Moreover, 86% of state departments of transportation indicate a high level of public resistance to alternative intersection designs, according to NHCRP Synthesis 550, 2022.

This report provided no examples where transit or transit users were considered in the design process, and the need to accommodate transit users was not identified as a concern of state highway agencies. FHWA's Alternative Intersections/Interchanges Informational Report (AAIR), 2010 provides a limited discussion on transit users as pedestrians but does not address the movement needs of transit vehicles. A review of readily available research suggests that design for transit vehicles and users would require a novel approach or an innovation in the design of alternative intersections.

Figure 95: Example of Managed Lane in Seattle

Image: theurbanist.org

- Managed lane transitions – Managed lanes are most commonly designed as high-occupancy vehicle (HOT) or high-occupancy toll (HOT) lanes where both safety and capacity considerations (NHCRP Synthesis 550 identifies capacity as the top-ranked factor for consideration, just ahead of costs, right-of-way, and safety). Managed lanes serve predominately motorists in private vehicles; however, dedicated bus lanes are limited to specially trained operators with CDL and specialized training specific to local conditions. Thus, bus-only facilities are often designed with transitions between lane types based on changes in urban context; these transitions between freeways-to-city streets, bus lanes to

- Bus on-shoulder operations, and bus-only lanes/queue jumps are mixed-traffic lanes are common in many cities. Since traffic on these facilities is limited to buses, bus operators are trained to navigate a more complex operating environment while the lower volumes of bus traffic have minimal, if any, impacts on other traffic. In Seattle, for example, frequent bus routes often operate on a mix of street types ranging from downtown streets to arterials and freeways. Seattle's street rights-of-way tends to be narrower than other major cities, and bus lanes have been configured in a variety of ways. Seattle's Rapid Ride lines operate on a mix of transit-only streets, bus and streetcar lanes, shoulder and median bus-only lanes, highway shoulders, mixed traffic, and queue jump lanes at intersections.

Conventional design approaches, especially those that enforce roadway symmetry tailored to general traffic, may offer fewer solutions than context-specific design approaches that prioritize specific modes, particularly transit but also freight, pedestrians, and bicyclists. Caltrans and its local agency partners should consider a more in-depth study of roadway design options to address the needs of all users of the multimodal Golden State corridor over the long-term.

SR-99 Corridor Alignment

State Route 99 (SR99) is under the purview of the California Department of Transportation (Caltrans,) which is identified as both a highway and a freeway across different segments throughout California. Since this corridor is solely owned and operated by Caltrans, improvements may be easier to coordinate than on the locally owned Golden State corridor.

Between southern Fresno and northern Selma, there is approximately 40' of median right-of-way between the northbound and southbound lanes of SR99. Within this area, a managed lane with two lanes approximately 12' wide to support bidirectional traffic could be provided. Between northern Selma and Kingsburg, it was identified that a modified section approximately 20' wide could be used for managed lanes by either having reduced lane widths of 10' or having split segments in either the north or south direction. A modest lane shift associated with future rehabilitation work on SR-99 could also accommodate a continuous lane width for managed lanes.

The main limiting engineering factor in constructing a consistent managed lane pair between southern Fresno and Kingsburg is the number of over/underpasses where the width of SR-99 is significantly reduced. Due to this limiting element, large bridge widening improvements will need to be done to maintain uniformity in bidirectional managed lanes. However, a detailed traffic analysis may reveal that complete symmetry is not required, and alternative approaches are possible (e.g. lane asymmetry or reversible lanes, which are common approaches in other states).

Another consideration in developing transit-focused manage lane infrastructure on SR-99 is the unique access needs of transit vehicles and users. In the Los Angeles area, in-line busway stations provide efficient bus operations while giving transit users convenient access to transit centers and park-and-ride facilities. A contrasting approach commonly used in Houston is the use of flyover ramps that allow transit vehicles direct access to off-corridor transit facilities. Both design approaches used in Los Angeles and Houston are common in Seattle. Whichever design approach is preferred, the core focus should remain on the speed and reliability of transit that can be conveniently accessed by transit users, whether they walk, bike, take a local bus, or, in some cases, drive to the transit station.

08 | Energy Analysis

08 Energy Analysis

For each of the designated communities to which microtransit deployment is recommended, the Energeia team conducted an analysis of Pacific Gas & Electric (PG&E) electric distribution network data to develop a high-level understanding of current and future grid constraints. Distribution network constraints may limit utility interconnection to electric vehicle (EV) chargers, solar photovoltaic (PV) systems, and battery energy storage systems (BESS), all key components of a reliable electrified transit system.

PG&E's publicly available Grid Needs Assessment (GNA) and Integrated Capacity Analysis (ICA) datasets provide distribution feeder-specific forecasts of electric peak demand in megawatts (MW) and include distribution asset rating in the same units. When forecast peak demand exceeds asset rating, an asset becomes constrained, and is not able to interconnect to additional load, potentially hindering transport electrification and transit service expansion efforts.

A geospatial analysis of each of the cities was developed, including modeled distribution feeder headroom, or the magnitude of incremental load the feeder can host without facing a constraint. While the microtransit service vehicles may only require up to 10 or 20 kilowatts (KW) of charging power at a given time via Level 2 chargers, future in-route charging for FCRTA's other routes and services may require additional fast-charging infrastructure, BESS and solar PV backup systems to ensure system reliability. Further study is required to determine the exact magnitude and coincidence of charging demand on each community's respective distribution assets, and engagement with PG&E will be necessary to develop a complete view of asset headroom beyond their published forecast period.

The following section includes maps of each microtransit community, illustrating forecast distribution assets in 2030. Feeders with more than 2 MW of headroom are in green, 0-2 MW of headroom are in orange, and constrained assets (with less than 0 MW of headroom) are in red. The team selected the forecast year of 2030 to visualize anticipated grid conditions coincident with FCRTA's full transit fleet electrification goal. The GIS maps also include anticipated EV charging sites highlighted in purple, where planned or known, to indicate the exact distribution feeder to which the EV chargers would be connected. Finally, the maps show CA State Route 99, to indicate charging locations relative to the transport corridor.

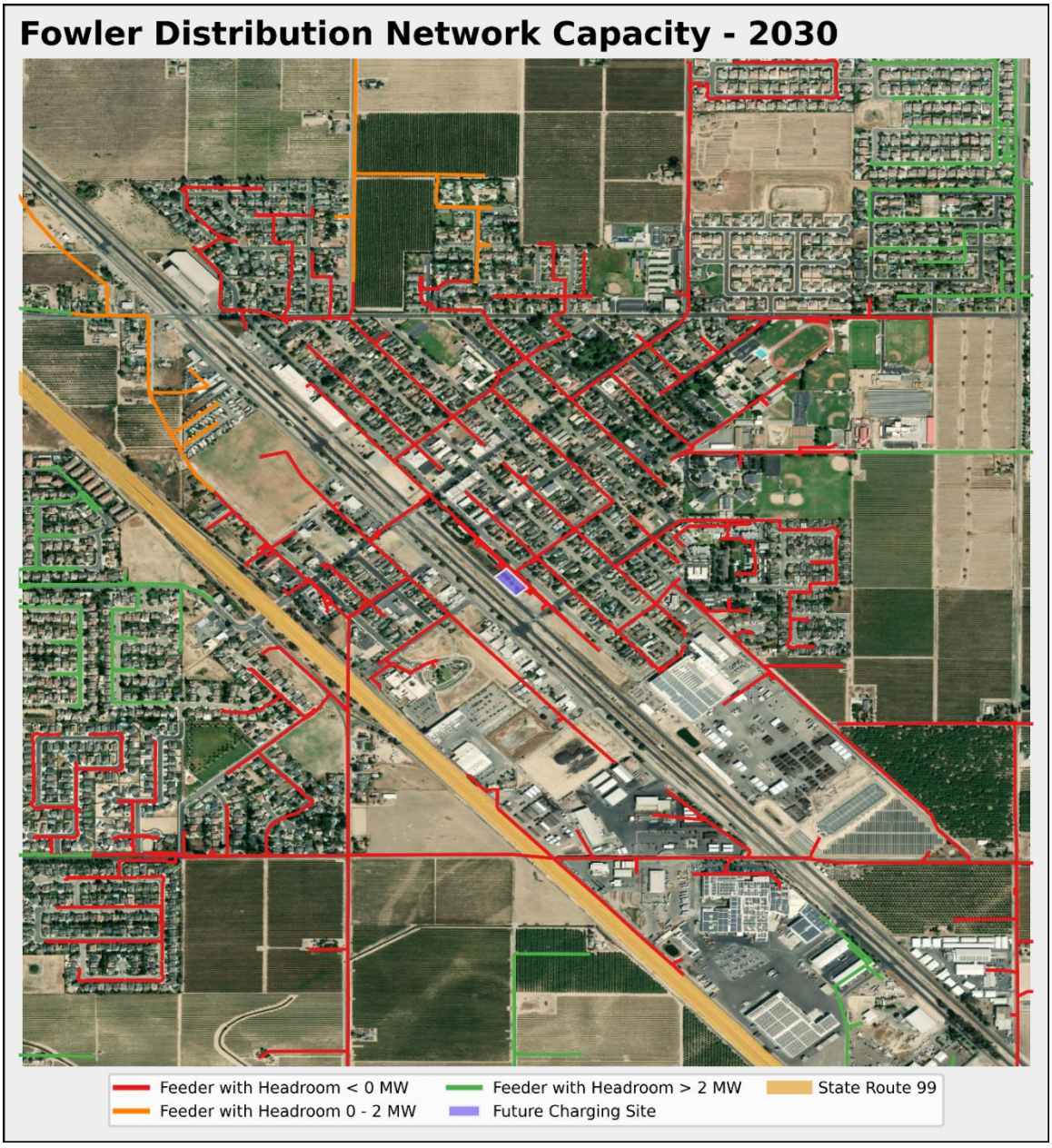
It is critical to note that PG&E's distribution system upgrade horizon, which involves upgrading the ratings of overloaded assets, does not extend beyond 5 years. The analysis in the following section accounts for distribution upgrades to assets within the 5-year horizon, but additional upgrades were not forecasted beyond 2029. As such, feeder headroom forecasts may be underestimated; however, a conservative approach to forecasting grid integration constraints is best practice to maximize the likelihood of a given grid asset having sufficient hosting capacity for EV charging.

Site Energy Analysis

Fowler

Fowler microtransit service deployment would involve EV charger deployment at the Fowler Library, including one to two Level 2 chargers, and possible backup solar PV and battery storage to ensure sufficient energy supply in the event of a grid outage. The Energeia team forecasts constraints at the two primary distribution feeders serving Fowler, which may lead to grid interconnection challenges. However, distributed solar PV generation along with battery storage to shift charging consumption away from peak periods may sufficiently offset charging coincidence with asset peak demand. Further utility engagement and analysis is required to appropriately assess the potential constraints.

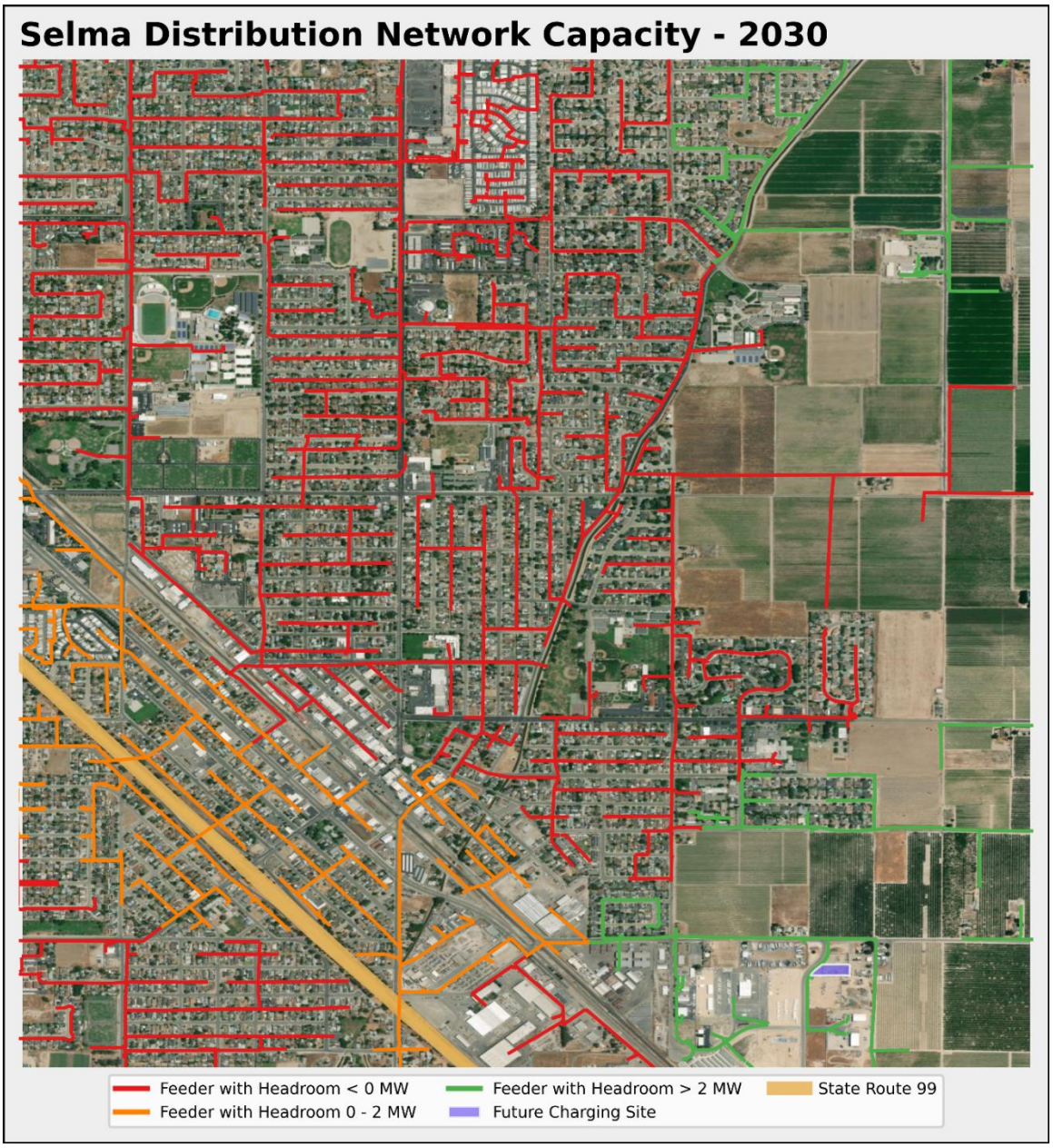
Figure 96: Fowler Distribution Network Capacity, 2030 Map



Selma

Selma microtransit service would charge at the Selma Maintenance Facility, which has already undergone significant development and grid interconnection. The distribution asset forecast includes a planned upgrade on the feeder serving the highlighted maintenance facility, indicating that a grid constraint is unlikely to hinder transport electrification efforts. However, further analysis is required to accurately quantify the impacts of other sector electrification efforts, such as residential and commercial buildings and industrial and agricultural processes.

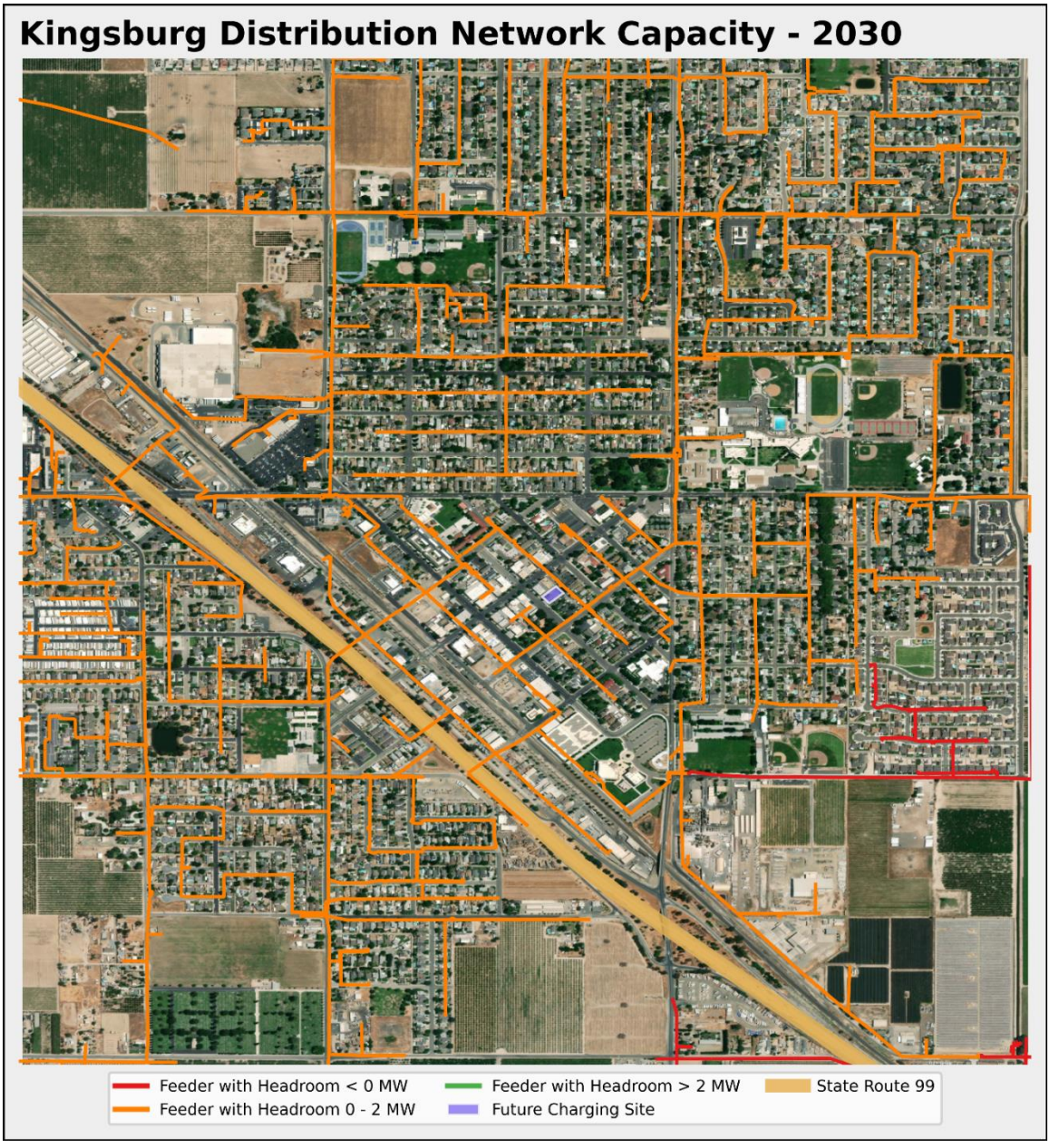
Figure 97: Selma Distribution Network Capacity, 2030 Map



Kingsburg

Kingsburg microtransit service would charge at the proposed Resiliency Hub, including two Level 2 cheers. The site is interconnected to a feeder with less than 2 MW of headroom in 2030, however a constraint is unlikely due to the relatively small charging peak demand produced from level 2 chargers. Additionally, an energy management system can typically shift charging load away from peak periods to minimize costs to FCRTA and the utility in the event of interconnection with an asset with minimal headroom.

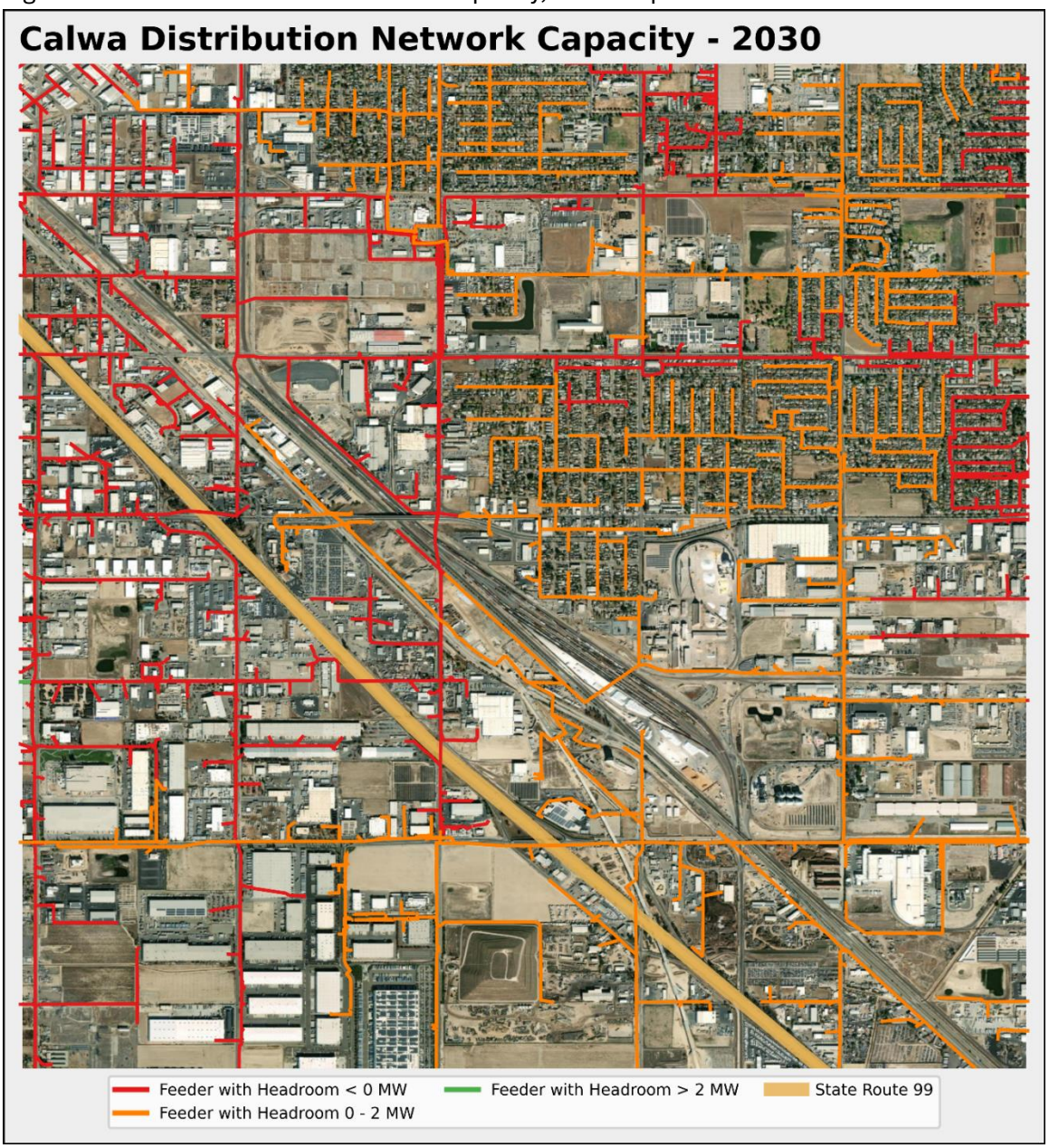
Figure 98: Kingsburg Distribution Network Capacity, 2030 Map



Calwa

Calwa microtransit service would likely charge at the proposed Chinatown Resiliency Hub, a location for which has not yet been determined. Potential in-route charging along the SR99 corridor in Calwa may be challenging as electrification of buildings and transport will constrain assets and prompt distribution network infrastructure upgrades. The project team recommends engaging with the utility to ensure feasibility of interconnection before deploying any EV charging infrastructure along this section of the SR99 corridor.

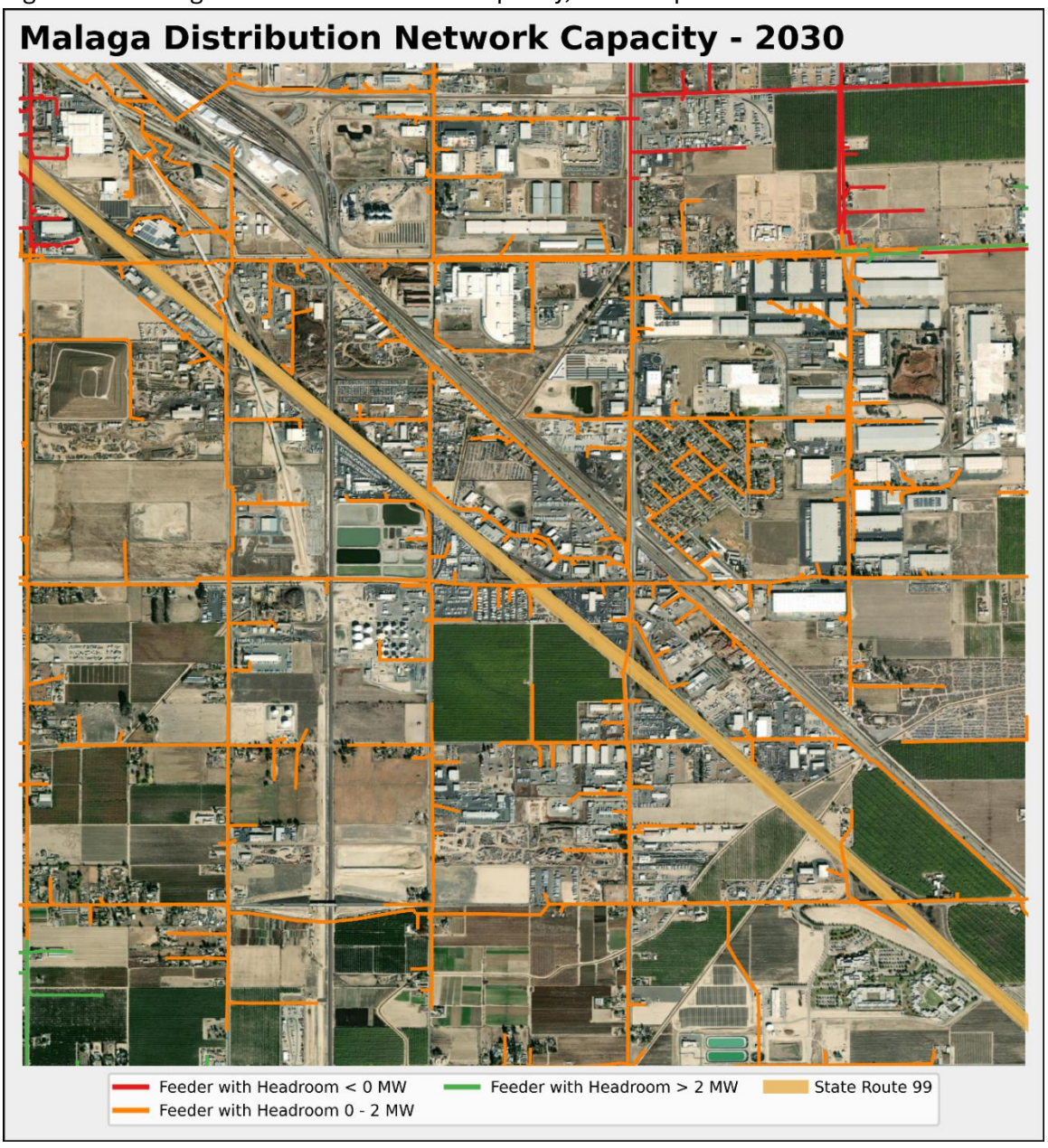
Figure 99: Calwa Distribution Network Capacity, 2030 Map



Malaga

Malaga microtransit service would also charge at the proposed Chinatown Resiliency Hub. Potential in-route Level 2 charging along the SR99 corridor may be more feasible in Malaga as distribution assets are not forecasted to be as constrained in this section of the SR99 corridor. Fast charging infrastructure deployment from 200 to 400 kW or greater may lead to grid integration challenges as electrification the transport and building sectors increase peak demand.

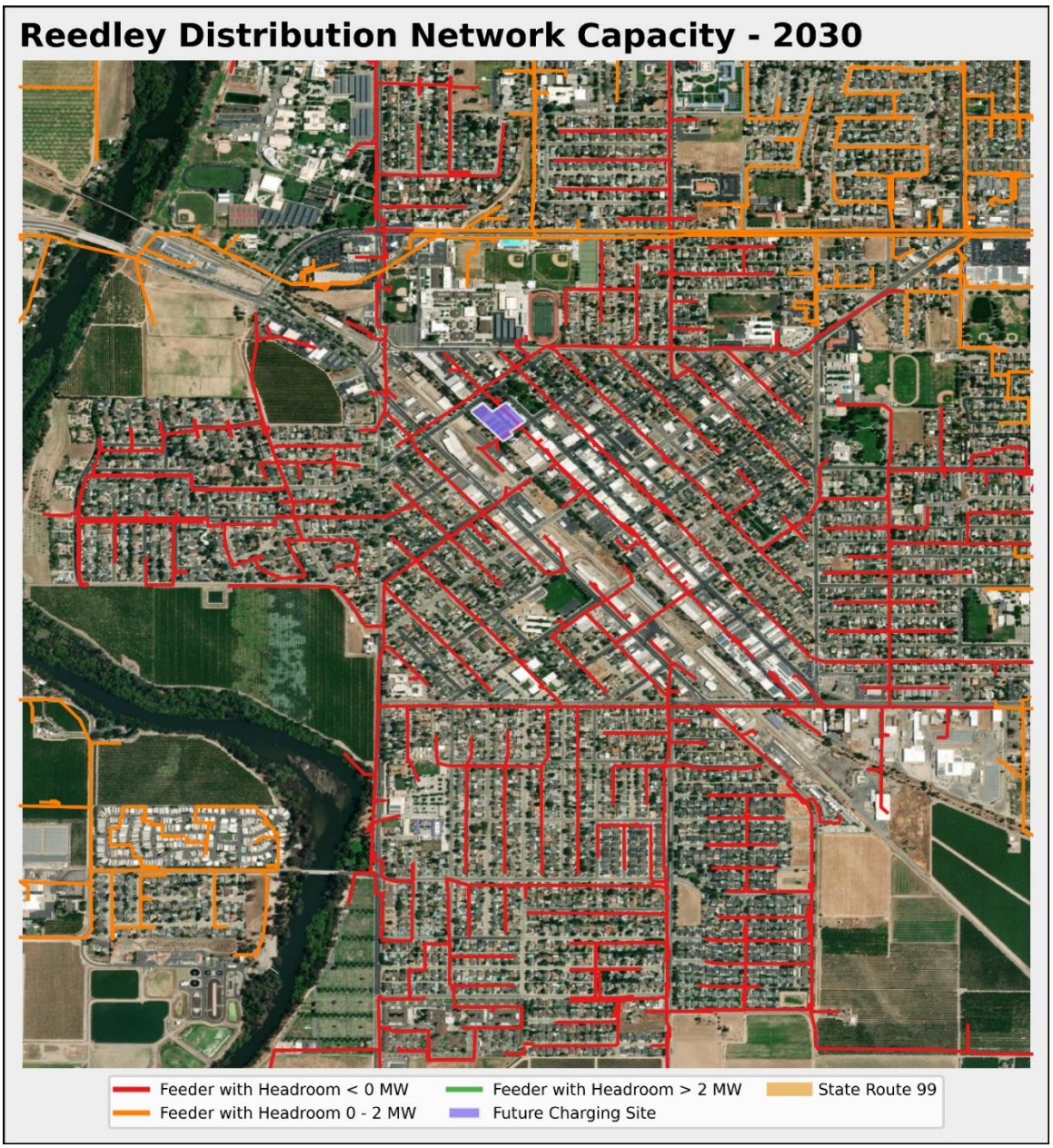
Figure 100: Malaga Distribution Network Capacity, 2030 Map



Reedley

The Reedley distribution network is forecast to be the most constrained of any of the recommended microtransit communities. The Energeia team recommends further analysis and consideration of solar PV and battery storage deployment, paired with an energy management system, to shave charging peak demand at the Reedley City Hall and reduce impact on local distribution assets.

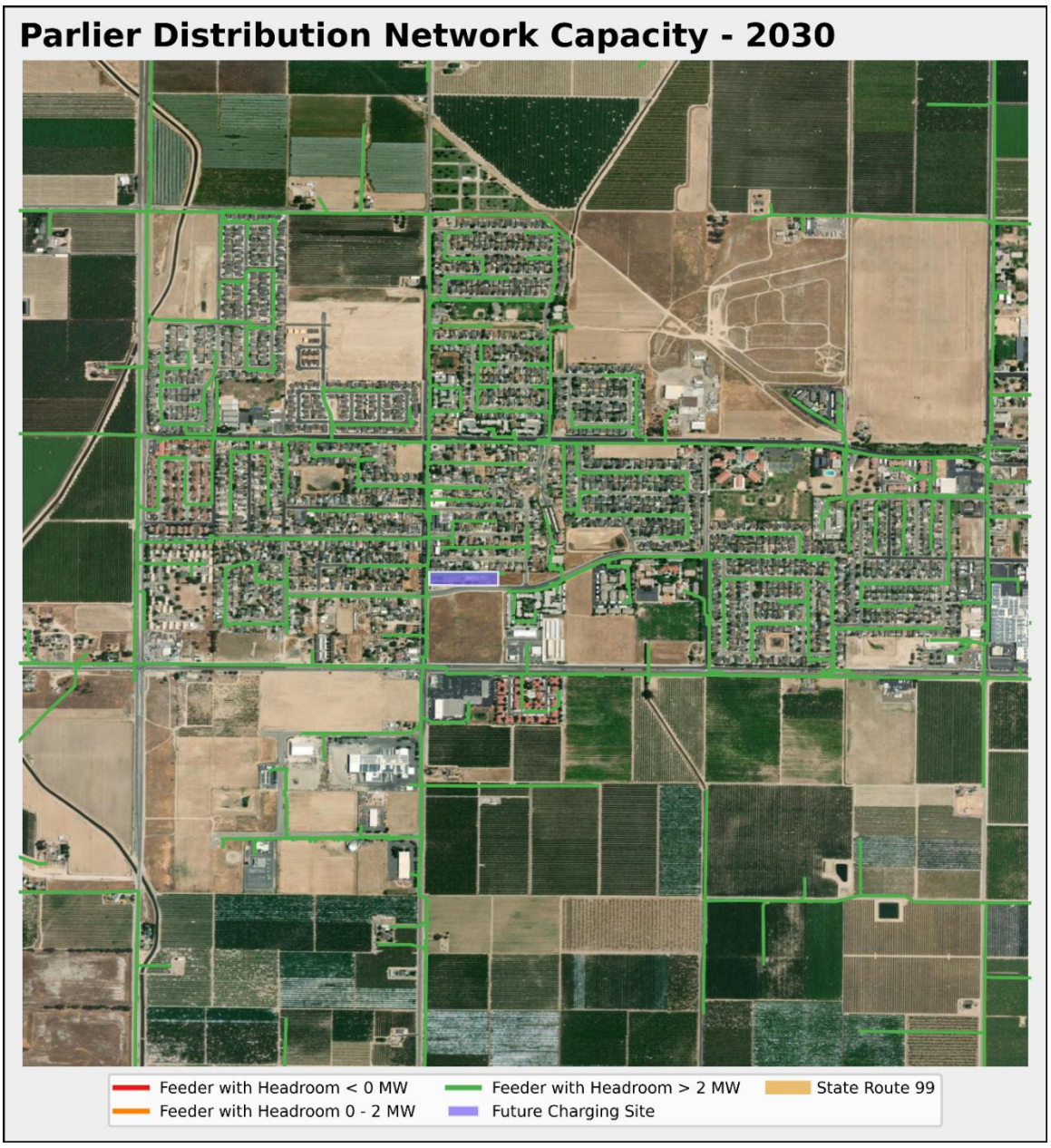
Figure 101: Reedley Distribution Network Capacity, 2030 Map



Parlier

The Parlier community is unlikely to see electric distribution constraints over the forecast period due to larger headroom on each of its assets. The Parlier Police Department, the proposed microtransit charging site and Resiliency Hub, may be an optimal candidate site to host future in-route fast charging infrastructure for vehicles traveling from the SR99 corridor to Reedley, Parlier, and Orange Cove.

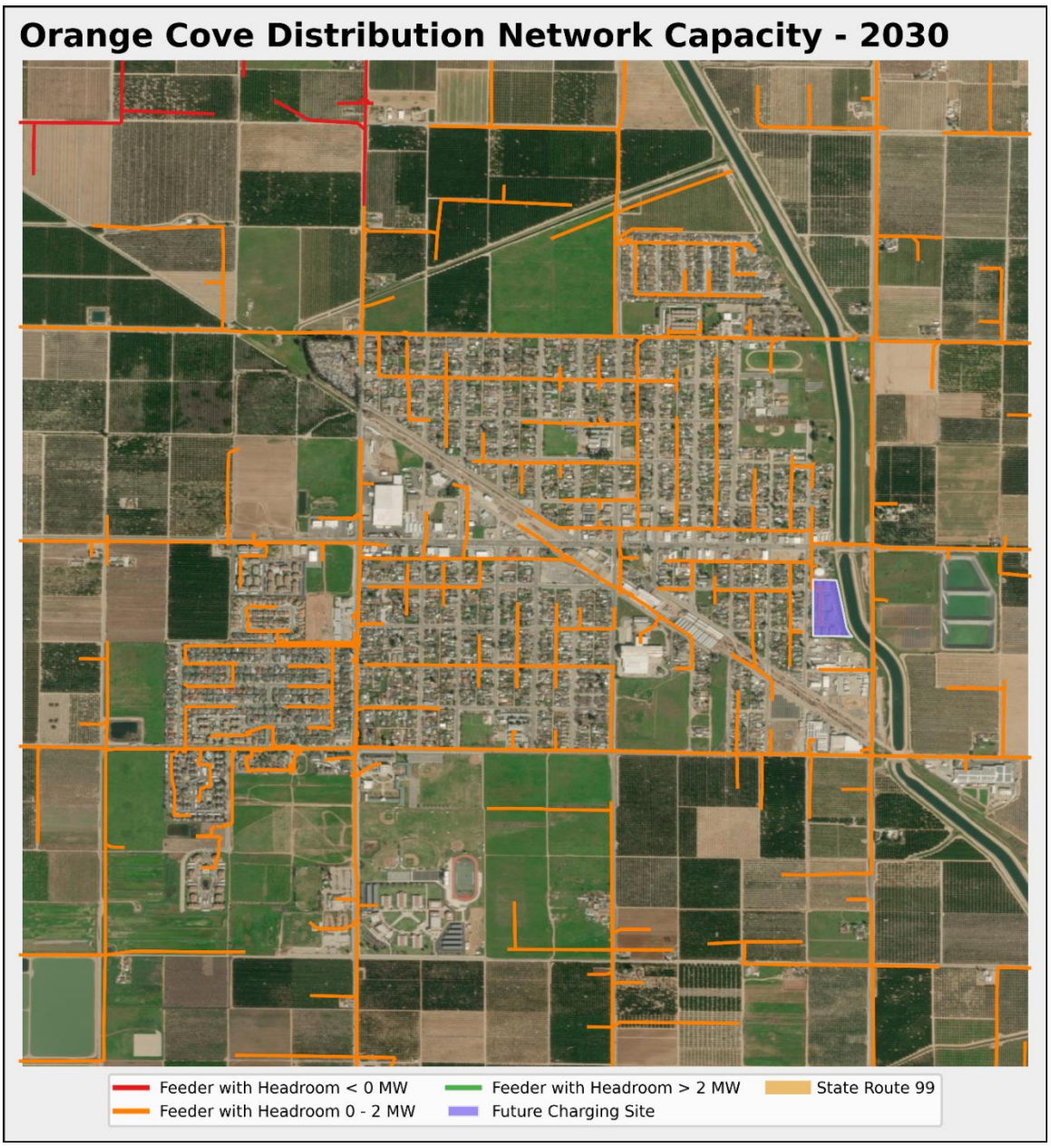
Figure 102: Parlier Distribution Network Capacity, 2030 Map



Orange Cove

Microtransit charging in Orange Cove is proposed at the current municipal yard, which is connected to a distribution asset with forecast headroom less than 2 MW in 2030. As such, the project team recommends further analysis and utility engagement prior to deployment of any EV infrastructure greater than Level 2 chargers to minimize risk of grid interconnection issues.

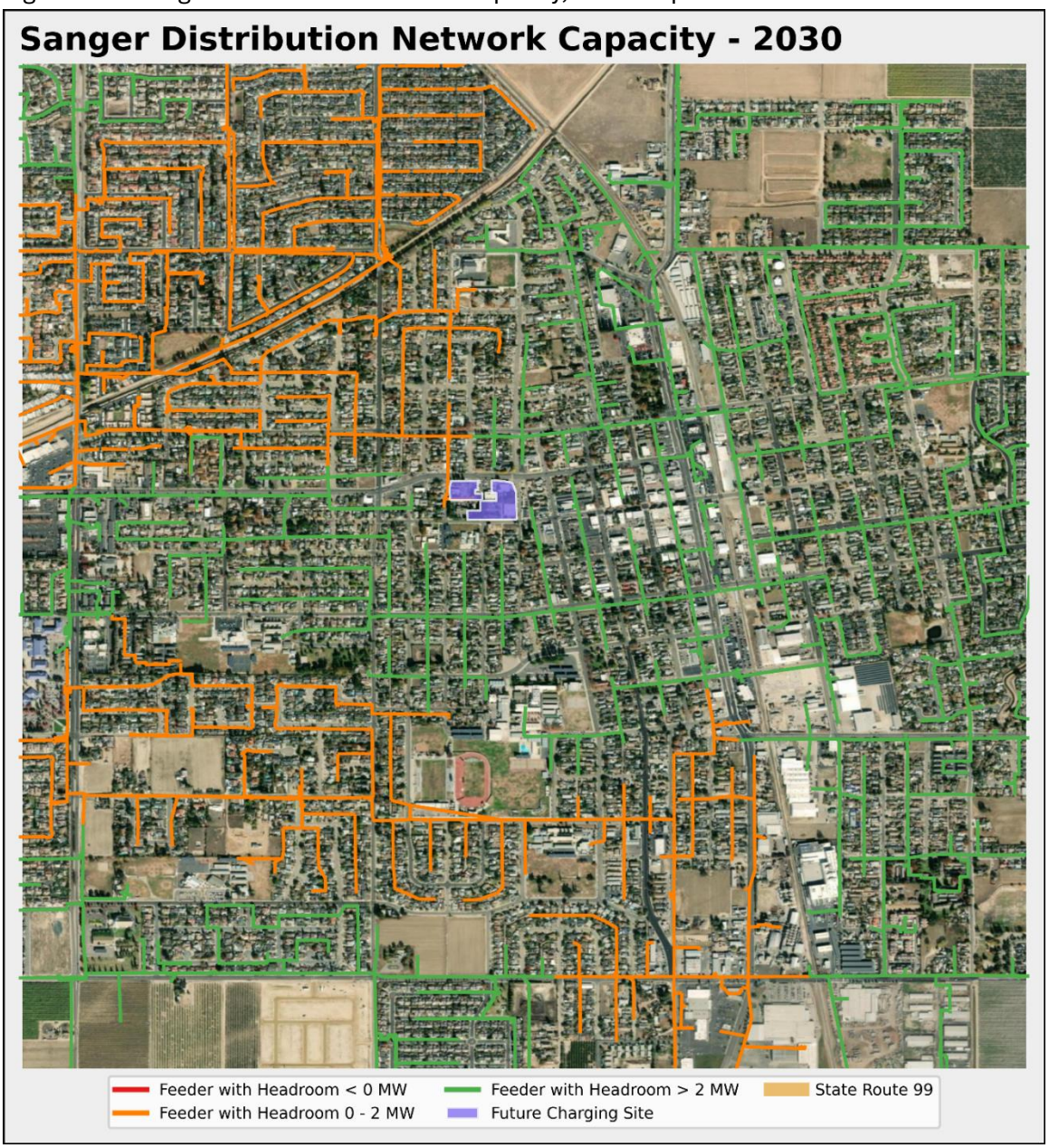
Figure 103: Orange Distribution Network Capacity, 2030 Map



Sanger

Microtransit charging in Sanger is proposed at the City Hall, which is connected to a distribution asset with less than 2 MW of forecasted headroom in 2030. Alternative options may include developing a site in the eastern portion of the community where assets are forecasted to have more capacity to host new load, or widespread deployment of an energy management to help minimize charging coincidence with the current timing of feeder peak demand. Further analysis is needed to determine the least-cost charging infrastructure deployment solution.

Figure 104: Sanger Distribution Network Capacity, 2030 Map



9 | Next Steps

09 Next Steps

Implementation

In the immediate term, next steps to implement the near-term recommendation of hybrid microtransit, and increased service on the Southeast route include:

- Funding: Review budget and financial data to determine the level of funding necessary and available to implement new service and the potential for a phased approach.
- Capital:
    - Vehicles: FCRTA has available vehicles to begin microtransit service. Review vehicles available to add service on the Southeast route, including Ford E-Transits.
    - Infrastructure and Charging Capacity: Vehicles are already located at FCRTA maintenance facilities. No additional EV charging infrastructure is necessary.
- Operations:
    - Staffing: FCRTA will need to hire additional drivers to operate service. This is likely one of the most challenging aspects of implementation. Similar to past efforts implementing service in Biola, CA, FCRTA should work with its transit operator to hold hiring fairs to hire local drivers.
    - Technology: FCRTA should consider the technology options discussed, including an app-based program for scheduling rides.
- Marketing and Communications:
    - FCRTA should work with the rural towns, unincorporated areas, and local organizations to communicate the new service to the community. This can include flyers, postcards, website information, commercials, and targeted social media ads.

Funding Sources and Applicability Score

The following are potential funding sources that would help to fund the proposed transit service. The applicability score is a measure of the likelihood of FCRTA receiving funding. The applicability score is based on the grant source and professional judgement of the project team, who have experience successfully leading over $12 million in grant funding transit and fleet electrification projects.

Figure 105: Potential Funding Sources

Funding Source	Type of Funding	Funding Entity	Applicability	Applicability Score
Section 5311	Formula Grants/Operations	Federal Transit Administration	-Formula funds for transit operations	High
Transportation Development Act (TDA)	State Sales Tax funds/Operations	California Department of Transportation	-Formula funds for transit operations	High
Grants for Bus and Bus Facilities (5339(b))	Competitive Grant/Capital	Federal Transit Administration	-Funds infrastructure, including vehicles and facilities	High
Low or No Emission Grant Program (5339(c))	Competitive Grant/Capital	Federal Transit Administration	-Funds zero emission vehicles and infrastructure	High
Transit and Intercity Rail Capital Program (TIRCP)	Competitive Grant/Capital	California State Transportation Agency	-Funds capital improvements that decrease greenhouse gas emissions, vehicle miles traveled, and congestion	High
Measure C	Fresno County Sales Tax/Capital and Operations	Fresno County Transportation Authority	-Can be used for operations -Can help FCRTA meet the local match requirement for competitive grants	High
Measure C New Technology	Competitive Grant/Capital	Fresno Council of Governments	-Funds new transit technologies, including EV infrastructure	High
Low Carbon Transit Operations Program (LCTOP)	Formula Funding/Capital and Operations	California Department of Transportation	-Operating and capital assistance for transit agencies to reduce GHG emissions and improve mobility, with a priority on serving disadvantaged communities	High
Clean Vehicle Fueling Infrastructure Program	Incentive Program/Capital	San Joaquin Valley Air Pollution Control District	-Funds EV charging stations and solar infrastructure	High
Clean Mobility Options (CMO) Mobility Project Vouchers	Voucher Program/Capital and Operations	California Energy Commission	-Funds transit service, bikeshare, scooter share, EV carshare	High
Innovative Charging Solutions for Medium- and Heavy-Duty Electric Vehicles	Competitive Grant/Capital	California Energy Commission	-Funds innovative EV charging technologies	High
New Starts, Small Starts and Core Capacity Improvements	Competitive Grant/Capital Investments	Federal Transit Administration	-Funds transit capital investments, including heavy rail, commuter rail, light rail, streetcars, and bus rapid transit. -Grants are highly competitive	Low

Source: Walker Consultants.

10 | Appendices

Fresno County Rural Transit Agency State Route 99/Golden State Corridor Transit Feasibility Study

Advisory Committee Meeting #1

June 15, 2023

Action Items

- Walker to send survey links and one-pager to AC members in follow-up, along with brief boilerplate text asking for survey participation
- AC members to distribute (email, website, flyers, etc.) online survey information

Welcome and Introductions

- FCTRA – Moses Stites and Janelle Del Campo
- Caltrans – Nicholas Isla and Chris Xiong
- Fresno Council of Governments – Kristine Cai, Simran Jhutti
- Fresno Area Express Transit – Kristopher Grey
- City of Selma – Lupe Macias and Trevor Stearns
- City of Fowler – Thomas Gaffery
- MV Transportation – Gabriel Tabarez
- Fresno Area Express Transit – Kristopher Grey
- Clovis Transit – Amy Hance
- Fresno EDC – Thomas Dulin
- Leadership Council for Justice and Accountability – Karla Martinez
- MV Transportation – Gabriel Tabarez
- Walker Consultants – Chrissy Mancini Nichols, Ben Weber, and Keith Hall
- Energeia – Ezra Beeman, Aubree Nygaard, and James Spargo

Introduction by FCRTA

- Idea for Golden State Corridor transit improvements emerged 4-5 years ago; took a while to get grant for planning and build political will
- Golden State Corridor scheduled for major projects – why not consider transit opportunities?

Startup

- Goals, routing, grid capacity, sites, TOD
- Major opportunities on this corridor
- Focus on economic and connectivity potential of the trunk line Fresno-Kingsburg route

Background and Previous Planning Efforts

- 2003 Community Vision for the Golden State Corridor
- 2020 Route 99 Business Plan
- Caltrans Corridor Enhancement Master Plan

- Current Measure C project funds $53M for corridor improvements – including multi-modal improvements
- High Speed Rail
- FCRTA Electric Grid Study
- FCRTA Selma Maintenance Facility
- FCRTA Microgrid/Resiliency Hub Study
- FCRTA's $6.8M TIRPC grant for resiliency hub in Chinatown and connections to HSR
- FCOG – Activity and travel demand model

Opportunities

- More frequent service can leverage microtransit feeders
- Future Golden State Blvd construction could mean opportunities to add fiber internet and other social-equity-supporting investments
- City of Fowler – staff have been mindful of a longer-term vision of connections, reuse rail right-of-way for bike and bus rapid transit

Outreach

- Community outreach events this week in Selma, Fresno, Fowler, Kingsburg, and Reedley
- Survey is live, please distribute in newsletters, social media, and other outlets

General Notes

- FCRTA provides free fares to seniors, veterans, disabled
- FCRTA needs to meet operations farebox requirements (State requirement)
- Clovis Transit is fully free since pandemic
- Uber/Lyft isn't present in rural Fresno County, Nobody serves it due to expense.
- Future service needs to be simple and convenient for people to want to use it
- How Golden State Blvd traverses the built environment in Malaga/Calwa and Fowler is different than Selma and Kingsburg, Fowler's built environment – this study can add opportunity for more comfort and safety along the corridor.

MentiMeter Polling Discussion

- FAX: (Kristopher): Route 38 FAX bus in the Calwa/Malaga area – major planned development area.
- FAX: many bus routes planned to relocate their Fresno stations closer to HSR
- FAX: Kings Canyon route, Jensen route planning to Calwa area….
- Lots of student activity on FAX route: Fresno state to Jensen
- Best service question
    - More frequent service
    - Connections to existing service
    - Other
        - Capacity constraints – Some FAX buses aren't large enough too accommodate all the riders during peak
- Barriers to transit
    - Top: It takes too long, doesn't arrive often enough, doesn't go where people need to go
    - Unserved locations
    - Transportation anxiety – navigation, reliability

- Transit goals FCRTA/GSB service priorities
    - How GSB traverses the built environment in Malaga and Fowler is more drastic than Selma and Kingsburg, Connections are tough
    - City of Selma – “prioritizing convenience…” To entice people out of a car, transit needs to be convenient and welcoming to use

Attachments:

- 6/15/23 Presentation Slideshow
- MentiMeter results
- Survey flyer

Fresno County Rural Transit Agency
State Route 99/Golden State Corridor
Transit Feasibility Study

Advisory Committee Meeting #2

September 19, 2023

Attendees

- FCRTA – Moses Stites and Janelle Del Campo
- Caltrans – Nicholas Isla and Chrisopher Xiong
- California Air Resources Board - Dr. Yachun Chow and Alaina Bompiedi
- City of Kingsburg - Christina Windover
- City of Selma – Lupe Macias
- Fresno Housing Authority - Brandon Gonzalez
- Fresno Area Express – Kristopher Grey
- Clovis Transit – Amy Hance
- Leadership Council for Justice and Accountability – Natalie Delgado
- Walker Consultants – Chrissy Mancini Nichols, Ben Weber, Tania Schleck, and Keith Hall
- Energeia – Ezra Beeman, Aubree Nygaard, and James Spargo
- Precision Engineering – Jared Linney

Best Practices Review

- Reviewed the following agencies regarding their bus rapid transit and increased bus service:
    - Ben Franklin Transit in in SE Washington State
    - Whatcom Transportation Authority in NW Washington State
    - Roaring Forks Transportation Authority in Roaring Fork Valley, Colorado
- Themes of importance for attracting riders are service frequency (every 15 minutes, focus on peak times if necessary), focusing on dense areas and zoning that allows for more density, and the importance of technology such as live bus tracking.

Public Outreach and Community Input

- Community outreach events in Selma, Fresno, Fowler, Kingsburg, and Reedley in June
    - Tabeling and surveys at businesses, farmers markets, door to door visits, and intercept surveys.
    - Online and paper survey from June 5th to August 31st
    - Outreach findings are detailed in the corresponding presentation (in email)
    - Committee was not surprised that service frequency, travel times, and stop locations near destinations was important to survey respondents.

- One committee member noted that Fresno Area Express (FAX) bus frequency has a ceiling of 30 minutes. Over 30 minutes and ridership drops. FAX Bus Rapid Transit Lite has 10 minute headways during the peak time.

Analysis

- SWOT Analysis: Reviewed SWOT analysis developed by study team
  - One Committee member noted that Chinatown is a prime opportunity due to future high speed rail.
- Origin and Destination Analysis: Discussed origin and destination analysis that shows most work and non-work trips are local. Data is based on cell phone and U.S. Census:
  - Kingsburg residents are making trips to mostly Kingsburg destinations and some Selma trips
  - Fowler residents are staying near Fowler and some people are traveling to SW Fresno
  - Selma trips stay near Selma with a number of people traveling to the rural area near Bowles
  - Most residents of SW Fresno begin and end their trips in Fresno
  - Discussion:
    - Some people do not have smart phones, so the cell phone data may not be as reliable. Note that Census data showed the same travel patterns as cell phone data
    - It is not uncommon to see people only making local trips because they do not have access to a car and current transit service is not commuter to provide access to jobs in other cities along the corridor. More frequent transit service would open access to more job opportunities along the corridor.
    - Many health clinic have opened outside of Fresno, which reduce trips along the corridor.
    - The parking lot on SR 99 and SR 43 (Food For Less) is an area for vanpooling meetup to travel to the correctional facility. Could potentially move those trips to transit with frequent service.
    - Congestion on SR 99 could be due to travel from other counties, for example from Madera to Tulare, those trips are not captured in this analysis because they begin and end outside of the corridor.
    - Consideration for how to support inter-regional trips. For example FCRTA has an existing partnership with Kings Area Regional Transit in Kings County to bring people from Hanford and Kings County to Fresno County. Opportunity for future connections and park and rides related to this study.
    - Currently there are not many transit connections to Valley Children's Healthcare.
    - FAX expanded its bus rapid transit during an event, very successful because of ease and convenience, brought in choice riders.
    - Tremendous amount of partnership potential from the college system.
    - Need to pull in microtransit and park and ride to increase the transit shed.

- Cost and Service Evaluation
    - Reviewed modal evaluation screening #1, which evaluated light rail, hybrid rail, and bus rapid transit. Findings show the feasibility of rail is low due to cost and low densities. Unlikely to be funded by FTA, funding is highly competitive. Rail was eliminated. Moving forward on evaluating bus rapid transit service options (see presentation for analysis).
- TOD Analysis and Density to Support Transit
    - The team is currently working on a transit-oriented development analysis and will reach out to cities with questions. Will need TOD to attract enough riders to make the increase in transit service cost sustainable.

Attachments:

- 9/19/23 Meeting Presentation Slideshow

Fresno County Rural Transit Agency
State Route 99/Golden State Corridor
Transit Feasibility Study

Advisory Committee Meeting

August 13, 2024

Attendees

- FCTRA – Moses Stites and Janelle Del Campo
- Caltrans – Christopher Xiong and David Huff
- Fresno Council of Governments – Jennifer Rodriguez
- City of Selma – Lupe Macias and Kamara Biawogi
- City of Fowler – Thomas Gaffery
- Clovis Transit – Amy Hance
- League of Women Voters - Kay Bertken
- California Air Resources Board - Julie Cooper and Andrew Reyes
- Walker Consultants – Chrissy Mancini Nichols, Keith Hall, Tania Schleck, Sydney Stephenson Shah, Ben Weber
- Precision Engineering – Jared Linney

Meeting Minutes

Project Schedule

- Public outreach recap, community survey and workshops show support for new, frequent transit
- The project team has completed existing conditions, goal development, TOD review, concepts and alternatives, and is now presenting the preferred concept to the Committee for input

Land Use and Growth Findings

- **Advantages:**
    - Compact, walkable downtowns surrounded by traditional residential neighborhoods
    - Centrally located bus stops provide walk to downtown

- **Challenges**:
    - Population and job growth is forecast to occur outside of downtown cores
    - Difficult to reach these areas with fixed route bus
    - Parking requirements limit density, which is a physical barrier to transit access
    - FCRTA noted there are challenges with rural transit due to lack of density; even microtransit has been difficult to sustain; for example, the microtransit service in Biola has no deadhead, and costs are still high the bigger picture is how to move more people along the corridor
    - City of Fowler has entitled 20 new downtown housing units, more in the pipeline
        - City of Fowler noted the Housing Accountability Act inhibits the ability for smart growth

- Housing must be built on available, mostly larger parcels that are not available in downtown cores

Service Screening Evaluation/Modeling Results

- Last Advisory Committee Meeting: After reviewing the capital and operating costs of rail options, along with demographic characteristics of peer systems, FCRTA and the Project Advisory Committee determined that bus-based transit solutions were the most appropriate transit solution to move forward for further analysis.
    - Walker evaluated light rail, hybrid rail (using freight rail lines), and bus rapid transit
    - Rail: Challenges with high capital costs of rail modes; ridership does not support the cost
    - Bus Rapid Transit: Provides a more flexible option that can be tailored to fit the rural context
- The project team worked with the Fresno Council of Governments to perform a ridership model for Bus Rapid Transit
    - Modeled based on the updated FCOG model (updated in 2024)
    - Modeled a frequent route option with 15-minute peak and 30-minute of-peak service times. Service operates between 6am and 10pm
    - Existing FCRTA Southeast Corridor route is replaced with BRT route that remains on Golden State Boulevard
- Modeling forecast results in little ridership change under any transit scenario through 2035
    - Model assumes lower employment and population growth
    - Ridership projections do not justify high capital and operations costs
    - Reasons ridership is projected to be low:
        - BRT operates on a liner route on Golden State Boulevard, does not veer outside the downtown cores of Kingsburg, Selma, Fowler, Malaga, Cala, or SE Fresno.
        - Most of the growth that will occur (housing and jobs) is projected outside of the downtown cores, and would not be walkable to the bus stops.
        - This dispersed growth outside of the downtown cores is challenging to serve, (more costly and slower) while attracting fewer riders (less cost-effective)
        - The level of ridership results in high capital and operating costs per rider, reducing opportunities for federal and state funding
        - BRT is a local solution for a regional problem. Congestion on SR 99 results from vehicles beginning or ending trips outside of Fresno County, which would not be served by this BRT.
        - FCRTA pointed out that FCOG modeling doesn't necessarily correspond with local city plans
- **Opportunities**
    - Microtransit could operate faster and more efficiently and reach people outside of the downtown cores near-term without taking on the burden of capital expenditures
    - The corridor has several closely spaced and larger population centers either directly along the corridor or that can be connected to the corridor through a microtransit transfer
    - City of Selma agreed that there is development outside of cities, Selma is undergoing a downtown business revitalization project, noted new healthcare networks

- Travel patterns show origins and destinations to and throughout the rural areas, not necessarily people going from the rural areas to Fresno.
- City of Fowler noted that the city's new zoning code should be approved this week with some parking reductions in the commercial areas
- BRT implementation could be phased over time with improvements by other agencies, such as managed lanes (high-occupancy vehicle or toll lanes built by CalTrans

- **Transit Evaluation**
  - The project team then evaluated light rail, bus rapid transit, and microtransit according to feasibility and project goals
    - Microtransit ranked highest
      - Supports findings that travel is happening in and around the rural areas
      - Allows FCRTA to rollout out a demonstration
      - Allows service to grow over time to support BRT in the future

- **Recommended Service Concept**
  - The project team presented the recommended service concept
  - Microtransit:
    - Increase service along the Golden State Corridor
      - SE Fresno, Malaga, Calwa, Fowler, Selma, Kingsburg
      - App-based on-demand local service that serves the downtown cores and nearby areas to reach people; riders can travel on microtransit within a designated zone or transfer to a fixed route to go to other cities
      - Microtransit connects riders to existing FCRTA Southeast service (which would increase the number of daily trips from three to six)
    - Spurs
      - Similar service would operate in Reedley, Parlier, and Orange Cove, providing more transit service in these locations and connecting people to fixed-route Southeast bus
  - Question about how the service would work with the existing FCRTA Dial-a-Ride:
    - Service would not overlap, it would complement
    - Dial-a-Ride would still serve ADA riders
    - FCRTA noted that we need to do a better job of educating passengers about fixed-route to increase ridership on fixed-route, dial-a-ride is expensive
      - People like the door-to-door convenience of Dial-a-Ride, but it is expensive
  - FCRTA highlighted the challenges with farebox recovery, the agency works to keep fares low, especially for seniors, veterans, and low-income, and can do so with support of Measure C funds
  - City of Fowler noted that the bike/pedestrian master plan will be released soon

Service Thresholds and Future BRT/SR 99 Managed Lane

- The project team discussed service thresholds for transitioning to future Bus Rapid Transit
- The project team discussed a concept for BRT build out based on the ridership threshold

- The project team presented a concept for an SR99 Managed Lane with a toll and bus lane to support future transit and reduce congestion on SR 99, the team has presented this to Caltrans
    - Long-term, Caltrans would lead any planning for SR99

Engineering Review

- Precision Engineering discussed the right of way considerations for bus/HOV lane and showed high-level concepts for BRT on GSB and SR99
- There are several pinch points that require further study

Next Steps

- Walker to move forward with the concepts for the report and present the final draft

Attachments:

- 8/13/24 Presentation Slideshow

Fresno County Rural Transit Agency
State Route 99/Golden State Corridor
Transit Feasibility Study

Advisory Committee Meeting

February 26, 2025

Attendees

- FCTRA – Moses Stites and Janelle Del Campo
- Caltrans – Christopher Xiong, David Huff, Nicholas Isla
- City of Fowler – Thomas Gaffery
- Fresno Area Express – Kristopher Grey
- California Air Resources Board - Dr. Yachun Chow
- Walker Consultants – Chrissy Mancini Nichols, Keith Hall, Tania Schleck, Sydney Stephenson Shah, Ben Weber
- Precision Engineering – Jared Linney
- Energeia – Nick Auerbach, Ezra Beeman

Meeting Minutes

Welcome

- FCRTA welcomed the committee and provided background information.

Project Schedule

- The project team discussed how the analysis, community outreach, and stakeholder input led to the recommendation.

Existing Conditions

- The project team discussed how the existing conditions findings show many trips within the rural areas on the corridor and among the rural cities. There are still trips to the rural cities and the City of Fresno, but most stay within rural areas.
- The project team discussed how corridor growth can lead to challenges with operating public transit. The corridor is growing in some locations, but the Fresno Council of Governments regional travel demand model shows limited growth overall. This is likely due to the population and job growth occurring outside of the downtown cores.
- The corridor communities lack the density to support bus rapid transit, light rail, or hybrid rail, given the high capital and operations costs.

Recommended Service Concept

- As previously noted, the project team worked with the Fresno Council of Governments to perform a ridership model for Bus Rapid Transit.
    - Modeled based on the updated FCOG model (updated in 2024).
    - Modeled a frequent route option with 15-minute peak and 30-minute of-peak service

times. Service operates between 6 a.m. and 10 p.m.
    - The existing FCRTA Southeast Corridor route is replaced with the BRT route that remains on Golden State Boulevard.
- Modeling forecast results in little ridership change under any transit scenario through 2035.
    - Model assumes lower employment and population growth.
    - Ridership projections do not justify high capital and operations costs.
    - Reasons ridership is projected to be low:
        - BRT operates on a liner route on Golden State Boulevard and does not veer outside the downtown cores of Kingsburg, Selma, Fowler, Malaga, Cala, or SE Fresno.
        - Most of the growth (housing and jobs) is projected outside of the downtown cores, and it would not be walkable to the bus stops.
        - This dispersed growth outside the downtown cores is challenging to serve (more costly and slower) while attracting fewer riders (less cost-effective).
        - The level of ridership results in high capital and operating costs per rider, reducing opportunities for federal and state funding.
        - BRT is a local solution for a regional problem. Congestion on SR 99 results from vehicles beginning or ending trips outside of Fresno County, which this BRT would not serve.
        - FCRTA pointed out that FCOG modeling doesn't necessarily correspond with local city plans.
    - One challenge is that congestion on State Route 99 is occurring because of trips originating or ending in locations outside of Fresno County. Moving those trips to transit is challenging if it only operates in Fresno County.
- The project team discussed the opportunities on the corridor (as discussed in a previous Advisory Committee meeting).
    - FCRTA noted that future High Speed Rail could help capture regional trips
- The project team presented the final recommended service concept:
    - Microtransit:
        - Increase service along the Golden State Corridor
            - SE Fresno, Malaga, Calwa, Fowler, Selma, Kingsburg
            - App-based on-demand local service that serves the downtown cores and nearby areas to reach people; riders can travel on microtransit within a designated zone or transfer to a fixed route to other cities.
            - Microtransit connects riders to existing FCRTA Southeast service (which would increase the number of daily trips from three to six).
        - Spurs
            - Similar service would operate in Reedley, Parlier, and Orange Cove, providing more transit service in these locations and connecting people to fixed-route Southeast bus.
        - Dial-a-Ride would still serve ADA riders
    - FCRTA again highlighted the challenges with farebox recovery; the agency works to keep fares low, especially for seniors, veterans, and low-income, and can do so with the support of Measure C funds. Measure C is up for renewal.

- Precision Engineering discussed the right-of-way considerations for bus/HOV lane and showed high-level concepts for BRT on GSB and SR99.
- Energeia reviewed any energy requirements as a result of operating zero-emissions buses.
- Caltrans noted that this could be a potential future transit solution.
- The City of Fowler noted that the recommended concept is where the city thought it would land, and it is a good goal to move towards, as the City has 1,000 housing units in the pipeline.
- FAX noted to work in conjunction with potential for transit oriented development to help frame the capital needs.

Next Steps

- FCRTA and the project team will finalize the plan.

Attachments:

- 2.26.25 Presentation Slideshow