Solano Active Transportation

Appendices

B: Technical Analysis and Summary Memorandums

Creating Connected and Safe Networks Using Level of Traffic Stress Analysis

To maximize the use of a bicycle network, networks should make bicycling attractive and accessible to people of all ages and abilities. Level of Traffic Stress (LTS) analyses can be used to determine the most and least stressful segments for bicycling in the existing roadway network and indicate where improvements are needed.

When analyzing LTS, it is important to consider the range of people who ride bikes. On one end of the bicyclist spectrum are highly confident bicyclists who are comfortable riding with traffic. The other end of the spectrum includes people who are not comfortable riding with or adjacent to traffic (e.g., children, the elderly, and occasional adult bicyclists). They prefer off-street bicycle facilities or bicycling on low-speed, low-volume streets and may not bike at all if bicycle facilities do not meet their comfort preferences. In the middle are people who prefer separated facilities but are sometimes willing to ride with or adjacent to traffic if needed.

LTS analysis involves mapping out the existing roadway network and color-coding segments based on their traffic speeds and volumes. It is based on the premise that a person's level of comfort on a bicycle increases as separation from vehicular traffic increases and as traffic volumes and speeds decrease. Conversely, the higher traffic speeds and volumes are, the higher level of stress a potential bicyclist riding that segment would experience. By analyzing networks from an LTS perspective, gaps in the low-stress bicycling network can be identified and projects implemented to create a connected low-stress network attractive to all riders.

Comfort Typology of Bicyclists

Design User Profile	Non-Bicycle	Interested but Concerned	Somewhat Confident	Highly Confident
Bicycling Preferences	Uncomfortable bicycling in any condition, have no interest in bicycling, or are physically unable to bicycle.	Often not comfortable with bike lanes, may bike on sidewalks even if bike lanes are provided; prefer off-street or separate bicycle facilities or quiet or traffic-calmed residential roads. May not bike at all if bicycle facilities do not meet needs for perceived comfort.	Generally prefer more separated facilities, but are comfortable riding in bicycle lanes or on paved shoulders if need be.	Comfortable riding with traffic, will use roads without bike lanes.
Percent of General Public	31-37%	51-56%	5-9%	4-7%

Figure 1. Comfort typology of bicyclists.

On low-speed and low-volume streets, separated bicycle facilities are not usually necessary, as most bicyclists are comfortable riding in or directly adjacent to vehicle traffic with these characteristics. However, if either traffic volumes or speeds (or both) are high, then further separation of bicycle facilities is warranted in order to ensure bicyclists of all ages and abilities remain comfortable. There are a variety of bicycle infrastructure treatments that physically separate bicyclists from motor vehicle traffic physically and temporally, including: protected bicycle lanes, bicycle signals, protected intersections, and bend-out treatments at transit stops. By incorporating these design elements into bicycle networks in addition to more traditional bicycle infrastructure (e.g., signed bicycle routes, standard bicycle lanes), jurisdictions can create seamless low-stress networks. Modern bicycle infrastructure has the added benefit of being beneficial to pedestrians as well.

People's experience at intersections has a critical impact on whether they choose to bike for a given trip. For this reason, the LTS analysis also scores intersection stress. Intersection stress is the result of the speed of traffic and number of lanes crossed. Stress can be reduced with traffic control devices. Low-stress streets and trails that cross a major street without a traffic signal are generally considered high-stress. Bicyclists in these cases would have to wait for a gap in high-speed traffic to cross, or they may be crossing a wide street. When a traffic signal is present, riders can count on the cross traffic being stopped.

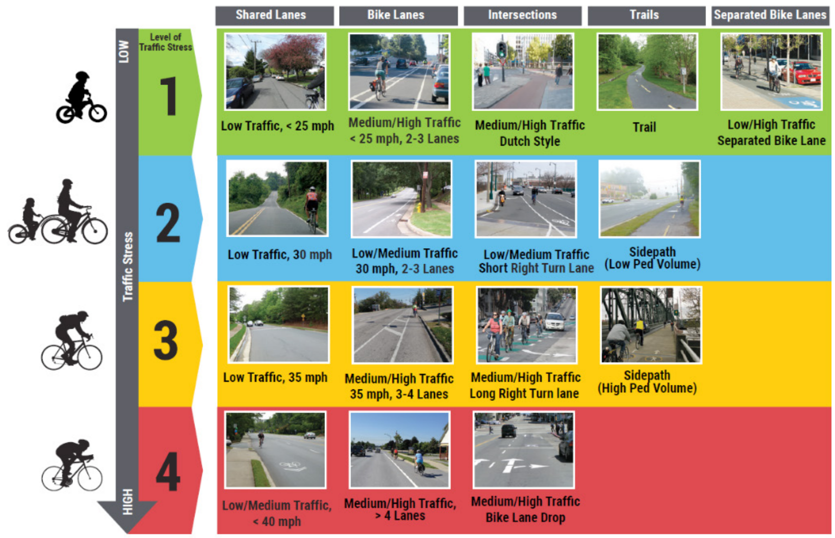


Figure 2. Level of traffic stress by bicycle facility

Best Practice Example

Alameda Countywide Active Transportation Plan LTS Analysis

The LTS analysis for the Alameda Countywide Bicycle and Pedestrian Master Plan determined traffic stress for both the existing bicycle network and planned bicycle network by evaluating the following characteristics of streets: traffic speed, traffic volume (sometimes using estimated volumes, sometimes using number of lanes as a proxy), presence of parking, and type of bicycle facility. Trails were given a default low-stress score, since they are by their nature separated from traffic stress.

The LTS analysis for Alameda County found the prevalence of high-stress riding conditions on the major streets—arterials and collectors—throughout the county. While 70 percent of the county's streets rate as low stress for bicycling, nearly all, 89 percent, of those streets are classified as local. For the most part, these are the residential streets of the county; meaning that many people have a low-stress street outside their front door. However, most residents would not feel comfortable bicycling beyond the limits of their immediate neighborhood because it is hemmed in by larger, high-stress streets, or cut off from the adjacent neighborhood by a high-stress crossing of a major street. In addition to low-volume local streets, the low-stress on-street network also consists of higher classification streets that have more robust bicycle facilities. In general, collector and arterial streets with bicycle facilities are less stressful than those without, but many of these streets with bicycle facilities (58 percent) are still high-stress. This is the result of bike lanes and bike routes existing in places with higher speeds and volumes.

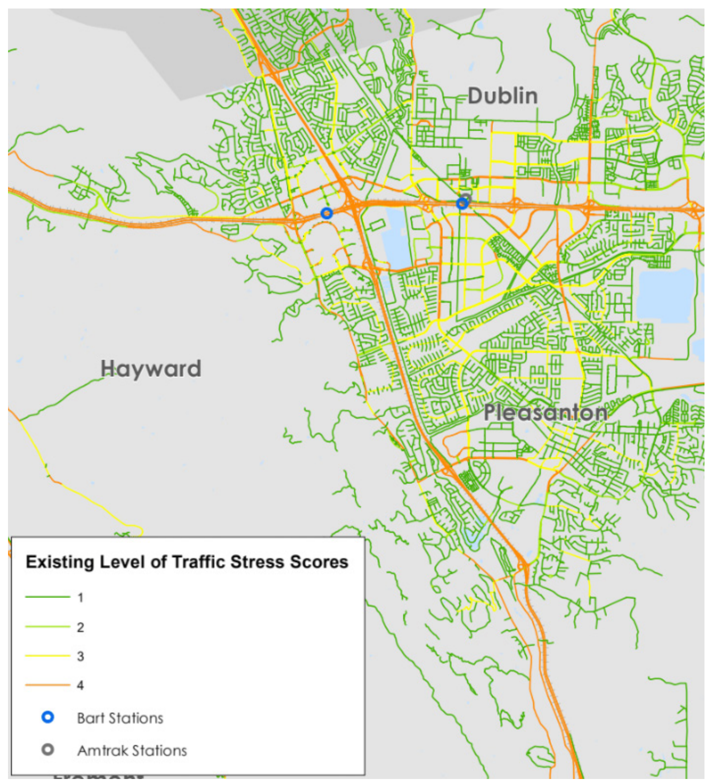


Figure 3. LTS Map for Hayward, Dublin, and Pleasanton from the Alameda Countywide Active Transportation Plan (Green (1) = Lowest Stress, Red (4) = Highest Stress)

Resources

Alameda Countywide Bicycle and Pedestrian Master Plan
https://www.alamedactc.org/app_pages/view/5390

Low-Stress Bicycling and Network Connectivity, Mineta Transportation Institute
https://transweb.sjsu.edu/sites/default/files/1005-low-stress-bicycling-network-connectivity.pdf

Planning for Walking at the Regional Scale

Planning for walking at the regional scale usually takes a different approach than for bicycling. By comparison, walking trips tend to be much shorter, so the concept of developing regional routes for walking makes less sense than for bicycling. Nonetheless, walking plays an important role in the transportation system and offers immense potential for helping jurisdictions achieve regional goals.

Regional governments can help local agencies plan for walking by providing education, technical assistance, tools, policy guidance, and a common vision. For example, some regional governments have adopted and implemented Complete Streets policies at a regional level and provide support to local jurisdictions who also hope to adopt Complete Streets policies. Regional governments also develop and share data, analyses, and design resources with local planners to encourage best practices in pedestrian planning and troubleshoot local barriers.

Regional Pedestrian Planning Themes:

1. Few regional governments have identified regional pedestrian networks. A more common approach is to identify pedestrian zones or areas with high expected levels of pedestrian activity.
2. Pedestrian zones are identified based on land use, street network characteristics, and the presence of transit service.
3. Regionally significant pedestrian corridors should be highly comfortable, including wide, separated facilities designed to accommodate expected levels of pedestrian activity.
4. Regional governments often provide tools and policy guidance to help local agencies improve conditions for pedestrians.

Contra Costa Countywide Bicycle and Pedestrian Plan

The Contra Costa Countywide Bicycle and Pedestrian Plan (Plan) identifies Priority Pedestrian Areas (PPAs) in order to prioritize pedestrian infrastructure improvement projects throughout the county, given limited funding. PPAs are characterized by high-density residential land uses, high combined residential and retail employment density, high combined total employment and retail employment density, high total employment density, and proximity to Priority Development Areas with higher forecasted growth. They also include a more diverse mix of land uses and contain existing connected pedestrian networks that support moderate or high levels of pedestrian activity. Walking routes within half a mile of public schools and transit stops with high-frequency service were also included as PPAs.

Once the PPAs are identified, recommended treatments include: constructing new walkways, installing new curb ramps or retrofitting existing curb ramps, improving pedestrian crossing safety, installing traffic calming measures, creating more direct connections between destinations, and adding streetscape improvements. See map on reverse.

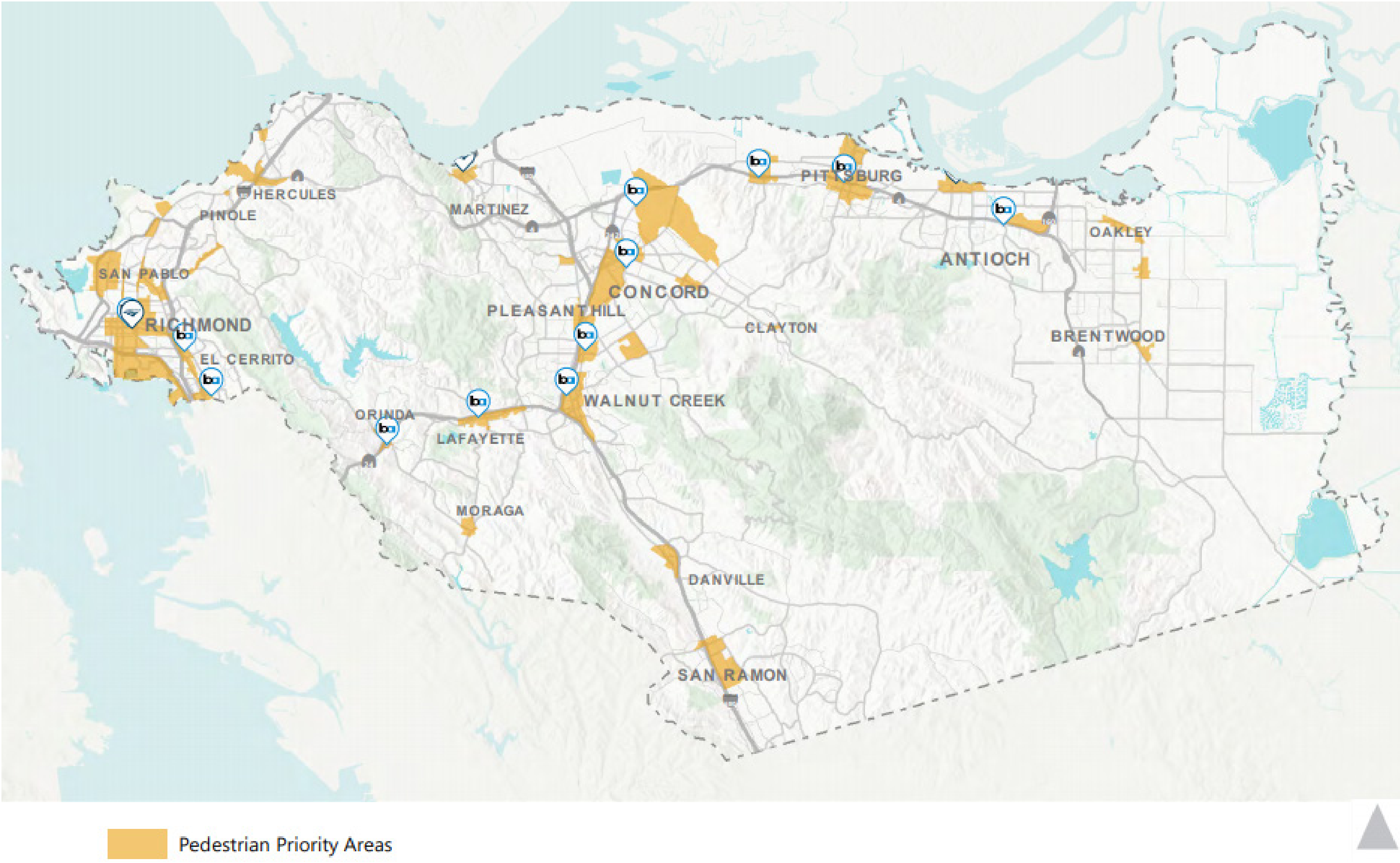


Figure 1. Priority Pedestrian Areas in the Contra County Bicycle and Pedestrian Plan

Capital Area Metropolitan Planning Organization (Austin, TX)

As part of its pedestrian planning process, CAMPO develops Pedestrian Zones and a set of networks to guide project prioritization and implementation decisions. Pedestrian Zones are areas in the region where walking is likely to occur. These areas include locations with a high intersection density.

CAMPO focuses their pedestrian planning efforts within the Pedestrian Zones. As outlined in CAMPO's 2045 Regional Active Transportation Plan, CAMPO uses three types of networks to assess gaps, support first- and last-mile connections to transit, and improve access to local destinations and communities throughout the region.

Unconstrained network: All projects identified by local officials and CAMPO staff during the planning process and routes provided by the public through an online interactive map.

Local networks: Areas in the region where population density, street grid density, and other factors support short bicycling and walking trips and access to transit. The specific projects for local networks come from local governments.

Regional priority network: Organized into three tiers and identifies key longer-distance routes that connect communities to one another.

CAMPO also provides design guidance to help set a regional standard for facilities and to support the efforts of local jurisdictions. The design guidance includes topics such as pedestrian facilities, street lighting, transit access, green infrastructure, and street trees.

A growing number of regional governments, including CAMPO, have begun to encourage the use of green infrastructure and street trees as a way to improve the pedestrian environment and encourage more people to walk.

Resources

Contra Costa Countywide Bicycle and Pedestrian Plan (2018)
http://www.ccta.net/uploads/5ae76dbd290f3.pdf

Capital Area Metropolitan Planning Organization 2045 Regional Active Transportation Plan (2017
https://47kzwj6dn1447gy9z7do16an-wpengine.netdna-ssl.com/wp-content/uploads/2018/03/Final-Plan-for-web.pdf

Regional Approaches to Bicycle Network Planning

Regional approaches to bike network planning vary from region to region. Typically, a "bike network" refers to a combination of trails, shared-use paths, bike lanes, shoulders, and shared streets that connect bicyclists to destinations. Some jurisdictions also consider end-of-trip facilities, such as bike parking and repair stations, as part of their network. Bike network planning at any scale usually includes establishing a purpose and vision, mapping existing and planned facilities, identifying areas with potential for increased bike trips (latent demand analysis), engaging with stakeholders and the broader public, and the development of an implementation plan. However, some regional governments choose not to develop a regional bike facilities network, preferring to focus on policies, programs, and guidance. Another approach common at the regional or statewide scale, is to develop a somewhat conceptual network, highlighting important connectivity needs, but not specifying exact alignments or facility types. In either case, design guidance should be provided to promote uniformity and cohesion throughout the network.

Regional Bike Network Themes:

1. There are a variety of network development approaches used by regional jurisdictions for different planning purposes. There is not a one-size-fits-all solution and not all regional governments have developed a regional network.
2. Regional networks provide a unifying vision but are only sometimes tied to funding.
3. In many instances, existing and proposed facilities, as identified through previous local planning efforts provide the basis for a regional network and regional networks are typically consistent with local plans.
4. Network development can focus on connecting regional destinations and major transit centers and on providing cross-jurisdictional links; some communities focus on short trip areas for walking and biking enhancements, while emphasizing connections to transit for longer trips.
5. In some cases, regional routes are considered flexible, with exact alignments and facility types to be identified through local planning processes.
6. Tiering, or some other mechanism for indicating significance is a commonly used strategy.
7. Some regional governments have separate on- and off-street networks in their regional network maps/visions.
8. Facility design guidance and definitions are helpful to promote consistency and uniformity.
9. Facilities implemented on regional routes should be highly comfortable and serve all ages and abilities. Less comfortable facilities should be reserved for limited cases with feasibility constraints or where the emphasis is on providing facilities for highly skilled cyclists.
10. A regional network is often only one aspect of a regional government's Active Transportation program. Technical assistance and data sharing is commonly used to support implementation of the regional network.
11. Regional bike network planning does not need to focus solely on addressing commute trips. Most walking and bicycling trips are made for trips other than for work (e.g., to run errands, visit friends, for recreation), so it is effective to address these trip types when planning the regional network, even if that means a more localized focus.

Napa Countywide Bicycle Plan Update

The first step during development of the recommended bicycle network for the Napa Countywide Bicycle Plan Update was to create a bicycle study network, which identified the overall set of streets to be included in the network before specifying facility types for each street. Feedback from the county (Napa Valley Transportation Authority), local jurisdictions (City of Napa, American Canyon,

Calistoga, Yountville, and St. Helena), and community members informed the study network as well as recommendations in existing regional and local bicycle plans and Strava heatmap data.

The study network was intended to be comprehensive enough to connect major destinations (e.g., schools, parks, commercial centers, and trails) as well as known recreational riding routes and existing bicycle facilities. In instances where multiple options were available to create a desired connection, the route with the best existing bicycle conditions (i.e., low vehicle speeds and volumes) was selected for inclusion in the study network.

Once the study network was finalized, bicycle facilities were assigned to each route in the network. Facilities selection was informed by the AASHTO Bicycle Facility Selection Chart (based on traffic speeds and volumes), posted speed limits, estimates of traffic volumes based on the number of lanes on each segment, general network configuration, discussions with regional and local planning staff, and observations in the field.

Alameda County Bicycle & Pedestrian Master Plan for Unincorporated Areas

The bicycle study network in the Alameda County Bicycle & Pedestrian Plan for Unincorporated Areas was developed from the preceding plan's network, Wikimap comments received from community members during public outreach, client feedback, and Strava heatmap data.

For all urban and suburban streets, the AASHTO Bicycle Facility Selection Chart guided facility selection along the study network's various corridors. Facilities were only recommended if they could fit within the existing curb-to-curb width, an assumption made to ease implementation of the recommendations. Actions identified to reallocate roadway space to implement facilities included lane diets (i.e., reducing the width of vehicle lanes), road diets (i.e., reducing the total number of vehicle lanes), parking reconfiguration, parking removal, and, in limited cases, roadway widening. Widening is only recommended on streets with open drainage. Traffic

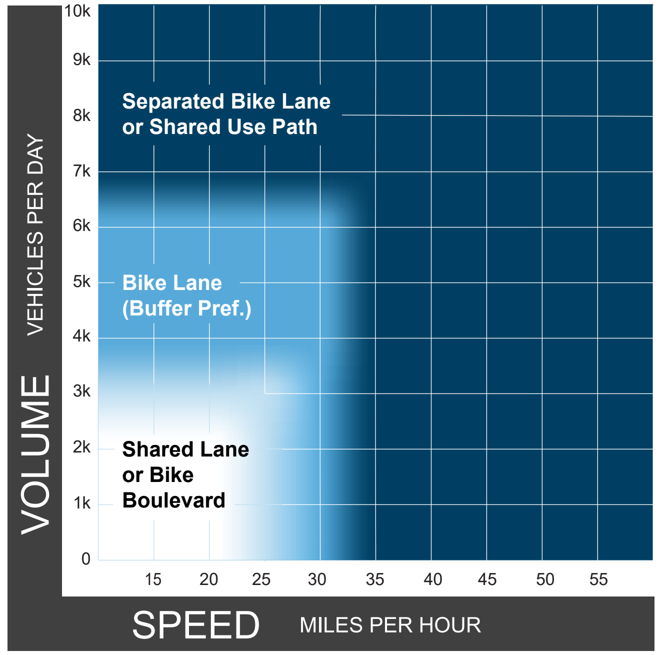


Figure 1. AASHTO Bike Facility Selection Chart for Urban and Suburban Roadways.

calming is recommended for implementation of bike boulevards in most cases, and installation of shared lane markings and wayfinding in others.

Capital Area MPO (Austin, TX)

In its 2045 Regional Active Transportation Plan, CAMPO, the MPO for the Austin, TX region, developed an inventory of local and regional existing and planned network elements, conducted a demand and needs analysis, and established a three-tier prioritization scheme. In addition to bike facilities, CAMPO included bike detection at traffic lights, signs and wayfinding, and bike parking in their network inventory. The list of existing and planned bike facilities included trails, bike lanes, separated bike lanes, and shoulders. CAMPO used the following types of data to identify areas with high potential for bicycling: demographic and socio-economic information, vehicle ownership, bicycle and pedestrian crashes, transit and active transportation facilities, and points of interest (e.g., schools, universities, parks, and court houses). CAMPO's planning team identified potential regional routes that connect population centers and popular destinations. This information was used to develop a priority facility network. The priority network is separated into Tier I, Tier II, and Vision Connectors (Tier III) to be developed in the next 10 years, 25 years, and 25+ years, respectively.

Resources

Napa Countywide Bicycle Plan Update (2018)
http://www.nvta.ca.gov/napa-countywide-bicycle-plan-update

Alameda County Bicycle & Pedestrian Master Plan for Unincorporated Areas (2018)
https://www.acpwa.org/pas/bicycle-and-pedestrian-master-plan

Capital Area Metropolitan Planning Organization 2045 Regional Active Transportation Plan DRAFT (2017)
http://www.campotexas.org/wp-content/uploads/2017/08/Public-Draft-2045-Regional-Active-Transportation-Plan-081517-for-web.pdf

Incorporating Equity in Active Transportation Planning

Active transportation options contribute to a more equitable transportation system by reducing barriers for people who do not use a motor vehicle. Many people do not drive because of ability, income, age, or a combination of these factors. The cost of owning and maintaining a vehicle can be a major burden, especially on low-income families. People without a vehicle need to access employment, school, grocery shopping, and a variety of other activities to fully participate in society. Transit, walking, and bicycling play a vital role in the overall transportation system by offering increased mobility, independence, and access to opportunity for people without vehicles.

National statistics point towards the need for equity in active transportation planning and design. Across the country, a disproportionate share of walking and bicycling fatalities occur among non-white, older adult, and low-income populations.[1] Fatality rates are 23 percent to 30 percent higher for Latino and African-American bicyclists than for white bicyclists.[2] Additionally, individuals 65 years or older are 50% more likely than younger populations to be killed while walking. Older adults can face considerable mobility challenges, especially after giving up driving either by choice or necessity. Older adults who live in neighborhoods with connected and accessible active transportation infrastructure have better access to daily physical activity and can have an easier time remaining independent without a vehicle.

Active transportation planning and design should incorporate equity throughout every step of the process. Projects that fail to incorporate the voices of the community run the risk of exacerbating existing inequities and may even get derailed by vocal opposition. The following are important considerations for incorporating equity:

- Ensure that community engagement encourages participation from all members of the community early and throughout the process. This begins with scoping projects to include the necessary budget for engagement, identifying key stakeholders, and adopting a flexible approach. It is best practice to “meet people where they are.” Planners must look beyond the traditional public meeting. Approaches should be designed to reduce barriers to participation and provide culturally relevant amenities and activities.
- Design transportation infrastructure to be responsive to community feedback and balance existing and desired travel behaviors. These factors should be taken into consideration with bicycle facility selection, crosswalk siting, and other key features of active transportation infrastructure.
- Make decisions about investment based on equity. The traffic safety challenges faced by residents of lower-income neighborhoods are often a result of historic patterns of disinvestment and higher dependence on transit, walking, and biking. An equitable approach to investment includes prioritizing projects and programs that have safety benefits for populations and communities at greatest risk. Many agencies incorporate equity into their project funding prioritization criteria and scoring.

1 Dangerous by Design. Smart Growth America, 2016. https://smartgrowthamerica.org/dangerous-by-design/
2 Centers for Disease Control and Prevention, 2001. Cited in: League of American Bicyclists. The New Majority: Pedaling Towards Equity.

San Jose Better Bike Plan 2025

The San Jose Better Bike Plan is prioritizing extensive community outreach during plan development. Outreach methods are intended to cast a wide net and capture feedback from a diverse, representative cross-section of the city population. Outreach includes engaging online tools, connecting with members of the community at popular civic events, and partnering closely with three of the city's most influential community-based organizations to ensure that the Plan will reach people who might otherwise face barriers to participation. These partners include liaisons to the city's Spanish- and Vietnamese-speaking residents, helping to build trust and communicate with these communities. VIVO works to provide employment opportunities, health and family services, and English language classes to San Jose's robust Vietnamese population; LUNA works to unify the Latino community of Silicon Valley to improve the quality of life of its families; and Veggielution works to connect San Jose's diverse population and build community through food and urban farming in East San Jose.

Figure 1. Community outreach event during the development of the San Jose Better Bike Plan

Denver Vision Zero Action Plan

Equity was a focus of both the outreach and action strategies for Denver's Vision Zero Action Plan. Analysis showed that corridors with a disproportionate share of injury and fatality crashes have significant overlap with communities of concern. Communities of concern is a term used by several Vision Zero cities, including Denver, to describe neighborhoods that have low income and education levels, high concentrations of seniors, low rates of vehicle ownership, high obesity rates, and high numbers of schools and community centers. The City held pop-up events at four locations in communities of concern and engaged nearly 200 people in face-to-face conversations. The resulting Action Plan acknowledges that certain enforcement strategies, such as increased patrolling, can exacerbate injustice, increase distrust, and be counterproductive for Vision Zero. Therefore, the plan focuses on street design changes as a primary strategy to address traffic safety in communities of concern. The plan also commits to using automated speed enforcement paired with warning signs on high injury corridors and school routes. Fines for traffic violations will not be increased and a pilot "diversion" program will offer positive reinforcement of good driving behaviors. Finally, the City plans to continue holding discussions in communities of concern about topics related to Vision Zero.

Figure 2. Community outreach event during development of the Denver Vision Zero Action Plan

Resources

City of Oakland Let's Bike Oakland! (Ongoing)
https://www.oaklandca.gov/projects/lets-bike-oakland-oaklands-bike-plan

City of San Jose Better Bike Plan 2025 (Ongoing)
https://www.bikesanjose.com/

City of Denver Vision Zero Action Plan (2017)
http://www.denvergov.org/content/dam/denvergov/Portals/705/documents/visionzero/Denver-Vision-Zero-Action-Plan.pdf

Pedestrian and Bicycle Volume Data

Many jurisdictions have established systems and processes for collecting and managing motorized traffic volume data. Historically, volume data collection for bicycling and walking has not received the same attention and resources, though jurisdictions are now bridging this gap in important ways.

Non-motorized count data can be used by local agencies for several purposes, including monitoring trends, evaluating changes in use after a new facility is implemented, developing pedestrian or bicycle crash risks, estimating miles walked or biked, or calibrating travel models. Non-motorized count data can be collected manually or with automated sensors. Manual bicycling and walking count data provides a low-cost avenue for communities to begin counting pedestrians and bicyclists. It also allows for collection of behavioral data that is not easily obtained through automated means. However, manually collected count data has significant limitations due to the short duration of manual counts and requires significant staff or volunteer time to develop a robust dataset. Nonetheless, manual counts have been used by many local and regional agencies.

In recent years, many state and regional agencies have started to develop larger non-motorized count programs that rely on automated counters. With automated counters, counting can be conducted over long periods of time (including permanent installations), resulting in a rich dataset. Automated count equipment vendors usually offer methods for downloading count data remotely, which simplifies the data collection and organization process. Note that significant data management and analysis resources are generally required to process and interpret data obtained from automated counters. Quality control protocols should be followed to ensure the data is reliable. Automated counters also require up-front equipment and installation costs and ongoing maintenance. Because of the complexity of automated count data, the most successful state and regional count programs are developed based on strategic agency goals and are well integrated within the agency's operations.

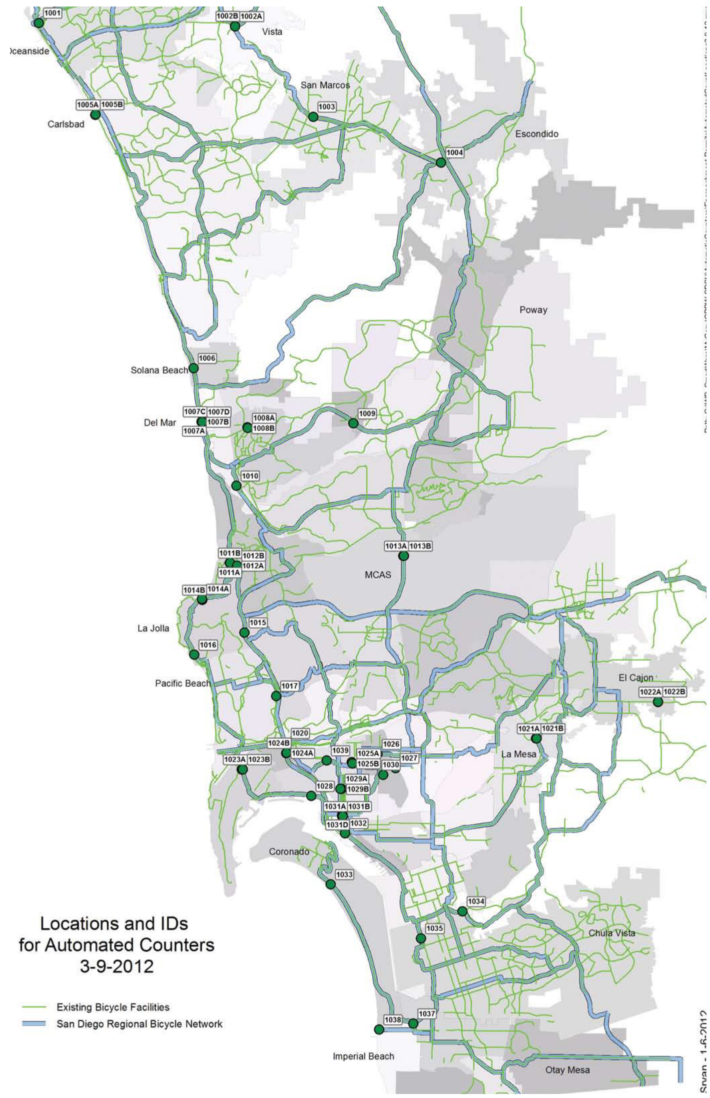


Figure 1. Locations of automated counting devices in San Diego County Active Transportation Monitoring Program.

Best Practice Examples

Designing and Implementing a Regional Active Transportation Monitoring Program Through a County-MPO-University Collaboration

As part of a grant to promote physical activity, the County of San Diego Health and Human Services Agency teamed with San Diego State University and the San Diego Association of Governments (SANDAG) to implement an active transportation monitoring program. Through this partnership, SANDAG installed Eco-Counter devices at 26 representative sites throughout San Diego County: 15 sites along Class II bike lanes or Class III bike routes, seven sites on

Class I shared-use paths, and four sites in urban areas with heavy pedestrian traffic. Sites were determined to be "representative" by looking at population density, employment density, and median household income. 24-hour counts were conducted at 15-minutes intervals, and data was automatically uploaded to a count database. The data collected were used to understand existing active transportation patterns and inform long-range planning efforts for construction of new countywide bikeway and pedestrian facilities.

Southern California Association of Governments Bike Count Data Clearinghouse

One of the best examples of a regional non-motorized count program is the Southern California Association of Governments' (SCAG) Bike Count Data Clearinghouse. Jurisdictions in the region upload their count datasets to the site and the data are presented in an interactive web map. Public users can view the map and download the raw datasets. However, the count data does not have standardized variables, making it challenging for users to compare data across jurisdictions. Currently, the web map has data for over 1,000 count locations.

The Clearinghouse also includes a manual, Conducting Bicycle and Pedestrian Counts, that discusses count types, how to properly conduct bicycle and pedestrian counts, preparation before counts, and count technologies.

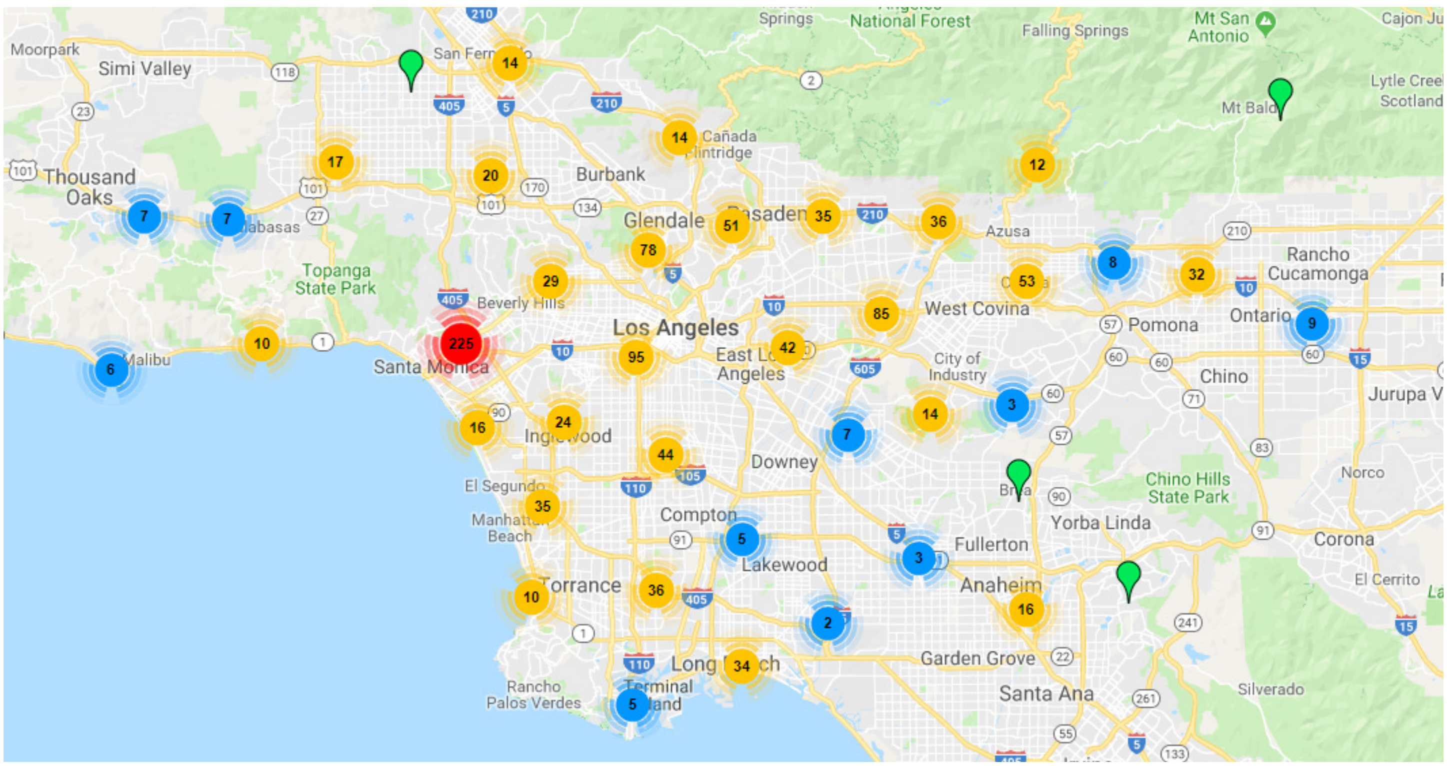


Figure 2. Bike count data Clearing House Interactive Map

Resources

SANDAG Designing and Implementing a Regional Active Transportation Monitoring Program Through a County-MPO-University Collaboration
https://activelivingresearch.org/sites/default/files/2013_Methods_Ryan.pdf

Southern California Association of Governments Bike Count Data Clearinghouse
http://www.bikecounts.luskin.ucla.edu/

Conducting Bicycle and Pedestrian Counts
http://www.bikecounts.luskin.ucla.edu/

Pedestrian and Bicycle Wayfinding

Wayfinding is a comprehensive system of signage and maps that helps residents and visitors orient themselves to trails, bike paths, and transit routes. People are accustomed to wayfinding systems while driving, but they also benefit people walking, biking, and using transit. Wayfinding provides four main pieces of information:

- Current location
- Direction and distance to destinations
- Confirmation of correct routing
- Notification of arrival at destinations

Wayfinding also encourages and promotes the inclusion of physical activity into everyday work and recreation by making transportation options more approachable and understandable. A comprehensive wayfinding system of signage and maps can provide guidance for recreational runners or bicyclists without a specific destination, and reassurance for visitors unfamiliar with an area. Transit-focused wayfinding can help to integrate bicycling and walking with public transportation. Well-designed and branded wayfinding can also reinforce a community's sense of place, benefiting not only users of bicycle and pedestrian facilities, but the entire community.

Table 1. Benefits and Challenges of Wayfinding (St. Croix County Recreational Bicycle and Pedestrian Plan)

Benefits	Challenges
• Improves the usefulness of the bicycle network, especially when routes diverge from well-known streets. • Helps bicyclists find lower-stress bikeways. • Supports bicycle encouragement efforts by reducing concerns about misdirection and getting lost. • Indicates to motorists to expect bicyclists, especially on popular bike routes.	• Can cause unnecessary confusion if signs do not uniquely identify the route, if the selection of destinations is not optimized, and if placement of signs is not logical. • Bike route signs should be placed in addition to appropriate facility types such as paved shoulders or bike lanes. Bike route signs are only a suitable stand-alone treatment on very low-traffic roads. • Too many signs can contribute to sign clutter.

Wayfinding is especially important for non-contiguous networks, where users must navigate gaps in pedestrian or bicycle facilities. As technology continues to advance, routing and facility information is often easily accessible in active transportation plans or using online mapping or routing service.

Ventura County Bicycle Wayfinding Plan

When wayfinding is considered for a regional network of bicycle facilities, the focus should be on providing consistent signage and direction across a multi-jurisdictional context. The Ventura County Transportation Commission developed a Bicycle Wayfinding Plan that identified 17 regional routes with over 400 miles of bikeways that represent where people ride and where they want to ride. Regional routes provide connections between communities, acting as a backbone to local bicycle networks which provide connections to local destinations. To do this, the Plan developed a set of ten goals to go from route and network planning to sign design and implementation.

City of El Cerrito Active Transportation Plan

For individual facilities, wayfinding helps to communicate progress along a route and the distance to nearby destinations. The City of El Cerrito in Contra Costa County updated its Active Transportation Plan in April 2016, including a comprehensive system of wayfinding consistent with other local wayfinding programs. One of the key components of the Plan included installation of wayfinding signs along the Ohlone Greenway at all roadway crossing locations. The Greenway is a multi-jurisdictional Class I Multi-Use Path that connects Berkeley to Richmond, including three BART stations. The wayfinding signs provide direction and distance to the nearest BART station as well as other key destinations.

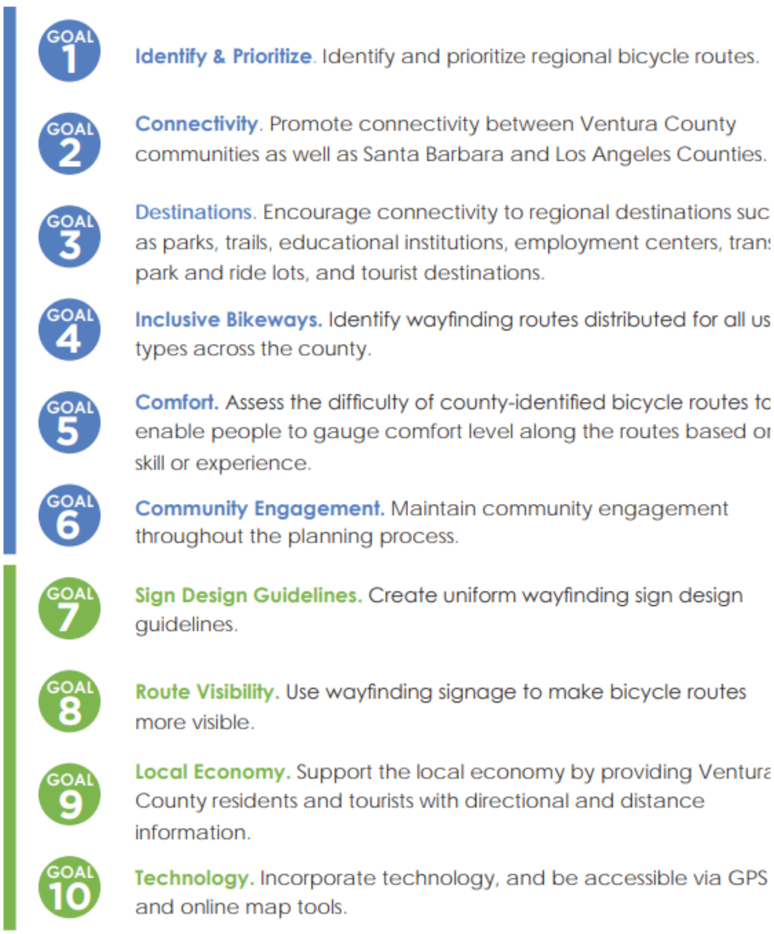


Figure 1. Ventura County Bicycle Wayfinding Plan Regional Wayfinding Goals

Figure 2. Wayfinding on the Ohlone Greenway at Moeser Lane in El Cerrito, CA

Resources

St. Croix County Recreational Bicycle and Pedestrian Plan (2008)
https://www.sccwi.gov/337/Bicycle-Pedestrian-Plan

Ventura County Regional Bikeway Wayfinding Plan (2017)
https://www.goventura.org/wp-content/uploads/2018/03/VCTC_Bicycle_Wayfinding__Plan_April_2017_FINAL.pdf

City of El Cerrito Active Transportation Plan (2016)
https://el-cerrito.org/DocumentCenter/View/6290/Active-Transportation-Plan?bidId=

Implementation Strategies for Active Transportation

Active transportation plans develop thoughtful recommendations for bicycle and pedestrian projects that expand and enhance the existing networks. However, these recommendations are only useful if they are feasible and matched with tools for implementation. Many projects are never constructed due to barriers encountered during the implementation phase. With proper planning, many of these barriers can be mitigated or avoided. Key challenges and strategies are outlined below:

Challenges	Strategies
Lack of agency resources or staff capacity	Ongoing Bicycle and Pedestrian Committee (BPAC) to shepherd implementation
Lack of interagency coordination	Agency coordination through an ongoing Steering Committee
Political sensitivity or community pushback	Meaningful community engagement that reaches a representative cross-section of the population
Feasibility	Review checklist of critical feasibility barriers
Lack of funding	Leveraging grants, sales tax measures, CIPs, private development, etc. for funding
	Using routine paving/resurfacing projects as opportunities to implement active transportation facilities

Best Practice Examples

Contra Costa Countywide Bicycle and Pedestrian Plan

The Contra Costa County Bicycle and Pedestrian Plan includes a robust implementation chapter outlining numerous strategies to successfully implement the Plan's recommended bicycle and pedestrian projects. It establishes seven priority criteria for funding to be used when scoring and ranking projects for implementation, asking to what the extent the project will: improve connectivity and eliminate gaps, serve a wide range of users, support increased transit ridership, leverage funds from other sources, generate walking and bicycling trips, demonstrate feasibility, and integrate with other local efforts. In addition to establishing funding criteria, the Contra Costa Transportation Authority conducted a thorough analysis of finding sources for its projects.

San Ramon Bicycle Master Plan

Due to limited financial resources, prioritization of projects and identification of funding opportunities is crucial to implementation of the San Ramon Bicycle Master Plan. Project prioritization criteria are outlined in a table and include: connectivity, demand and comfort, key destinations and demand, feasibility, safety, and safe routes to school. Projects are assigned points and ranked based on their ability to address these criteria.

One implementation strategy is to coordinate the construction of lower-priority striping projects with existing repaving schedules. For higher priority, more expensive projects, the Plan identifies various grant sources: TIGER Discretionary Grants (federal), Active Transportation Program funds (state), Office of Traffic Safety funds, Highway Safety Improvement Program funds, and Affordable Housing and Sustainable Communities Program funds.

Connectivity (4 points maximum)	
Evaluates a project's ability to create new connections or to enhance existing connections.	
Criteria	**Points**
Provide a new complete and continuous low stress facility	4
Provide at least 1/2 mile of a low stress facility	3
Close a gap or create a new facility, but do not provide a low-stress facility	2
Improve an existing facility, but do not provide a low-stress facility	1
Demand and Comfort (3 points maximum)	
Evaluates a project's ability to attract new biking trips based on the stress experienced by the bicyclist. Proposed facilities that feel more comfortable and accommodate a wider range of users of all ages and abilities are prioritized.	
Criteria	**Points**
Protected bikeways, protected intersections, or other low traffic stress facilities that are well-used existing corridors	3
Buffered bike lanes; or bicycle boulevards and bicycle lanes on lower volume roadways	2
Key Destinations and Demand (3 points maximum)	
Evaluates projects within 1/2 mile radius of key destinations (such as transit stations, commercial centers, schools, and park/bark and ride lots) that would attract new biking trips.	
Criteria	**Points**
Within a 1/4 mile of the key destinations, and is a well-used existing bike route	3
Within a 1/2 mile of the key destinations, and is a well-used existing bike route	2
Well-used existing bike routes, or within a 1/2 mile of a key destination	1
Feasibility (3 points maximum)	
Evaluates projects based on ease of implementation. Projects that do not require easements, property acquisition, or additional pavement are prioritized to focus on cost-effective improvements. Political support is considered expressed interest by City officials and/or members of the public.	
Criteria	**Points**
Have all of the following qualities: are feasible, have political support, are strong-contenders for grant funding, and are cost-effective	3
Have at least two of the following qualities: are feasible, have political support, are strong-contenders for grant funding, and are cost-effective	2
Have at least one of the following qualities: are feasible, have political support, are strong-contenders for grant funding, and are cost-effective	1
Safety (4 points maximum)	
Based on the number of bicycle collisions on the roadway in the past five years.	
Criteria	**Points**
On-Street Facilities	
Improve biking on the "safety priority network," and provide or improve a bicycle facility at a location with at least one severe or fatal injury condition in the past five years	4
Improve biking on the "safety priority network," or has a severe or fatal injury in the past five years	3
Provide or improve a bicycle facility at a location with two or more bicycle collisions in the past five years	2
Provide or improve a bicycle facility at a location with one bicycle collision in the past five years	1
Off-Street Facilities	
Evaluated based on potential for conflicts with motor vehicles; prioritizes trails or paths with one or more missing or unenhanced uncontrolled crossings, particularly where the crossing occurs on a multi-lane roadway; intended to prioritize projects that install or enhance new trail or path crossings with the appropriate traffic control.	
Trail or paths that have one or more uncontrolled crossings or are missing crossings of arterials	3
Trail or paths that have one or more uncontrolled crossings or are missing crossings of multilane collectors	2
Trail or paths that have one or more uncontrolled crossings or are missing crossings of major driveways, or projects that have one or more uncontrolled crossing at local streets with limited sight distance	1
Safe Routes to School (4 points maximum)	
Prioritizes bicycle projects that are common biking routes to schools; in close proximity to schools; and enhances the safety of school-aged students.	
Criteria	**Points**
Along a school frontage or any block face with a school entrance	4
Within 1/8 mile of a school	3
Within 1/4 mile of a school	2
Within 1/2 mile of a school	1

Figure 1. San Roman Bicycle Master Plan Project Prioritization Criteria

Resources

Contra Costa Countywide Bicycle and Pedestrian Plan (2018)
http://keepcontracostamoving.net/ documents/

San Ramon Bicycle Master Plan (2018)
http://www.sanramon.ca.gov/UserFiles/Servers/Server_10826046/File/Shared%20Document/Transportation%20Documents/Fianl%20BMP.pdf

Source: https://sfbike.org/news/sf-bike-lane-sweepers-debut/

Maintenance of New Bikeway Facilities

To remain safe and comfortable in all seasons, year after year, bicycle facilities should be regularly maintained. This includes routine cleaning as well as more significant repairs. Debris, which can accumulate in the area where people bicycle, can puncture bicycle tires and result in serious falls and injuries. Uneven longitudinal cracks and joints can divert a bicycle wheel and potholes can cause wheel rims to bend or tires to puncture. Lack of adequate maintenance can also render bicycle facilities undesirable or unusable, which can force bicyclists into adjacent travel lanes and over time discourage bicycling altogether. Bikeway facility maintenance activities, equipment, and operations vary depending on facility type.

Planning and Designing for Maintenance

The development of a formal maintenance policy to guide maintenance activities can aid agencies in making cost-effective maintenance decisions. A maintenance program can include: creating and maintaining an inventory of bicycle facility assets, conducting periodic inspection of assets, establishing maintenance performance measures, developing cost estimates for maintenance activities, programming maintenance activities, prioritizing high-volume corridors or key links for priority maintenance, developing a maintenance budget, and tracking performance.

When designing bikeways, it is important to consider ongoing maintenance needs. Well-designed bikeways can reduce maintenance costs by ensuring bicycle facilities are well constructed and easily accessed by maintenance crews and equipment. Prior to making construction or maintenance investment decisions, planners and designers should consult the staff responsible for maintaining bicycle facilities to gain a better understanding of the challenges or opportunities that have been observed during maintenance operations. Maintenance staff can aid in identifying maintenance issues, suggestions for design elements to facilitate maintenance activities, and provide estimates for ongoing maintenance costs.

Surface Maintenance

Ongoing pavement preservation and maintenance are important to maintain a smooth surface for bicyclists and prolong the life of bikeway pavement. Maintenance treatments include crack sealing and roadway patching. Preservation treatments include micro-surfacing, replacement of friction courses, or other single lift resurfacing. On-street bikeway maintenance is typically performed as part of routine road maintenance activities. High-priority bike routes can be prioritized for street maintenance. Preservation and maintenance of shared use paths and separated lanes requires dedicated activity. While not subject to vehicle wear and tear, shared use paths and separated bike lanes still experience drainage issues, erosion, root heave, freeze-thaw cycles, and other aging and weathering processes. As with routine roadway maintenance, communities should establish schedules for preserving and maintaining off-street bikeways as well.

Many agencies use pavement management systems to track the condition of roadways. These systems minimize life-cycle costs by helping communities prioritize maintenance and repair activities. Pavement management systems can store data specifically related

to bikeways, including shoulders, separated bike lanes, and shared use paths. Data collection may need to be modified to capture the condition of the shoulder or bikeway.

Pavement markings deteriorate depending on the amount of vehicle traffic, sweeping operations, pavement surface quality, material durability, and environmental conditions. Pavement markings need to be replaced at the end of their useful life. For more information on the relative costs, lifespans, and retroreflectivity of different materials, see NCHRP Synthesis 306: Long-Term Pavement Marking Practices.

Bicycle regulatory and wayfinding signs and signals may be damaged, vandalized, worn, or lose retroreflectivity through natural aging and require repair or replacement. Bicycle signs, signals, and push buttons should be maintained on the same schedule as motor vehicle signs and traffic signals and replaced on an as needed basis or instances of accidental damage. Regulatory signage requirements should be reviewed to ensure that necessary signs are in place and comply with Section 9B of the MUTCD.

Seasonal Maintenance

Maintenance plans and operations must be tailored to seasonal considerations in order to ensure safe and comfortable conditions to accommodate and encourage year-round bicycling. Most bikeways and shared use paths can be swept and cleared of leaves and other debris with typical maintenance vehicles. Generally, separated bike lane widths of 8’ or more are compatible with typical vehicles. However, narrow vehicles with operating widths between 4’–5’ may be required for one-way separated bike lanes. Narrow vehicles can also be used for sidewalk maintenance. Agencies can procure vehicles that serve year-round maintenance duties through a system of seasonal attachments such as brooms, plow blades, and loaders.

Regular sweeping of bikeways—both on- and off-street—reduces the risk of falls and injuries due to debris in the bikeway. To simplify maintenance, on-street bikeways should be incorporated into established street sweeping programs. Off-street bikeways such as shared use paths and separated bike lanes may require different sweeping schedules and additional debris removal. Organic matter such as sticks and leaves can accumulate on off-street bikeways due to proximity of landscaping and vegetation. Bikeways constructed with permeable pavement should be vacuumed on a routine basis, as fine debris can settle into the surface and inhibit desired infiltration. Permeable pavement may need additional attention along areas where runoff routinely carries sediment. Vegetation management includes the maintenance of grass, trees, tree roots, shrubs, bushes, and other organic material. Vegetation can encroach on the path of travel, reduce vertical clearance, limit visibility, or degrade the pavement surface.

Best Practice Example

Long Beach Bicycle Master Plan

The Long Beach Bicycle Master Plan includes a Design and Maintenance chapter which outlines projected per mile maintenance costs for on- and off-street bikeway facilities, vehicles to be used in routine maintenance, maintenance activities to be conducted, and recommended frequency of each maintenance activity.

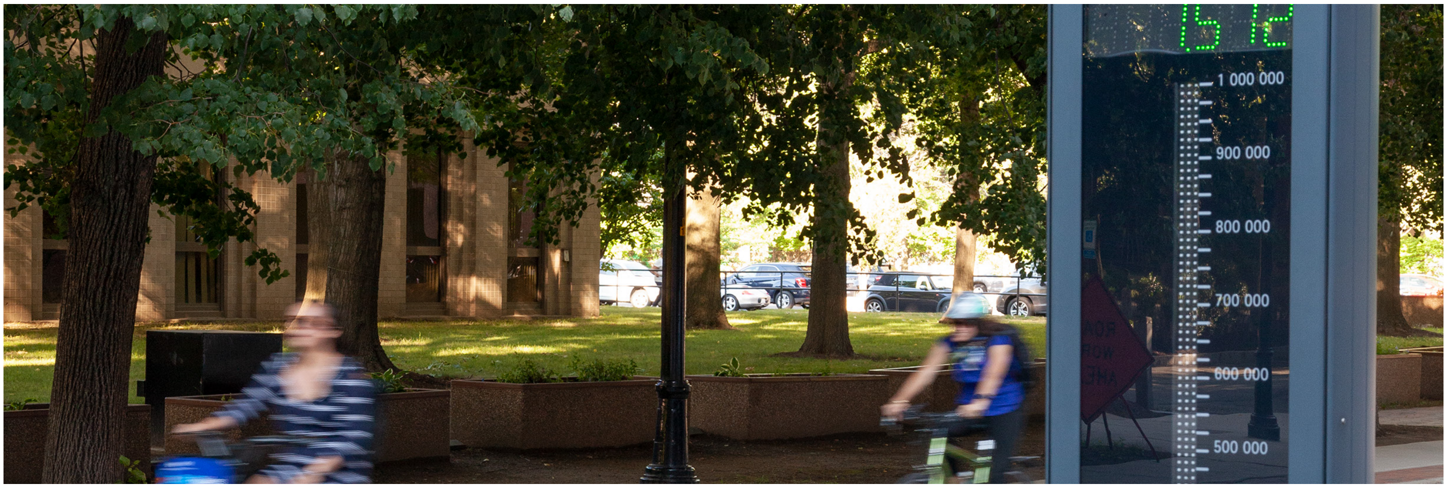
Figure 1. Poorly maintained buffered bike lane covered in leaves that could cause a bicyclist to slip and fall.

Item	Frequency
Sign Replacement/Repair	1 - 3 years
Pavement Marking Replacement	1 - 3 years
Tree, Shrub & grass trimming	5 months - 1 year
Pavement sealing/potholes	5 - 15 years[1]
Clean drainage system	1 year
Pavement sweeping	Weekly-Monthly/As needed
Shoulder and grass mowing	Weekly/As needed
Trash disposal	Weekly/As needed
Lighting Replacement/Repair	1 year
Graffiti removal	Weekly-Monthly/As needed
Maintain Furniture	1 year
Fountain/restroom cleaning/repair	Weekly-Monthly/As needed
Pruning	1 - 4 years
Bridge/Tunnel Inspection	1 year
Remove fallen trees	As needed
Weed control	Monthly/As needed
Remove snow and ice	Weekly/As needed
Maintain emergency telephones, CCTV	1 year
Maintain irrigation lines	1 year
Irrigate/water plants	Weekly-Monthly/As needed

Figure 2. Bikeway maintenace checklist and schedule from the Long Beach Bicycle Master Plan.

Resources

Long Beach Bicycle Master Plan (2001)
http://www.bikelongbeach.org/wp-content/uploads/2012/09/lb-master-plan-design-and-maintenance.pdf



Performance Measures

Performance management is an essential tool for transportation planners and program managers. Performance management supports transparency, objectivity, and accountability by defining what goals a project or program is supposed to achieve and measuring its progress towards meeting those goals. Performance management is also linked to federal, state, and regional requirements and targets. Performance measures are quantitative or qualitative data used to provide information related to progress towards achieving pre-determined goals. Performance measures can vary widely in terms of their scale, level of effort needed for data collection, and timeline. Active transportation projects and programs may have several intersecting goals that can require vastly different approaches to collecting and evaluating data. For example, a new shared-use path project may have objectives related to safety, mode shift, accessibility, congestion reduction, or air quality improvement. Agencies should develop performance measures to reflect community goals. Broadly categorized, community goals may include measures related to safety, connectivity, health, economic vitality, sustainability, equity, and livability.

Network Data

Network data can be used to measure progress towards goals such as increasing network size and connectivity, compliance with accessibility requirements, improving facility condition, and proactively addressing known risk factors. Accurate and updated sidewalk and bikeway data are fundamental to the planning, design, preservation, and maintenance of connected networks. Active transportation network data should describe the type and location of facilities, when they were implemented and updated, and basic physical characteristics such as width, surface material, and presence of adjacent on-street parking. Communities typically record and maintain geospatial network data via ArcGIS.

Safety Data

Collecting, maintaining, and analyzing safety data helps municipalities respond to safety concerns and track progress over time towards meeting performance targets. Communities typically collect and evaluate:

- Crash data, including detailed narratives, to understand the frequency and severity of crashes, map high crash locations, and illuminate contributing factors
- Risk and user comfort data, including motor vehicle speeds and street buffer width, to understand location- or area-specific concerns that may not be reflected in crash data

Travel Data

Collecting and analyzing data on the number, percentage, routes, and characteristics of pedestrians and bicyclists within a community can help track many performance related goals. Understanding trends in usage can allow communities to develop a measure of exposure against which to compare safety data (e.g. crashes per bicyclist), compare before-and-after project conditions, prioritize bikeway investments and municipal maintenance efforts, and monitor the equity of investments.

Economic Data

Investments in active transportation facilities can stimulate local economies by providing greater access to jobs and services, increasing tourism, and improving livability. Active transportation projects throughout the U.S. have measurably benefited local economies. Collection of before-and-after data will help agencies better understand and communicate the benefits of investments and what types of investments are most effective at stimulating growth.

As part of project scoping or planning, communities can develop a data collection plan to ensure that high-quality before-and-after data is collected in the most appropriate locations. The study area should be the area in which the benefits of the project are most likely to be observed. The analysis timeframe should span within two years prior to the start of construction to within one to three years after project completion. This allows communities to establish a good baseline of data to serve as the foundation of the analysis.

Multiple performance measures are available to measure commercial or personal economic impacts in a project area:

- Retail occupancy rates
- Business and customer perceptions
- Property value
- Sales tax revenue/Sales receipts
- Job creation

Best Practice Example

Toward an Active California State Bicycle and Pedestrian Plan

The vision statement of the California State Bicycle and Pedestrian Plan reads: "By 2040, people in California of all ages, abilities, and incomes can safely, conveniently, and comfortably walk and bicycle for their transportation needs." This vision statement is supported with more specific objectives in the Plan's policy framework, including:

- Safety: Reduce the number, rate, and severity of bicycle and pedestrian involved collisions
- Mobility: Increase walking and bicycling n California
- Preservation: Maintain a high quality active transportation system
- Social Equity: Invest resources in communities that are most dependent on active transportation and transit

In order to measure the Plan's effectiveness at achieving its objectives, it details performance measures for each of the policy framework goals.

Objective	Measure	Status
Safety	Number of bicycle and pedestrian fatalities and serious injuries (5 year rolling average)	Already collected Federally required per MAP-21
	Bicycle and pedestrian fatalities	Already collected Strategic Management Plan target to reduce by 10% per year
	Bicycle and pedestrian collision, serious injury, and fatality rate	Long term (requires exposure data)
Mobility	Walk and bicycle mode share (all trips)	Already collected (every 8 to 10 years as part of NHTS)
	Pedestrian and bicycle miles of travel	Long term (requires better count data)
	Bicycle level of traffic stress on the state highway system	Long term (requires finalizing measure and coding state highway network)
Preservation	Percent of bicycle and pedestrian facilities with a good condition rating	Long term (requires establishing condition ratings)
	Percent of bicycle and pedestrian facilities on state highways meeting established maintenance standards	Long term (requires establishing maintenance standards for bicyclists and pedestrians - P1.1)
Social Equity	Percent of transportation-disadvantaged population within 1/2 mile bicycling distance of on or off-street bicycle facilities	Long term (requires network data - M4.4)
	Percent of disadvantaged population for whom state highways serve as barriers to economic and other opportunities	Long term (need definition of barriers - S1.1 - and network data - M4.4)
	Percent of transportation-disadvantaged population with access to completed sidewalk network	Long term (need data on sidewalk network - M4.4)
	Bicycling and walking rates for low income communities, people of color, and women	Already collected (every 8 to 10 years as part of NHTS)

Figure 1. Performance metrics for each objective of the California State Bicycle and Pedestrian Plan

Resources

Caltrans Toward an Active California: State Bicycle + Pedestrian Plan (2017)
http://www.dot.ca.gov/activecalifornia/documents/Hi-Res_Final_ActiveCA.pdf

FHWA Guidebook for Developing Pedestrian and Bicycle Performance Measures (2016)
https://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/performance_measures_guidebook/pm_guidebook.pdf

Emerging Trends in Active Transportation Planning

Active transportation planning is rapidly evolving and will continue to undergo significant changes in the coming years. This fact sheet describes several key trends: rapid implementation of projects, Vision Zero planning, and the emergence of e-bike and scooter share systems.

Rapid implementation programs work to install bicycle and pedestrian facilities quickly and with minimal budget. There are various reasons for adopting a rapid implementation approach including: safety improvements to a road segment or intersection in response to a crash, creation of a demonstration "backbone" bike network that increases demand for bicycling and justifies future investments and expansion, and gap closures to enhance the connectivity of bike and pedestrian networks.

Vision Zero was first implemented in Sweden in the 1990s as is now gaining momentum in jurisdictions throughout the U.S. The objective of vision zero planning is to create a transportation system with no serious injuries or fatalities. Safety of roadway users is paramount to all other goals of the transportation network. It is sometimes referred to as a "Safe Systems" approach that prioritizes safe speeds, safe roads, safe vehicles, and safe people.

Shared mobility is a result of the rise of the sharing economy. Shared mobility is gaining access to a certain mode of transportation without owning the vehicle. Shared mobility programs increase travel options for residents and can provide first- and last-mile connections. Carshare and bikeshare have historically been the most popular forms of shared mobility. However, recently, scooter share programs have become popular in cities throughout the country. In addition, larger more established transportation network companies (TNCs) like Lyft and Uber have recently started to extend their services to include bike rentals by acquiring bikeshare companies.

Best Practice Examples

Rapid Implementation of Protected Intersection in Richmond, CA

The City of Richmond, in cooperation with the Contra Costa Transportation Authority, recently installed a protected intersection at the junction of Central Avenue and Rydin Road in order to facilitate a safer bicycle and pedestrian crossing for people using the San Francisco Bay Trail. Construction was completed over several weeks, and includes new pavement markings, signage, and flexible delineators. Future upgrades include a new traffic light and concrete barriers between the bikeway and vehicle travel lanes.

Figure 1. Rapid installation bicycle and pedestrian crossings at the intersection of Central Avenue and Rydin Road in Richmond, CA

Denver Vision Zero Action Plan

The City of Denver developed and adopted its Vision Zero Action Plan in response to a trend of traffic deaths increasing over time, despite efforts to create multimodal streets, transit investments, and advances in technology. The Plan outlines existing crash statistics throughout the city, shows which streets are part of Denver's high injury network, and proposes key actions to take to address traffic injuries and deaths. The Plan includes a significant equity component to ensure road safety in disadvantaged communities is addressed without burdening disadvantaged populations (e.g., not focusing on police enforcement as a primary means of addressing safety).

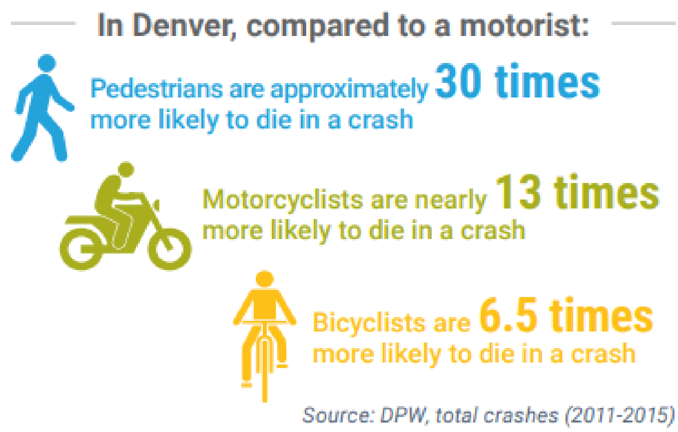


Figure 2. Bicyclist, pedestrian, and motorcyclist safety infographic from Denver Vision Zero Action Plan

San Francisco Guiding Principles for Management of Emerging Mobility Services and Technologies

The San Francisco County Transportation Authority (SFCTA) and San Francisco Municipal Transportation Agency (SFMTA) adopted ten guiding principles to evaluate emerging mobility services, identify ways these services can the City meet its transportation goals, and shape future areas of studies, policies, and programs.

Figure 3. SFCTA/SFMTA 10 guiding principles for management of emerging mobility services and technologies

Resources

First Protected Intersection for Bay Trail Arrives in Richmond (2018)
https://bikeeastbay.org/news/first-protected-intersection-bay-trail-arrives-richmond

City of Denver Vision Zero Action Plan (2017)
http://www.denvergov.org/content/dam/denvergov/Portals/705/documents/visionzero/Denver-Vision-Zero-Action-Plan.pdf

SFMTA/SFCTA Guiding Principles for Emerging Mobility services and Technologies (2017)
https://www.sfcta.org/emerging-mobility/principles

SOLANO ACTIVE TRANSPORTATION PLAN

EXISTING CONDITIONS REPORT

Solano Transportation Authority

September 2019

TABLE OF CONTENTS

CHAPTER 1
INTRODUCTION

1. INTRODUCTION

The Solano Active Transportation Plan (Solano ATP) is an effort to consolidate the Solano Transportation Authority's (STA) separate Countywide Bicycle, Pedestrian, and Safe Routes to Transit Plans. The Solano ATP will include individual chapters for each of the seven incorporated jurisdictions and a combined chapter for Unincorporated Solano County connections that knit Solano together. This Existing Conditions Report provides an understanding of who is walking and biking in Solano and how existing infrastructure supports active mobility across the county, and it will serve as a foundation for the ATP analysis and recommendations.

SOLANO COUNTY OVERVIEW

Solano County is located along the northeast portion of the San Francisco Bay in the area commonly referred to as the North Bay. Encompassing a total of 2,137 square miles, the county is situated along Interstate I-80, just north of the East Bay region and approximately 13 miles southwest of Sacramento. The San Pablo Bay, Carquinez Straight, and various other waterways from the Sacramento River and San Joaquin River form Solano County's southern boundary with Contra Costa County. To the west, several ridgelines form the boundary with Napa County while Yolo County and Sacramento form the northern and eastern boundaries. While the county is a part of the San Francisco Bay Area, its eastern portion is generally considered more akin to the Sacramento Valley. The majority of the county's population is located within the incorporated cities of Vallejo, Benicia, Fairfield, Suisun City, Vacaville, and Dixon, all along the Interstate 80 (I-80) corridor with 96 percent of the county's population residing in the incorporated cities. Highway 12 runs east/west through the county and connects Fairfield and Suisun City with Rio Vista, which sits on the banks of the Sacramento River.

The United States Census American Community Survey (2017) estimates that Solano County has a population of 445,458 and that it is one of the fastest growing counties in California. **Table 1-1** provides an overview of population change from 2010 to 2015.

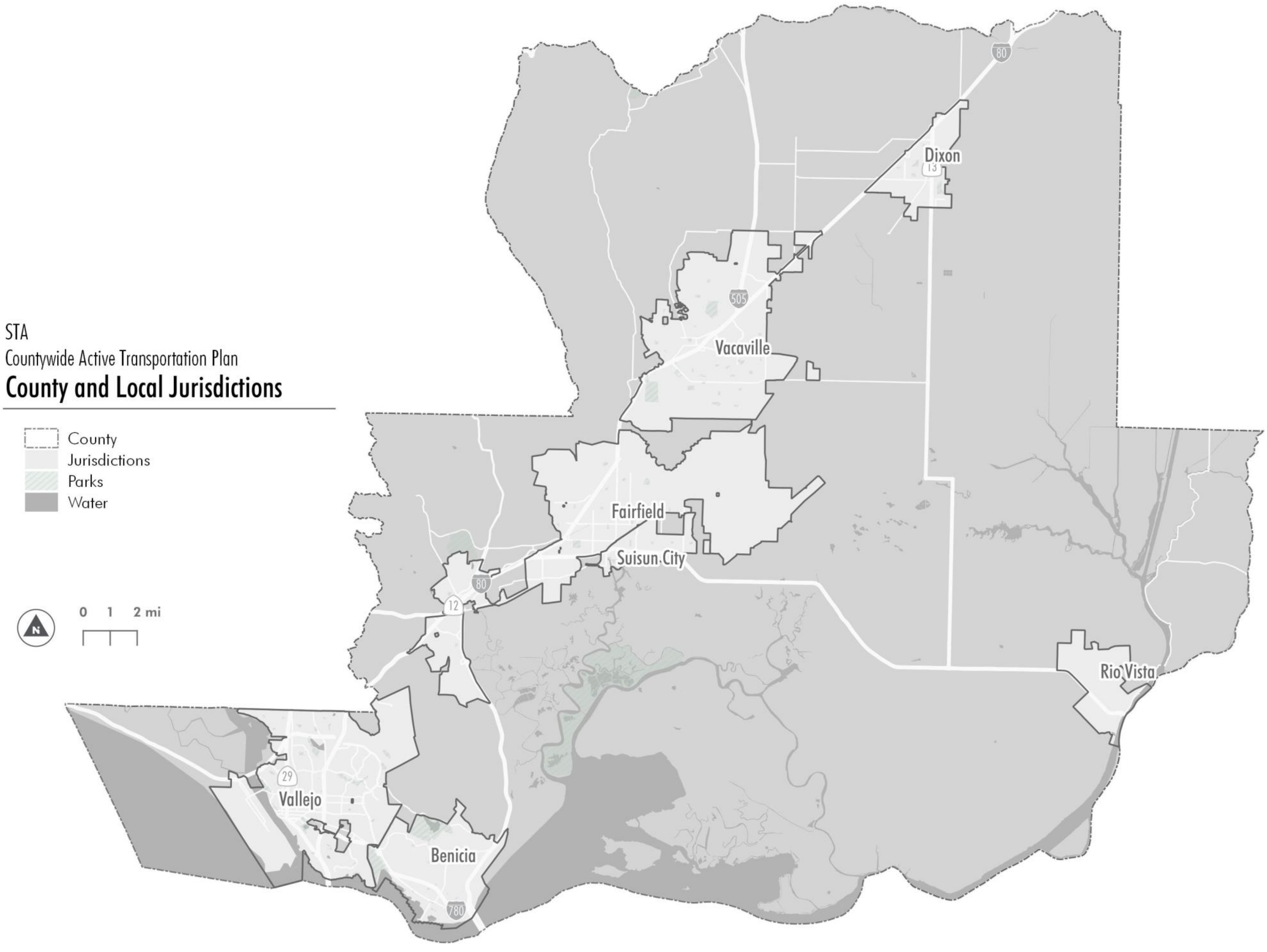
Table 1-1 Solano County Population and Land Area

Jurisdiction	2010 Census Population	ACS 2017 Population	Percent Change	Land Area (Sq. Miles)
City of Benicia	26,997	28,343	5.0%	12.93
City of Dixon	18,351	20,202	10.1%	7.13
City of Fairfield	108,321	116,266	7.3%	40.92
City of Rio Vista	7,360	9,009	22.4%	6.64
City of Suisun City	28,111	29,639	5.4%	4.11
City of Vacaville	92,428	100,032	8.2%	28.81
City of Vallejo	115,942	122,105	5.3%	30.67
Unincorporated	15,834	19,862	25.4%	691
Solano County Total	**413,344**	**445,458**	**7.8%**	**822**

STA

Countywide Active Transportation Plan

County and Local Jurisdictions



CHAPTER 2
SOLANO COUNTYWIDE EXISTING CONDITIONS

2. SOLANO COUNTYWIDE EXISTING CONDITIONS

The Solano Transportation Authority (STA) and Unincorporated Solano County support regional coordination. While STA does not have authority to implement projects, it provides all Solano jurisdictions with critical funding and support for transportation projects. While Unincorporated Solano County only contains four percent of the total countywide population, it is home to the primary connections between each of the incorporated jurisdictions.

UNINCORPORATED SOLANO DEMOGRAPHICS OF ACTIVE TRANSPORTATION

This section summarizes who currently walks or bicycles for work within unincorporated Solano County using data from the United States Census American Community Survey (2016, 5-year estimates) and the California Household Travel Survey (2012). While this information is useful, this data should not be taken at face value given the small sample sizes associated with this data in communities with small sample sizes, such as Unincorporated Solano County. It is presented here because it is the only source of standardized data across all geographies in Solano County and can help provide a clearer picture of walking and bicycling trips in Unincorporated Solano County. The total number of people who reported walking or bicycling to work in Unincorporated Solano County in the United States Census' American Community Survey is 169.

Multiple factors influence a person's ability to walk and bicycle within the unincorporated areas, and key trends in these factors are summarized in **Table 2-1** while **Figure 2-A** depicts demographics and travel patterns in Unincorporated Solano County.

RACE & ETHNICITY

Approximately 72 percent of Unincorporated Solano County's population is White, but White residents make up 89 percent of people who bike to work and just 57 percent of people who walk to work. Twenty-one percent of the population is Hispanic, but Hispanic residents make up only 11 percent of people who bike to work and a full quarter (26%) of people who walk to work. While four percent of the population is Asian, Asian residents make up 17 percent of the people who walk to work. According to Census data, the Black population accounts for almost none of the residents who currently walk or bike to work despite making up 3 percent of the total population.

AGE

Residents age 45 to 64 years old are the largest commuting age group in Unincorporated Solano County, accounting for about 48 percent of the total commuting population for all modes. However, this group makes disproportionately more trips by walking (95%) and disproportionately few work trips by bicycle (31%). The second largest age group of commuters includes those age 25 and 44, who make up 36 percent of the commuting population and account for 49 percent of walking trips.

GENDER

Unincorporated Solano County commuters have a gender split of 56 percent men and 44 percent women. Men and women make up a roughly proportional share of walking commuters (58% men and 42% women) compared to their share of all commuters. Women make up a larger share of bike commuters (61%) than their share of all commuters.

INCOME STATUS

Within Unincorporated Solano County, the largest single income range for commuters is those that make less than $25,000 a year (36%). People who make between $25,000 and $50,000 per year (23%) or over $75,000 per year (23%) make up equal proportions of commuters. Of those who bike to work, almost half (46%) have an annual income that is less than $25,000, with the next largest group making between $25,000 and $50,000 a year (26%). For those who walk to work, the largest group (41%) earns an annual income of over $75,000, with the next second highest group earning less than $25,000 a year (29%).

Table 2-1 presents information about which population groups are walking and bicycling more (or less) than others in Unincorporated Solano County to better understand which population groups may be more dependent on active transportation facilities and which population groups may lack access to these types of facilities. This can help Solano County plan for the equitable distribution of active transportation facilities and ensure that outreach efforts are targeting new audiences and considerate of the needs of specific populations. This information can also help Solano County determine which population groups should be engaged to better understand barriers to walking and bicycling.

Table 2-1 Unincorporated Solano County Active Transportation Demographics Findings

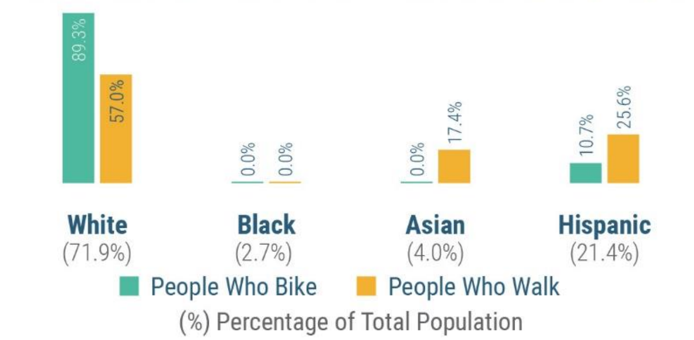
Who is Walking More	**Who is Biking More**
• White, Hispanic, and Asian residents • Middle-aged workers • Men • High and low-income earners	• White residents • High school and college students, young adults, and middle-aged workers • Women • Low and medium-low income earners
Who is Walking Less	**Who is Bicycling Less**
• Black residents • High school and college students, young adults, and working seniors • Women • Medium-low and medium-high income earners	• Hispanic, Asian, and Black residents • Working seniors • Men • Medium-high and high-income earners

Unincorporated Solano County Active Transportation Profile

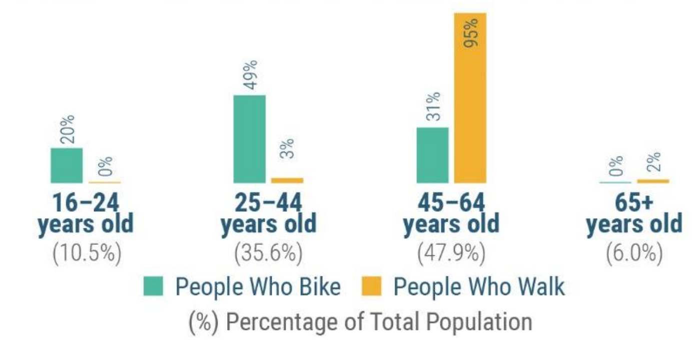
Characteristics of residents who walk or bike to work:

Source: US Census, ACS 5-Year Estimates 2016.

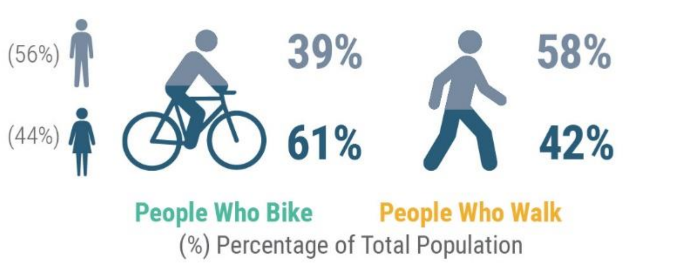
Race



Age



Gender



Income

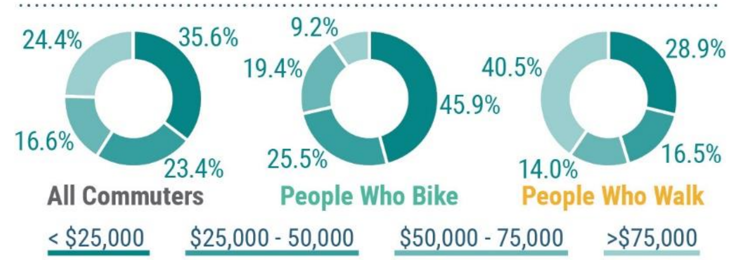


Figure 2-A. Unincorporated Solano ATP Demographics Infographic

EXISTING COUNTYWIDE GOALS AND POLICIES

Various documents guide how active transportation projects and programs are implemented throughout Solano County. STA provides the regional framework for each jurisdiction to refer to for bicycle and pedestrian-related policies as part of the Countywide Bicycle, Pedestrian, and Safe Routes to Transit Plans. While no jurisdiction within Solano County currently has an adopted bicycle, pedestrian, or active transportation plan, they all include guiding or supportive policies in their adopted General Plans.

The Unincorporated Solano County General Plan goals and policies help County staff to support and implement projects or programs throughout unincorporated areas.

SOLANO TRANSPORTATION AUTHORITY

Solano Countywide Bicycle Transportation Plan (2012)

The 2012 Solano Countywide Bicycle Transportation Plan is an update of the 2004 Countywide Bicycle Plan, and it includes various changes since the adoption of the 2004 document and earlier plans. The vision statement and purpose statement of the 2012 Bike Plan are:

Vision

> *"Complete and maintain a countywide bikeway network that will service the transportation needs of bicyclists in Solano County."*

Purpose

> *"To facilitate and provide safe and efficient bicycle travelling as an everyday means of transportation in Solano County."*

The 2012 Bike Plan outlines numerous goals, including the following:

- Plan and maintain a current Countywide Bikeway Network.
- Build the bicycle transportation network by planning, designing, constructing, and managing transportation facilities that will meet the needs of the cycling public.
- Improve bicyclist safety in Solano County.
- Increase the use of bicycles as a viable alternative to the automobile.
- Develop an integrated and coordinated transportation system that connects bicycling with other modes of transportation, which includes, but is not limited to, driving, walking, and taking public transportation.
- Provide safe access for bicyclists to all points in Solano County.
- Develop a bicycle network that connects to Northern California's alternative modes system.
- Develop the Countywide Bicycle Plan to serve as a bicycle master plan or a foundation for local agencies to use in the development of a local bicycle plan.
- Develop a standard countywide wayfinding signage system to regionally direct bicyclists that can be adopted by local agencies.

Each goal is supplemented with several objectives, which are the actions by which the achievement of the goals is measured.

Solano Countywide Pedestrian Transportation Plan (2012)

The 2012 Solano Countywide Pedestrian Transportation Plan (2012 Pedestrian Plan) is an update of the 2004 Countywide Pedestrian Plan, and it includes various changes since the adoption of the 2004 document and earlier plans. The vision statement and purpose statement of the 2012 Pedestrian Plan are:

“Make walking an everyday means of transportation and recreation in Solano County by creating a complete, safe, and enjoyable system of pedestrian routes and zones in the places people need and want to go in Solano County by providing a viable alternative to the use of the automobile through connections to transit, and employment, health, commercial, recreational and social centers.”

“To facilitate and provide safe and efficient pedestrian travelling as an everyday means of transportation in Solano County.”

The 2012 Pedestrian Plan outlines numerous goals including:

- Plan and maintain a current Countywide Pedestrian Plan.
- Develop the Countywide Pedestrian Plan to serve as a pedestrian master plan or a foundation for local agencies to use in the development of a local pedestrian plan.
- Build the pedestrian transportation network by planning, designing, funding, maintaining, and constructing transportation facilities that will meet the needs of the walking public.
- Improve pedestrian safety in Solano County.
- Increase the use of walking as a viable alternative to the automobile.
- Develop an integrated and coordinated transportation system that connects walking with other modes of transportation, which includes, but is not limited to, bicycling, driving, and taking public transportation.
- Provide safe access for pedestrian to all points in Solano County.
- Develop a pedestrian connections network that connects to Northern California’s alternative modes system.
- Develop a standard countywide wayfinding signage system to connect pedestrians to park-and-ride lots, transit, water transportation, and other key local destinations (i.e., downtowns, farmer’s markets/produce stands, local commerce and retail, etc.)

Each goal is supplemented with several objectives, which are the actions by which the achievement of the goals is measured.

Solano County Safe Routes to Transit Plan (2012)

The 2012 Solano County Safe Routes to Transit Plan (SR2T Plan) is the first of its kind in Solano County. It reflects the strategic collaboration of key stakeholders involved with operations of the Fairfield Transportation Center, the Suisun City Capitol Corridor Train Station, the Vacaville Transportation Center, the Vallejo Transportation Center at Curtola and Lemon Street, and the Vallejo Transit Center/Downtown Parking Structure. The vision statement and purpose statement of the SR2T Plan are:

“The ultimate goal for the SR2T Plan is to provide adequate detail and justification for Solano Transportation Authority (STA) and its member agencies to pursue funding that can be used to implement projects and programs, which improve transit access and pedestrian and bicyclist safety. New policies at the federal, state, and regional level have resulted in programs that promise to provide increased funding in the coming years for transit enhancement projects.”

“The purpose of the Solano County Safe Routes to Transit Plan (SR2T Plan) is to generate increased transit ridership by identifying specific strategies that improve transit center access and pedestrian and bicyclist safety. These strategies provide what is often referred to as the ‘first-mile’ (access from home to transit) and ‘last-mile’ (access from transit to work, school, etc.) solutions.”

The SR2T Plan does not outline more specific goals.

UNINCORPORATED SOLANO COUNTY

Solano County General Plan Transportation & Circulation Element (2008)

The 2008 County General Plan Circulation Element sets forth the policy framework to shape circulation within Solano County. Goals and programs related to active transportation include the following and are found primarily in the Plan's Nonmotorized Facilities section.

- Goal 4: Encourage the use of alternative forms of transportation such as transit, walking, and bicycling to alleviate congestion and promote recreation.
- Implementation Program 5: In cooperation with the Solano Transportation Authority, provide public education about options for reducing motor vehicle-related greenhouse gas emissions, include information on trip reduction, trip linking, public transit, biking and walking, vehicle performance and efficiency, low- and zero-emissions vehicles, and ridesharing.
- Implementation Program 8: Adopt road construction standards that account for the needs of pedestrians, bicyclists, and transit.
- Policy 19: Work with Solano Transportation Authority to develop strategies to remove barriers and increase commuter ridership on Amtrak passenger rail, including, but not limited to, collector bus services, bicycle and pedestrian routes to stations, bicycle parking facilities at stations, and promotional campaigns.
- Policy 24: In collaboration with other agencies and cities, continue to plan, design, and create additional bikeways and bikeway connections to provide intercity and intercounty access and incorporate system needs when approving adjacent developments.
- Policy 25: Encourage access to open space and recreation through the development of safe, convenient, and connected walking paths, trails, bikeways, and neighborhood-based parks and recreation options.
- Policy 26: Accommodate pedestrians and bicyclists in the design and construction of roadway improvements on County facilities.
- Implementation Program 21: Design, construct, and maintain bicycle routes as described in the Countywide Pedestrian and Bicycle Plan and ensure that adequate signs and pavement markings are provided.
- Implementation Program 22: Pursue roadway-improvement project funding to complete bicycle path linkages between Solano County communities.
- Implementation Program 23: Support applications to fund new bicycle and pedestrian facilities that close gaps in the system.
- Implementation Program 24: Ensure that funding priorities for investment in transportation system improvements are consistent with the land use and economic development goals and policies of the General Plan, especially as these relate to transit-supportive development and are consistent with the Regional Transportation Plan.
- Implementation Program 25: Require projects to facilitate bicycle and walking access when feasible. Adopt development standards and design guidelines that support such access.
- Implementation Program 26: Ensure that nonmotorized transportation systems are interconnected and include amenities such as secure bicycle parking.
- Implementation Program 27: Continue to participate in the Safe Routes to School program.

SUPPORT PROGRAMS

In addition to providing support to local jurisdictions, STA also implements multiple programs throughout the county. Unincorporated Solano County uses many of the STA-run programs but does not provide active transportation-related programs itself.

PROGRAMS

- **Safe Routes to School:** The Solano Safe Routes to School (SR2S) program encourages children to safely walk or bike to school and supports this effort with free, fun, and educational events and programs for students. The program works with schools, police, public health staff, city traffic engineers, and other community members to improve traffic safety and the health and well-being of youth in Solano County.
- **Solano Mobility Program:** This program provides a consolidated website, call center, and resources to assist Solano residents with accessing transportation options throughout the county. The program also provides information and assistance for seniors and people with disabilities to find mobility solutions that fit their needs. The program also funds travel trainings, including transit orientations, to teach people how to use transit at large as well as more specific features like bike racks or ADA lifts.
- **Solano Express Bus:** STA provides this express intercity bus service throughout Solano County, with individual routes operated by Fairfield Suisun Transit (FAST) and Solano County Transit (SolTrans). The call center is also managed by STA and assists potential users with creating personalized trip plans to meet their access and travel needs.

SOLANO PEDESTRIAN CONDITIONS

The pedestrian network within Solano County consists largely of sidewalk infrastructure supported by crossing treatments, multi-use paved trails, and unpaved recreational trails. For the Solano ATP, sidewalk presence was used as the metric for pedestrian accessibility and was inventoried within incorporated jurisdictions and adjacent pockets of unincorporated communities.

Sidewalk Inventory

An inventory of existing sidewalks was conducted to identify sidewalk gaps across the entire County, with results summarized in **Figure 2-F**. A comparison of each city in Solano County is provided in **Table 2-2** below.

Solano County currently has a total of 1,313 miles of existing sidewalk infrastructure, which includes measurements of sidewalks on both sides of the street independently. With approximately 7,233 miles of maximum sidewalk coverage (total countywide roadway mileage multiplied by two to account for both sides of the street). This indicates that a large percentage of roadways in the county may have inadequate sidewalk coverage. Depending on land use context, there may be many areas within Solano County (including within incorporated cities and unincorporated County areas) with rural characteristics where typical sidewalk infrastructure may not be compatible. However, it was not possible to exclude these areas from the overall sidewalk inventory evaluation.

Sidewalk coverage in Solano County was also evaluated in the equity focus areas (described later in this chapter) as designated by the Metropolitan Transportation Commission for Priority Development Areas and Communities of Concern, or CalEnviroScreen Disadvantaged Communities. In Priority Development Areas, there are approximately 44 miles of sidewalk coverage. For Communities of Concern, there are approximately 307 miles of sidewalk coverage. Finally, within Disadvantaged Communities, there are approximately 65 miles of sidewalk coverage. Overall, the need for sidewalk infrastructure is greatest in Communities of Concern, which need about 387 miles of sidewalk gaps filled.

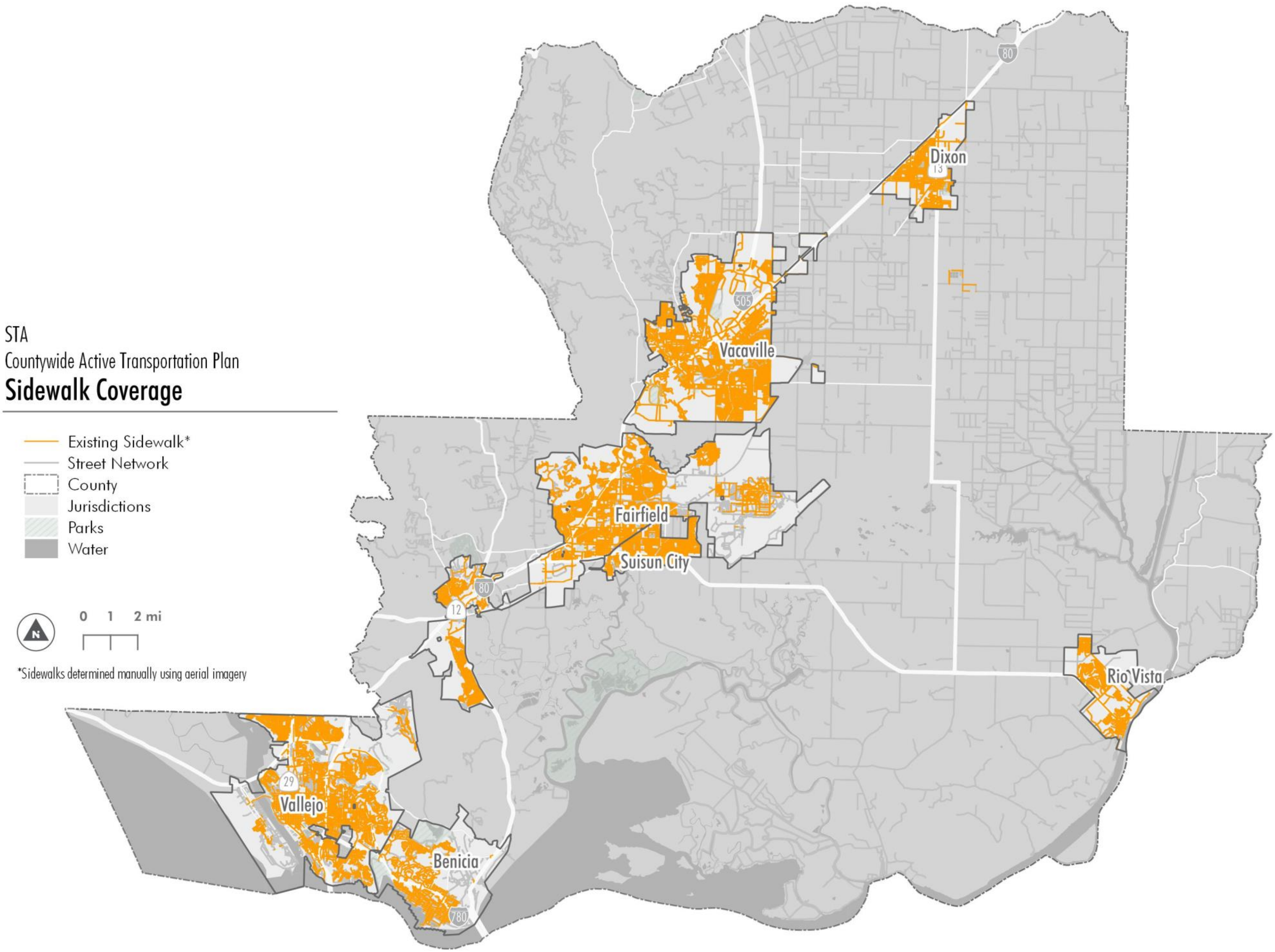
Table 2-2 Countywide Sidewalk Comparison by Jurisdiction

	Miles of Existing Sidewalks	Maximum Sidewalk Coverage
Benicia Total	96	348
Dixon Total	73	187
Fairfield Total	116	1050
Rio Vista Total	36	143
Suisun City Total	69	198
Vacaville Total	416	832
Vallejo Total	515	1,024
Countywide Total	1,313	7,233

STA

Countywide Active Transportation Plan

Sidewalk Coverage



*Sidewalks determined manually using aerial imagery

SOLANO BICYCLE CONDITIONS

Solano County is home to many types of bicycle facilities, ranging from on-street signed bike routes to off-street shared-use paths. The variety of bicycle infrastructure types reflects the differing needs present in Solano's diverse communities, which range from small, agriculture-focused municipalities like Dixon and Rio Vista to larger suburban cities like Fairfield and Vallejo. For the Solano ATP, comfort and connectivity of existing bicycle facilities were analyzed to identify opportunity areas for network improvements and to help with prioritizing potential projects. Analyses conducted as part of the existing bicycle conditions assessment include:

» **Presence of Bicycle Facilities:** An inventory of existing bicycle facilities was conducted for all roadways within the county.
» **Bicyclist User Comfort:** A Level of Traffic Stress (LTS) analysis identifies how comfortable each facility is to the average "interested but concerned" rider.
» **Bicycle Connectivity:** The Bicycle Network Analysis (BNA) tool identifies how connected areas are with low-stress facilities.

EXISTING BICYCLE FACILITIES

Bicycle Facility Types

Bicycle facility types are distinguished by their separation from motor vehicle traffic (

Figure 2-C). The California Department of Transportation (Caltrans) classifies bike facilities into four categories:

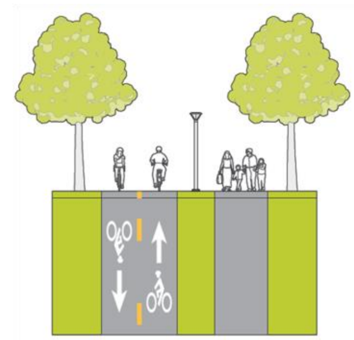
Off-Street Bike Paths or Shared-Use Paths (Class I)

Off-street bike paths and shared-use paths provide robust separation from motor vehicles and are often located within their own rights-of-way. Interactions between bicyclists and vehicles are limited to roadway crossings. Due to their separation from vehicle traffic, these facilities are typically attractive to most bicyclists and are considered the least stressful facility type. Many recreational trails, unpaved trails, or single-track facilities are not included under the Caltrans classification for multi-use or shared-use paths.

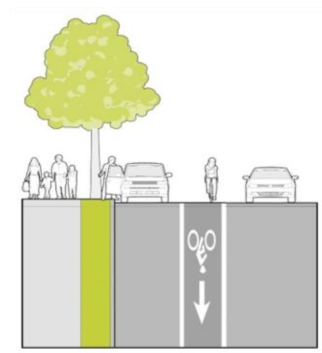
On-Street Bicycle Lanes (Class II)

On-street bike lanes are striped adjacent to vehicle travel lanes, delineated either by a solid white line or by a larger hatched buffer space. The latter case is known as a buffered bike lane. The relative comfort of bicycle lanes depends on adjacent motor vehicle speeds and volumes, given bike lanes' inherent lack of separation from

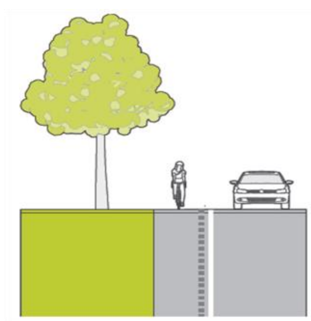
Figure 2-C. Bicycle Facility Types



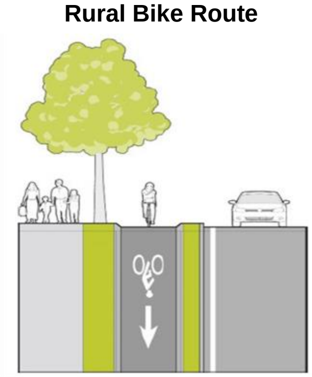
Off-Street Bike Path



Bike Lane



Rural Bike Route



Separated Bike Lane

traffic. Higher traffic speeds and volumes are often more stressful to ride next to and may discourage less confident riders.

Bike Routes (Class III)

On-street bike routes designate certain roadways as preferred bicycle roads. They typically include wayfinding signage for bicyclists as well as additional signage to increase driver awareness of the presence of bicyclists (e.g., Share the Road signage). However, they do not provide a dedicated space solely for bicyclists. Since users often must share travel lanes with motor vehicle traffic, bike routes can vary in comfort depending on traffic volume and speed characteristics.

One of the most common type of bike routes is known as a bicycle boulevard. Bicycle boulevards are often found on low-speed, low-volume neighborhood streets. These are often used as parallel options when high-speed and high-volume roadways cannot accommodate a low-stress bikeway. Another common type of bike route is known as a rural bike route. A rural bike route is where a wide shoulder and striping provide space for cyclists to ride on rural roads or highways. These facilities often have intermittent rumble strips to help prevent drivers from veering into the shoulder. Rural bike routes are often not considered low-stress since cyclists must often ride adjacent to higher speed and volumes of vehicular traffic with minimal separation.

Separated Bike Lanes (Class IV)

Separated bike lanes (SBLs) are similar to bike lanes in that they are located on-street adjacent to vehicular traffic. However, SBLs provide more robust physical separation between bicyclists and motor vehicles. Separation always includes both vertical separation (parked vehicles, planters, flexible posts, bollards, etc.) and horizontal separation (landscaping strips, concrete curbs, parking stops, etc.). SBLs can be implemented as one-way facilities on both sides of the roadway or as a two-way facility on one side of the roadway. Due to the increased separation from vehicular traffic, SBLs are often considered a lower stress facility option than a more traditional bike lane or bike route.

Existing Countywide Facilities

There are approximately 3,200 total roadway miles throughout Solano County with almost 600 lane miles of existing designated bicycle facilities. Currently, there are 165 lane miles of shared-use paths, 199 lane miles of bike lanes, and 244 lane miles of bike routes (**Figure 2-F**). A great majority of roadways in the county (81%) do not have any designated bicycle facilities. Many of the roads with bicycle facilities are typically found in incorporated areas with denser bicycle networks (**Figure 2-G**). Limited bicycle network connectivity exists between incorporated areas, and where there is connectivity in these locations it is primarily only bike routes with simple signage. In general, the existing bike network serves destinations that are centrally located within the county's seven incorporated municipalities and regional recreational areas. However, there are several intercity bikeways, such as the Solano Bikeway or the Vaca-Dixon and Dixon-Davis bikeways.

SOLANO BICYCLE NETWORK COMFORT

It is important to analyze the existing bicycle network's level of comfort, as this can indicate how many residents may choose to ride a bike for commuting, errands, and recreational trips. Comfort is determined by the speed and volume characteristics of vehicular traffic on segments within the network as well as the level of separation provided between the cyclist and adjacent vehicular traffic.

Types of Cyclists

No two bicyclists are alike. On one end of the bicyclist spectrum are people who are comfortable riding with traffic in almost any condition. These types of riders are considered "highly confident" bicyclists (e.g., adults who regularly commute by bicycle) and are willing to ride on roads with little or no dedicated bicycle infrastructure. On the opposite end spectrum is the "non-bicycle" population, who will not ride a bicycle at all or may have physical limitations that prevent them from being able to ride a bicycle. However, the largest segment of the population is generally willing to ride a bicycle but does not feel comfortable sharing the lane with motor vehicles or riding adjacent to high-speed and high-volume traffic (e.g., children, the elderly, and non-regular adult bicyclists). These types of riders are known as the “interested but concerned,” and they prefer off-street bicycle facilities or bicycling on low-speed, low-volume streets; they may not bike at all if bicycle facilities do not meet their comfort preferences. The middle of the spectrum includes bicyclists who prefer separated facilities but are willing to ride with or adjacent to traffic if needed. **Figure 2-D** describes each different type of potential user and summarizes their preferred bicycling conditions.

Figure 2-D: Comfort Typology of Bicyclists

Comfort Typology of Bicyclists

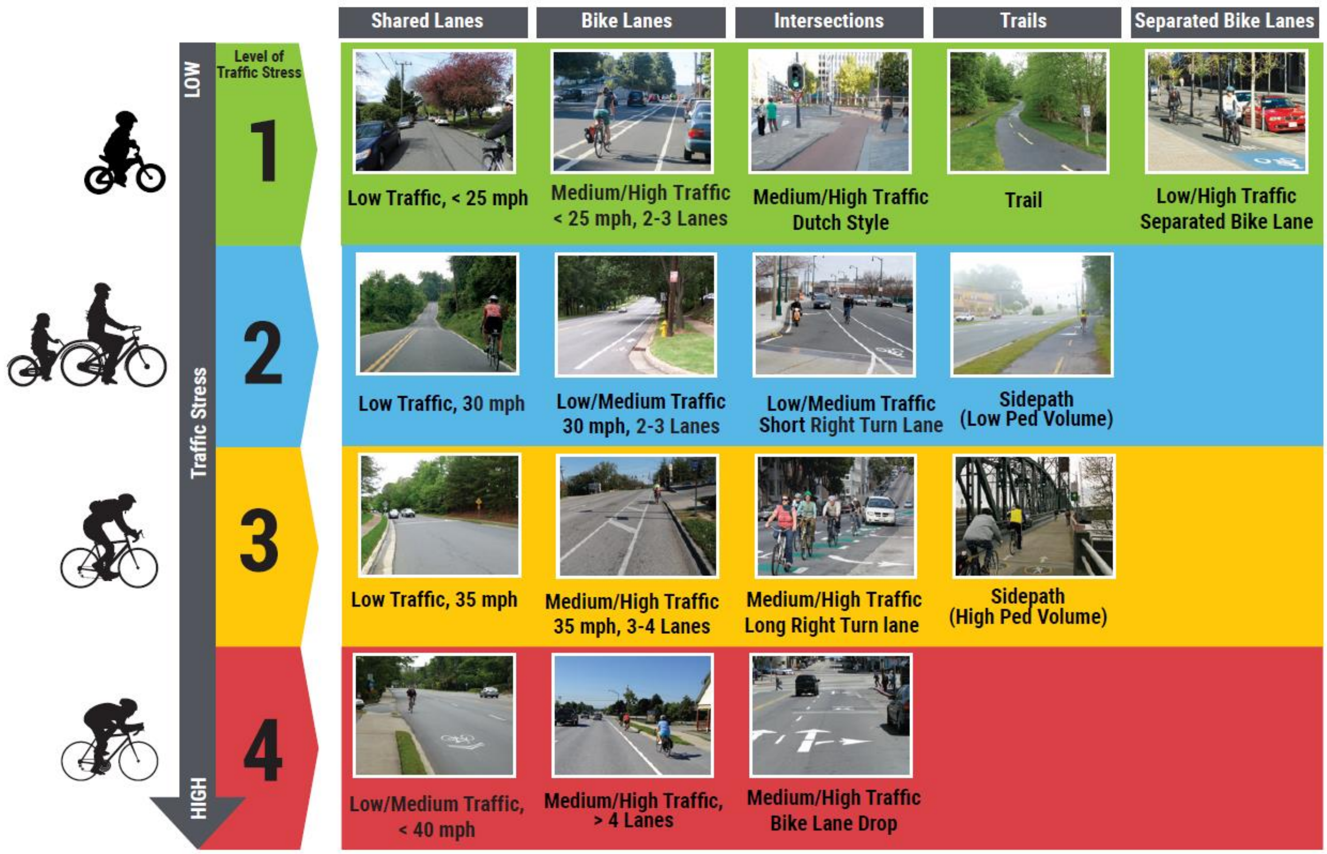
Design User Profile	Non-Bicycle	Interested but Concerned	Somewhat Confident	Highly Confident
Bicycling Preferences	Uncomfortable bicycling in any condition, have no interest in bicycling, or are physically unable to bicycle.	Often not comfortable with bike lanes, may bike on sidewalks even if bike lanes are provided; prefer off-street or separate bicycle facilities or quiet or traffic-calmed residential roads. May not bike at all if bicycle facilities do not meet needs for perceived comfort.	Generally prefer more separated facilities, but are comfortable riding in bicycle lanes or on paved shoulders if need be.	Comfortable riding with traffic, will use roads without bike lanes.
Percent of General Public	31-37%	51-56%	5-9%	4-7%

Level of Traffic Stress

One way to analyze bicyclist comfort in the existing bicycle network is through a Level of Traffic Stress (LTS) analysis. LTS is a rating given to an off-street bicycle facility, on-street bicycle facility, undesignated roadway segment, or crossing and that indicates the vehicular traffic stress experienced by the “interested by concerned” cyclist. It is based on the premise that a person’s level of comfort on a bicycle increases as separation from vehicular traffic increases and as traffic volumes and/or speeds decrease. The LTS analysis is useful for identifying roadways or crossings that may benefit from upgrading an existing high-stress facility to a lower-stress option or recommending a new bicycle facility where one may not have previously existed. The analysis helps identify appropriate bicycle facilities that are comfortable for people of all ages and abilities. Low-stress facilities can also become a factor when prioritizing projects for implementation.

LTS scores range from 1 to 4. LTS 1 scores indicate little or no traffic stress, and facilities with this score are generally suitable for most of the population. LTS 2 scores mean the user experiences some minimal traffic stress but facilities are suitable for most adults and families. LTS 3 scores describe facilities with moderate traffic stress that is generally uncomfortable or unappealing a large portion of bicyclists but that may be suitable for somewhat experienced or confident bicyclists. LTS 4 scores include facilities with high traffic stress that are primarily only suitable for very confident bicyclists. **Figure 2-E** provides examples of which types of bicycle facilities meet each LTS stress score.

Figure 2-E: Comfort Typology of Bicyclists



Methodology

The LTS analysis uses the Mineta Transportation Institute's nationally recognized research on low-stress bicycling and network connectivity developed in 2012. It includes the following inputs: traffic volumes, speeds, the number of travel lanes, and the presence and quality of bicycle facilities. This analysis emphasizes a "weakest link" method whereby the characteristic of any portion of a street segment that scores the highest stress level on a scale of 1 to 4 determines the score for that entire segment. For instance, a low-volume two-lane street with a speed limit of 40 mph would rate poorly with an LTS 4 score because of the high speed limit.

Countywide LTS Results

Figure 2-F presents the LTS scores by percentage of the network for all on-street facilities and off-street shared-use paths in Solano County. LTS 1 is by far the most common classification (77% of lane miles) due to the large amount low-speed, low-volume neighborhood streets as depicted on **Figure 2-H**. Roads with these characteristics often do not require designated bicycle facilities to be considered low-stress. Facilities provided on roadways with higher volumes and speeds also contribute to total LTS 1 lane miles. LTS 4 is the second most common comfort classification for roadways within the county (13% of lane miles). These include high-speed and high-volume roadways predominantly found in the county's incorporated areas, on major crosstown roadways. However, many examples of these can also be found in unincorporated areas (e.g., CA-12 and CA-113). Many LTS 4 roadways either have no designated bicycle facilities or have facilities that provide minimal separation from high-speed, high-volume traffic. While these high-stress routes are less common from a countywide perspective, they often

form the backbone of municipal street networks and function as barriers to direct, low-stress travel within Solano County's incorporated areas.

Roadways that scored LTS 3 make up a relatively low amount of the network (6% of lane miles), while those that scored LTS 2 follow closely as the least common stress classification (4% of lane miles). It is important to note that this LTS analysis is limited to roadways where it is legal to ride a bike and therefore does not include limited access facilities (e.g., I-880). Off-street, unpaved trails are also not included.

SOLANO BICYCLE CONNECTIVITY

Using the existing bicycle network's level of traffic stress results, connectivity of the network can be measured using the Bicycle Network Analysis (BNA) tool created in conjunction with People for Bikes. The BNA tool assess the ability of a user to travel on low-stress facilities between census blocks to assess connectivity.

Methodology

The BNA approach provides an understanding of where connectivity challenges exist. The BNA evaluates the connectivity of each census block to other census blocks within biking distance (which correlates to about 3 miles, or an approximately 30-minute ride). The BNA then assesses the number and types of destinations available within each of those blocks.[1]

Defining Connectivity

The BNA assumes that a census block connects to any street that either follows its perimeter or serves its interior. Two census blocks are only considered "connected" if an unbroken low-stress street connects them; therefore, even a short high-stress segment can negate a potential connection.

The BNA also considers detours; if a low-stress route deviates more than 25 percent when compared to the shortest potential direct route, then a low-stress route is not considered to be available.

Based on the information about which census blocks are connected, the BNA calculates the total number of destinations accessible on the low-stress network. The BNA then compares this with the total number of destinations that are within biking distance, regardless of whether they are accessible via the low-stress network.

Assigning Points

Points are assigned on a scale of 0-100 for each destination type based on the ratio of low-stress destinations to all destinations within biking distance. The scoring places higher value on the first three low-stress destinations by assigning points on a stepped scale. After the first few low-stress destinations, points are prorated up to 100 based on the ratio of low-stress to high-stress routes.

For example, a census block encompasses five parks; however, low-stress connections are available to only one park. Therefore, the BNA would assign 30 points to park access. If the census block has low-stress connections to two parks, the BNA would provide a score of 50 points (30 for the first park, 20 for the second). If the census block has low-stress connections to four parks, the BNA would provide a score of 85 points (30 for the first, 20 for the second, 20 for the third, and 15 out of the remaining 30 points for connecting one of the remaining two parks).

---

[1] For the BNA, destination data is pulled from Open Street Map and population data is pulled from the US Census.

Destination Categories

The BNA looks at six categories for assessing connectivity:

1. Population
2. Opportunity (i.e. jobs and education)
3. Core Services[2]
4. Recreation
5. Retail
6. Transit

Many categories include a mix of destination types; therefore, the category score is calculated by combining the scores of each destination type. Weights for each destination type are used to represent their relative importance within the category.

For census blocks where a destination type is not reachable by either high- or low-stress routes, that destination type is not included in the calculations. For example, if a city has no institute of higher education, the "opportunity score" will exclude the higher education destination type so the score is unaffected by its absence. This ensures that areas of a city with a denser concentration of destinations are not scored more highly than those with more dispersed destinations.

Bicycle Network Analysis Results

The BNA results indicate that much of Solano County, and essentially all populated areas of the county, have low-to-medium connectivity as shown on **Figure 2-I**. Generally, the only areas with high connectivity are rural portions of the county with agricultural land uses or nature preserves where there are minimal destination types. These areas have few barriers to bicycle travel. Conversely, cities with high-volume, high-speed roadways and rural portions of the county adjacent to major transportation corridor barriers (e.g., I-80, CA-12 and CA-113, the Union Pacific railroad tracks) are difficult to travel between on a bicycle due to connectivity gaps and high-stress barriers, which generate low BNA scores.

[2] Includes doctor offices/clinics, dentist offices, hospitals, pharmacies, supermarkets, and social services.

Figure 2-F. Solano Countywide Active Transportation Network Infographic

SIDEWALK NETWORK INVENTORY

	Existing Sidewalk Lane Miles	Full Sidewalk Buildout Lane Miles
Countywide	1,313	7,233
Priority Development Areas	44	178
Communities of Concern	307	694
Disadvantaged Communities	65	234

BICYCLE NETWORK INVENTORY

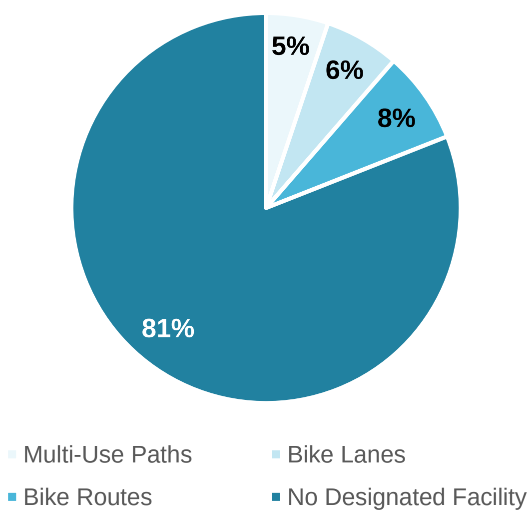
Bike Facilities	Lane Miles
Multi-Use Paths (Class I)	165
Bike Lanes (Class II)	199
Bike Routes (Class III)	244
No Designated Facility	2593
All Roadways	3202

Citywide Bicycle Connectivity (BNA) Score

17

Low Connectivity 0 → 100 **High Connectivity**

BICYCLE INVENTORY
PERCENT OF ROADWAY MILEAGE



LEVEL OF TRAFFIC STRESS (LTS)
PERCENT OF ROADWAY MILEAGE

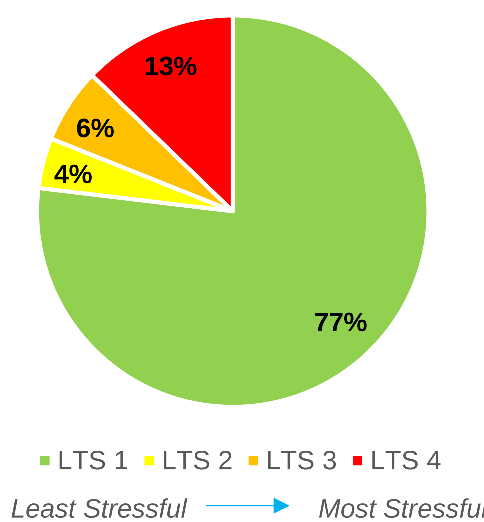


Figure 2-G. Solano Existing Bicycle Network

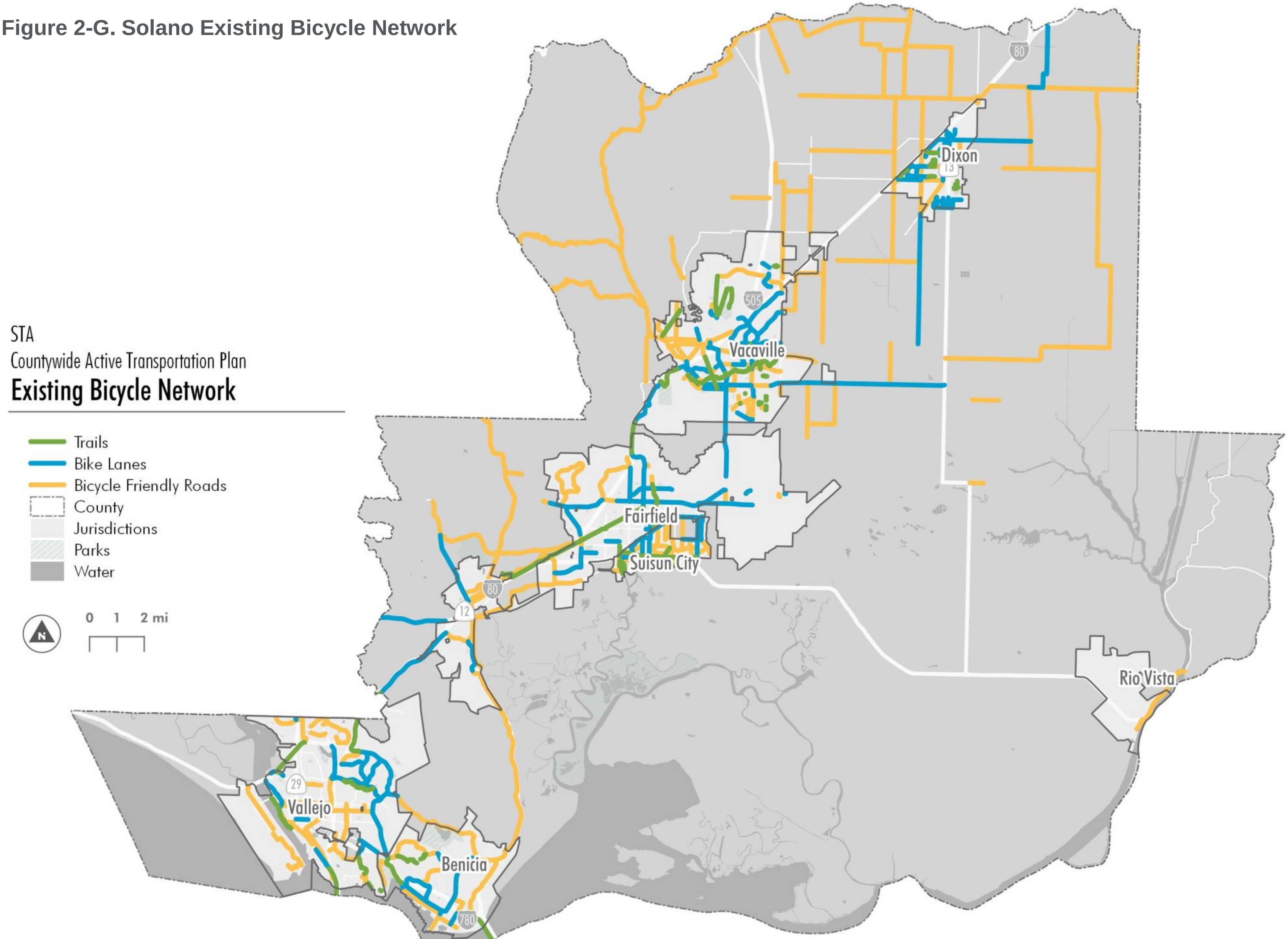


Figure 2-H. Solano Level of Traffic Stress

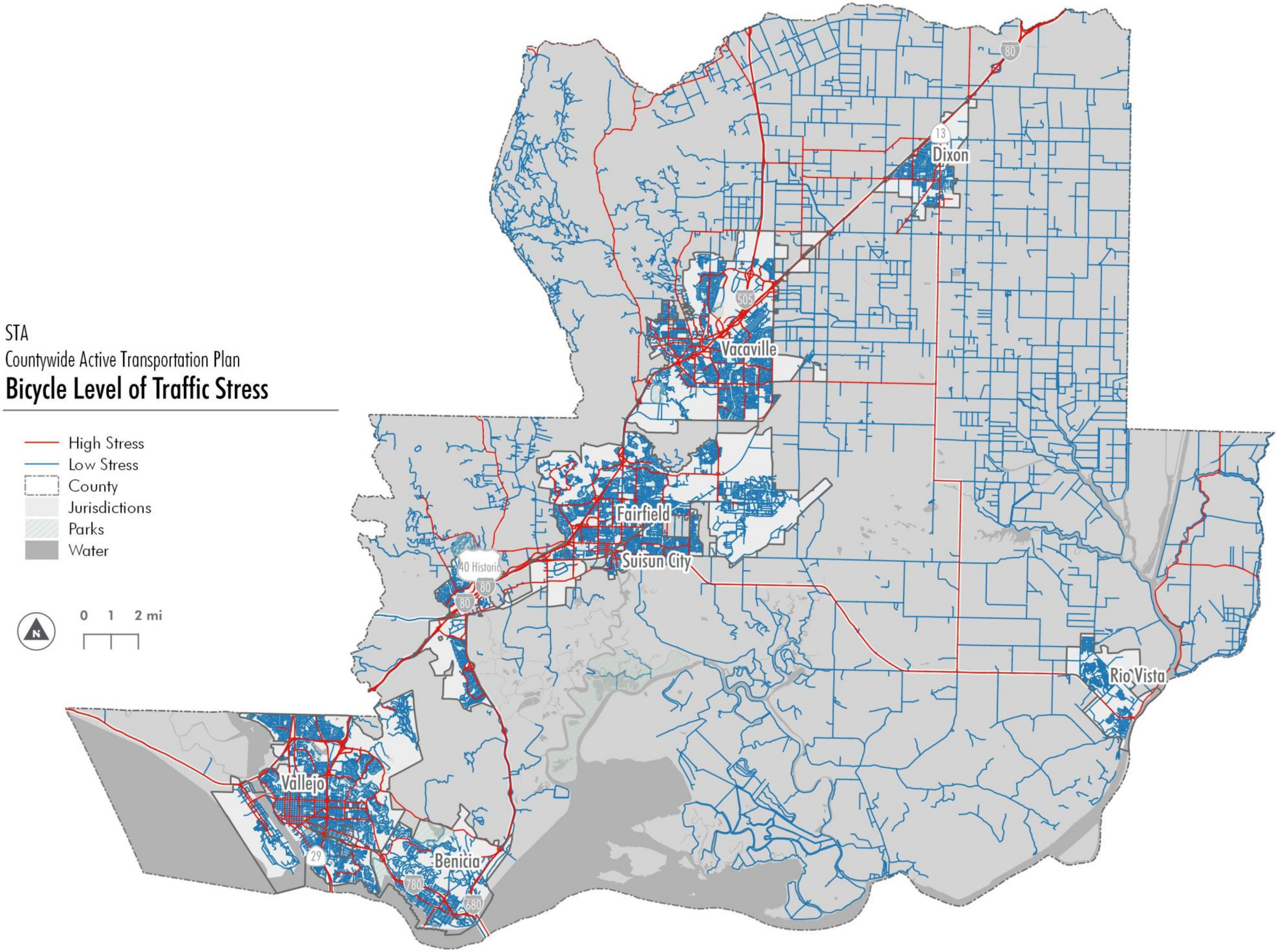
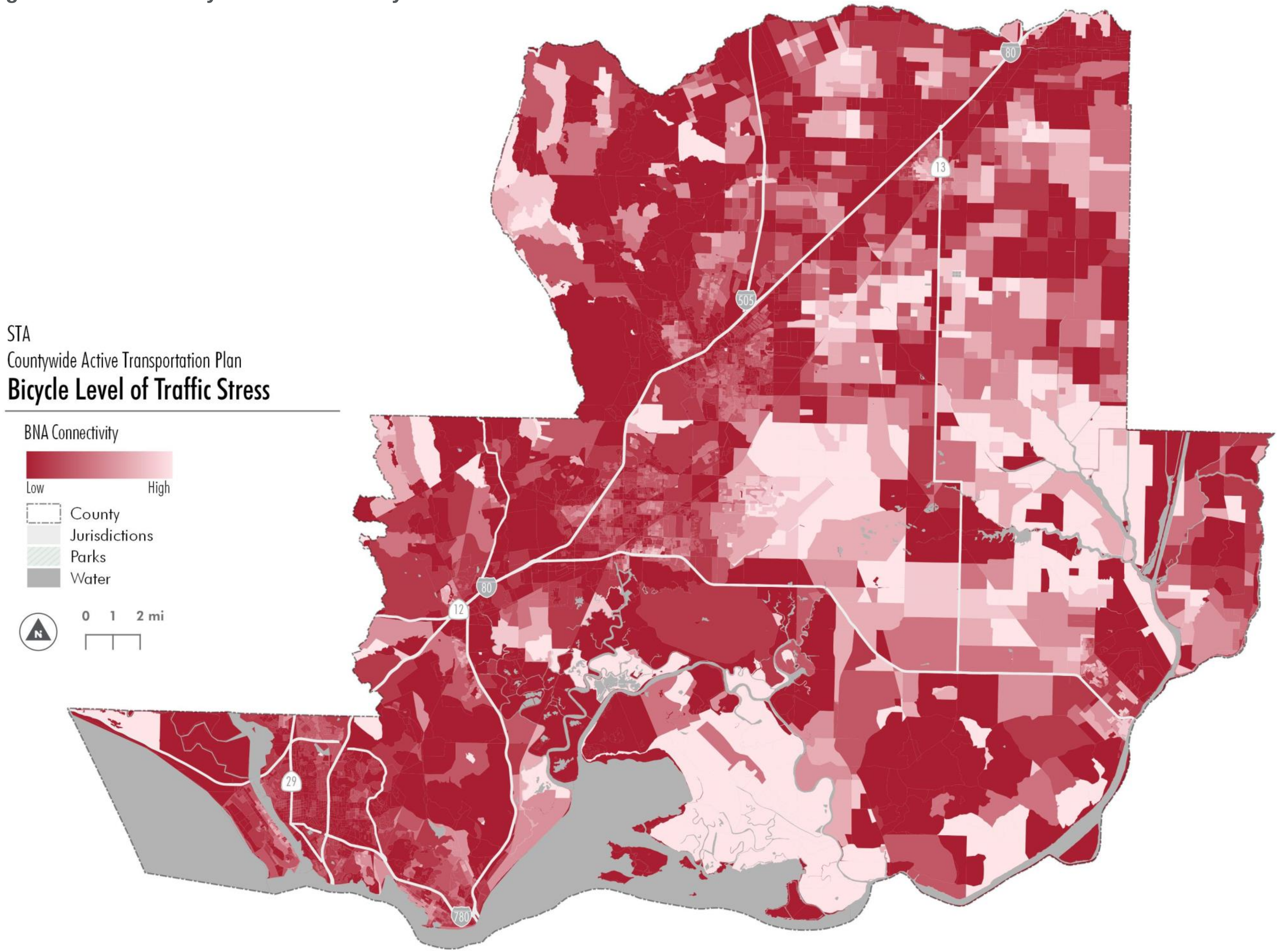


Figure 2-I. Solano Bicycle Network Analysis



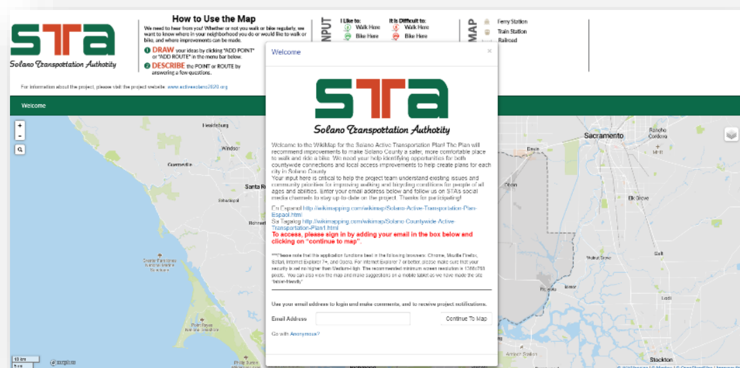
COUNTYWIDE PUBLIC OUTREACH PHASE I SUMMARY

As part of the first phase of public outreach for the Solano ATP, both online and in-person events were held to try to reach people across all parts of the county. The online and in-person feedback was combined to highlight where all participants had positive or negative input about existing infrastructure throughout the County. Positive comments generally encapsulate where people currently like to walk or bicycle and identify experiences to be highlighted. Negative comments mostly highlight areas where people feel it is dangerous or uncomfortable to walk or bike. Areas that received more comments show as darker than areas with only one or two comments as can be on the heatmaps on **Figure 2-J** to **Figure 2-M**. In total, 1,080 individual line and point comments were collected across Solano County, with 483 comments from in-person events and 597 comments from the project website.

ONLINE PARTICIPATION

An online interactive WikiMap was available on the project website, www.activesolano2020.org, which was hosted by STA. The WikiMap allowed participants to draw lines or drop pins where they like walking or biking and where they want to see improvements to walking or biking. This process helped identify the positive attributes that should be celebrated and the negative attributes that may need new projects to help encourage more people to walk and bicycle in Solano. Additionally, Spanish and Tagalog versions of the WikiMap were accessible on the project website to garner input from all Solano residents.

STA's online interactive WikiMap



IN-PERSON POP-UP EVENT

The Solano ATP Team hosted pop-up outreach events in each of the seven incorporated jurisdictions for the first phase of public outreach. At each event, participants were encouraged to provide feedback for areas all throughout Solano County, including in the unincorporated areas. However, there was no specific event for unincorporated areas hosted due to the size of Unincorporated Solano County and the fact that that most people live within communities adjacent to the incorporated jurisdictions.

SUMMARY OF PUBLIC INPUT FOR WALKING AND BIKING

Overall, the greatest number of positive biking comments were identified in Vallejo, Benicia, and Suisun City. However, Dixon and Fairfield both had pockets of positive feedback for biking. For walking, Vallejo and in Benicia had the most positive comments compared to all the other locations. Rio Vista had no positive comments for walking and very few positive comments for bicycling. Vacaville had only a few positive walking comments and no negative walking comments. Most negative biking comments were centered in Vallejo, Benicia, Suisun City, and Fairfield. The most negative walking comments were found in Benicia and on the northwest side of Vallejo.

Few positive or negative walking comments were identified within unincorporated areas. However, many people indicated that they liked to bike on many of the interconnecting routes such as the Solano Bikeway Path and frontage roads along I-80, CA-12 Lincoln Highway, Fairfield Linear Park Trail, Pleasant Valley Road, parallel to the Union Pacific Railroad between Vacaville and Dixon, Hawkins Road, Frye Road, and across the bridges to Contra Costa County. Participants wanted to see biking improvements along Cordelia Road, Rockville Road at the Bay Ridge Trail, Mankas Corner Road, Gibson Canyon Road, and on multiple connections to Yolo County.

Figure 2-J. Countywide Public Outreach – Positive WikiMap Walking Comments

Figure 2-K. Countywide Public Outreach – Negative WikiMap Walking Comments

Figure 2-L. Countywide Public Outreach – Positive WikiMap Bicycle Comments

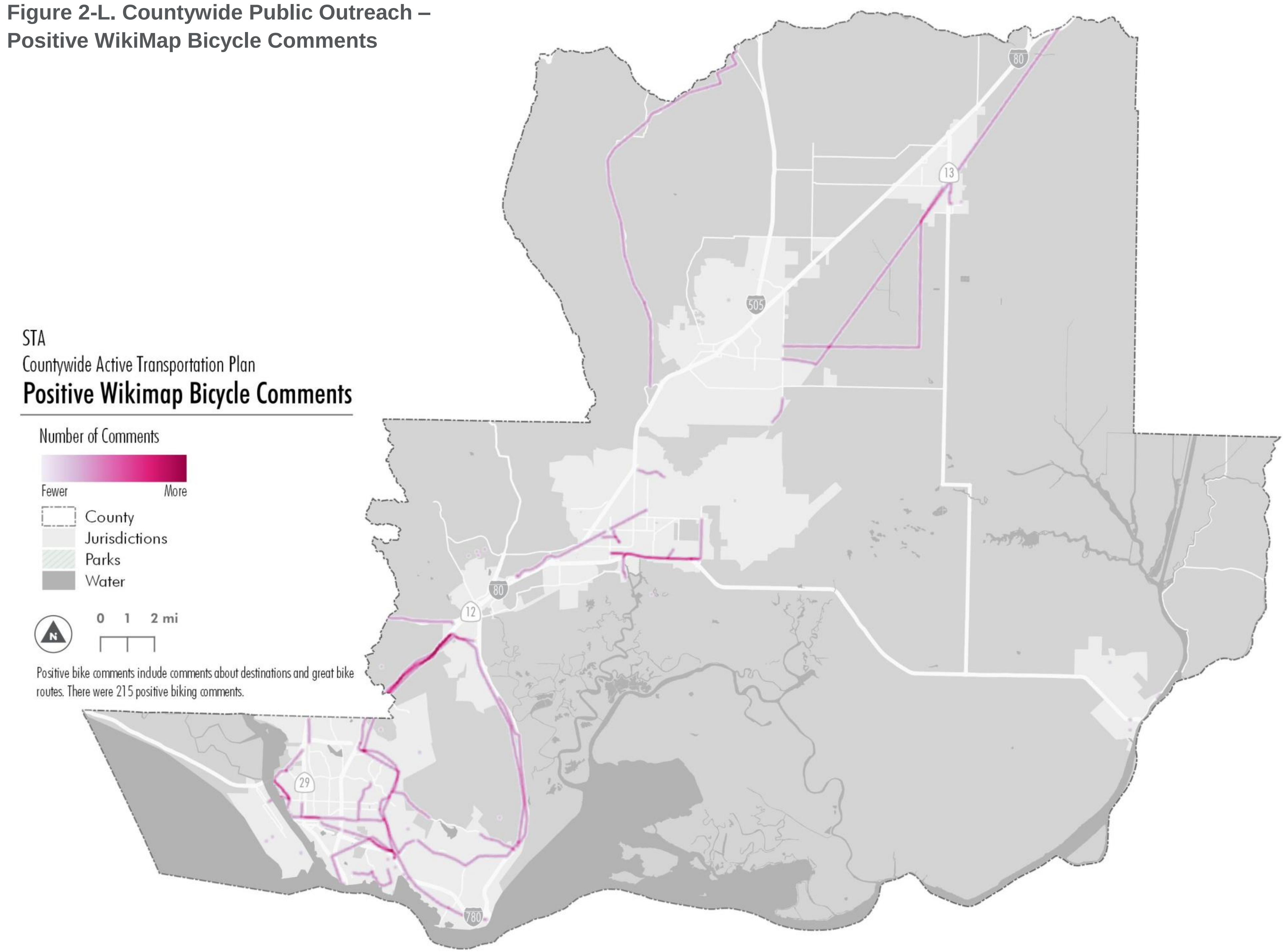
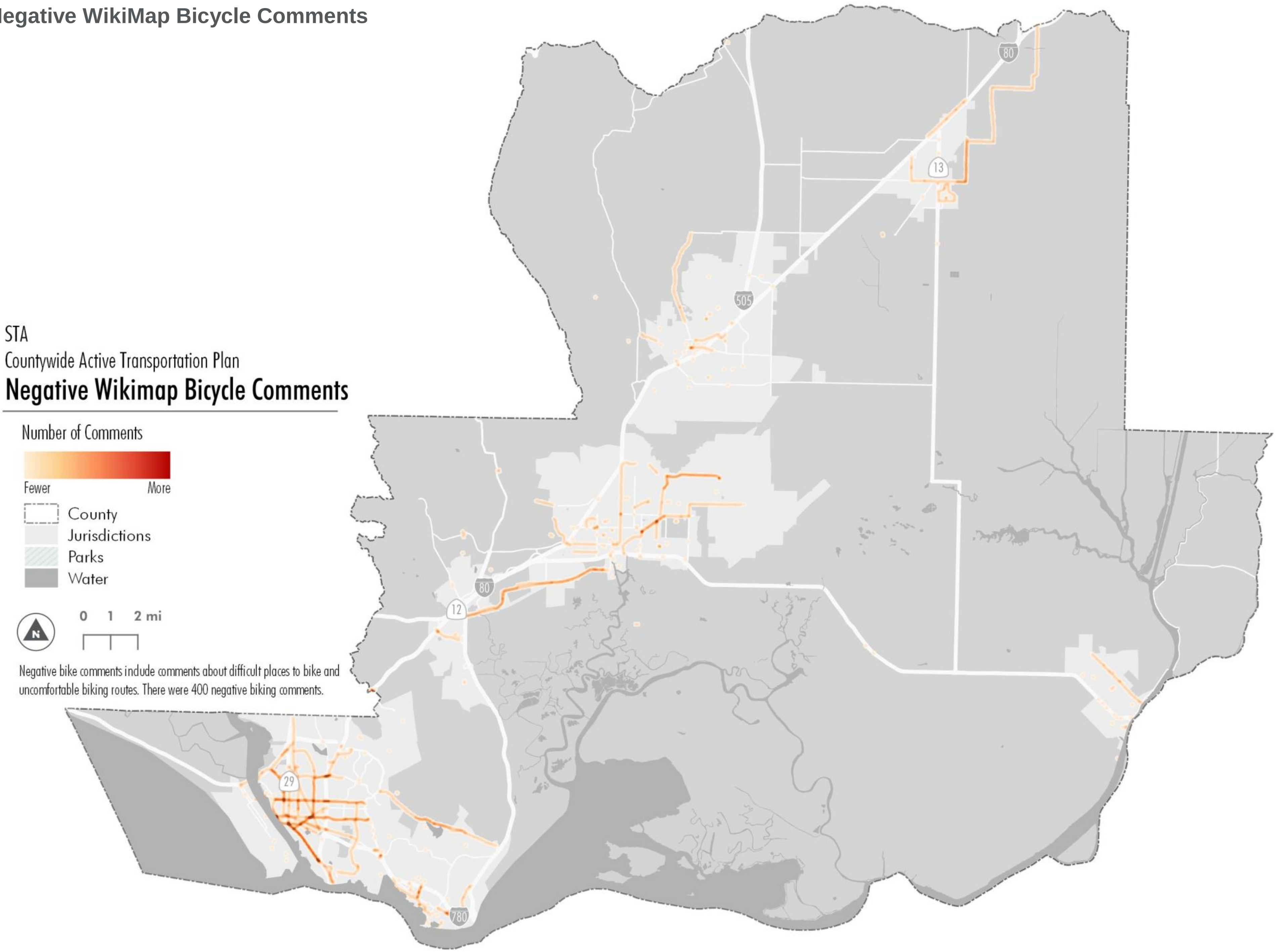


Figure 2-M. Countywide Public Outreach – Negative WikiMap Bicycle Comments



ACTIVE TRANSPORTATION, LAND USE, AND EQUITY IN SOLANO

Solano County is unique in comparison with other Bay Area counties, as it has both a diverse range of land uses and highly multicultural population. To help focus where many grant funding dollars can best be spent, multiple agencies have identified areas in which local communities want to focus growth near transit or in historically underserved communities. The areas addressed in this section can be used in the final Solano ATP to help prioritize project recommendations based on grant-competitiveness.

PRIORITY DEVELOPMENT AREAS

The nine-county Bay Area Metropolitan Transportation Commission (MTC) worked with local jurisdictions to identify land use areas for future growth near transit services or pedestrian-oriented areas known as Priority Development Areas (PDAs). These areas are often located near established job centers, shopping districts, and other services. All of the incorporated jurisdictions in Solano County have at least one identified PDA except for the City of Rio Vista. Projects identified in PDAs often score better in competitive regional transportation grant opportunities such as the One Bay Area Grant (OBAG) program. **Figure 2-N** shows were PDAs are located throughout Solano County.

EQUITY FOCUS AREAS

Grant applications vary in how historically underserved communities are identified. The two categories included in below represent the statewide standard and regionally-used methodologies which are shown together in **Figure 2-O**.

Disadvantaged Communities

At the statewide level, the Caltrans Active Transportation Program grant guidelines identifies how equity can be addressed through calculating a disadvantage community status using a variety of methods. However, the most common method involves using the California Office of Environmental Health Hazard Assessment's CalEnviroScreen tool. The CalEnviroScreen tool uses socioeconomic and environmental health data to map disadvantaged areas. Specifically, it uses pollution exposure, environmental effect, sensitive population, and socioeconomic indicators. The CalEnviroScreen tool produces an overall score for each census tract and compares the results as percentiles across all of California. Communities within the top 25th percentile statewide are considered disadvantages communities per the grant guidelines. Very few areas within Solano County meet this designation and are concentrated within the City of Vallejo on Mare Island, parts of the south Vallejo waterfront, as well as the Carquinez Heights, Flosden Acres, and Harry Floyd Terrace neighborhoods.

Communities of Concern

At the regional level, MTC uses communities of concerns to represent a diverse cross-section of populations and communities that could considered disadvantaged or vulnerable in terms of both current conditions and from potential impacts of future growth. The definition of communities of concern includes all census tracts that have a concentration of both minority and low-income households at specified thresholds of significance, or that have a concentration of three or more of six additional factors if they also have a concentration of low-income households. Among the additional factors are people with disability, seniors 75 years and over, and cost-burdened renters. Unlike the Caltrans methodology, environmental considerations are not considered. Communities of concern in Solano County are concentrated throughout Vallejo, central Fairfield, Suisun City, and central Vacaville.

Figure 2-N. Solano Priority Development Areas

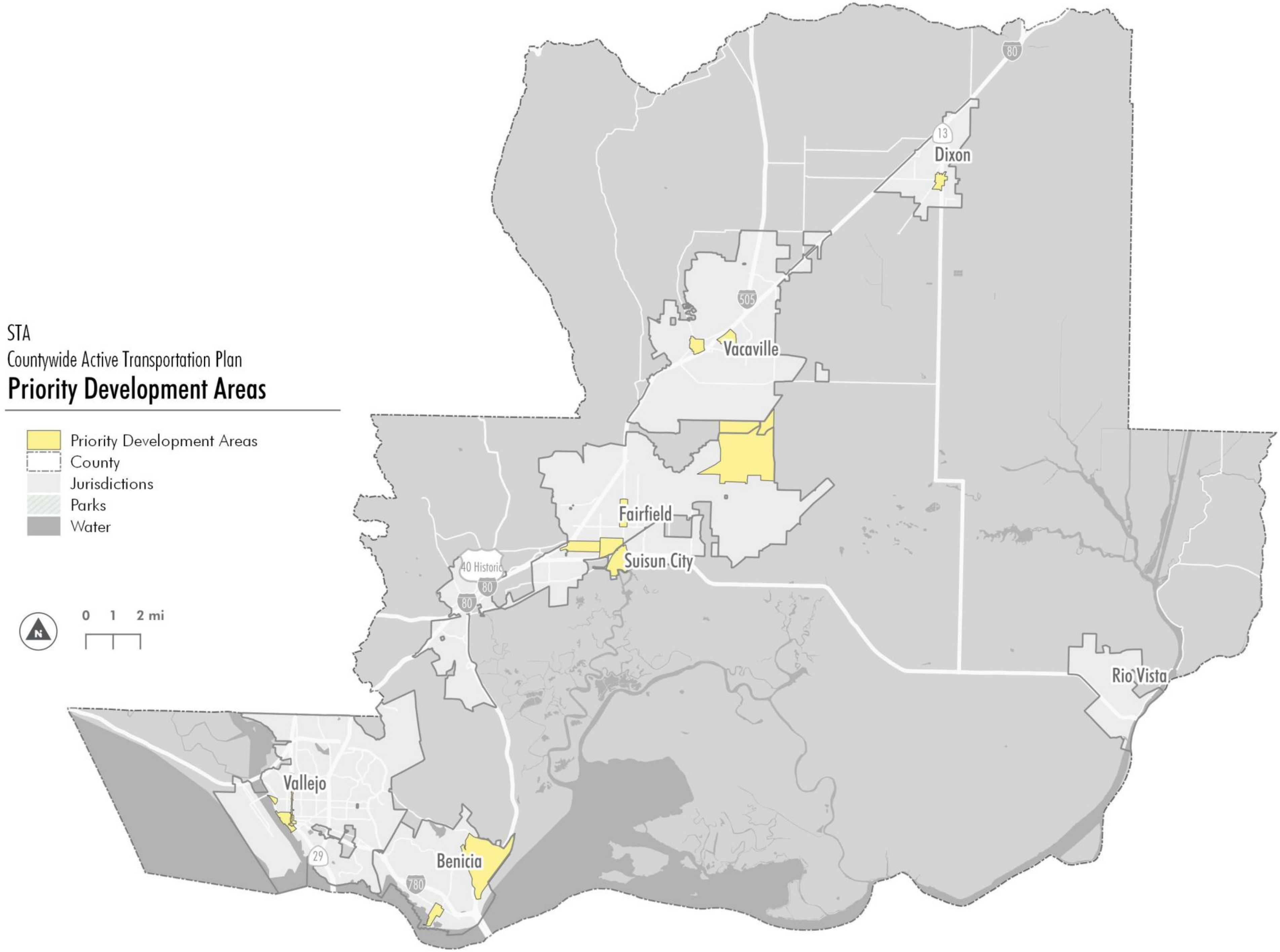
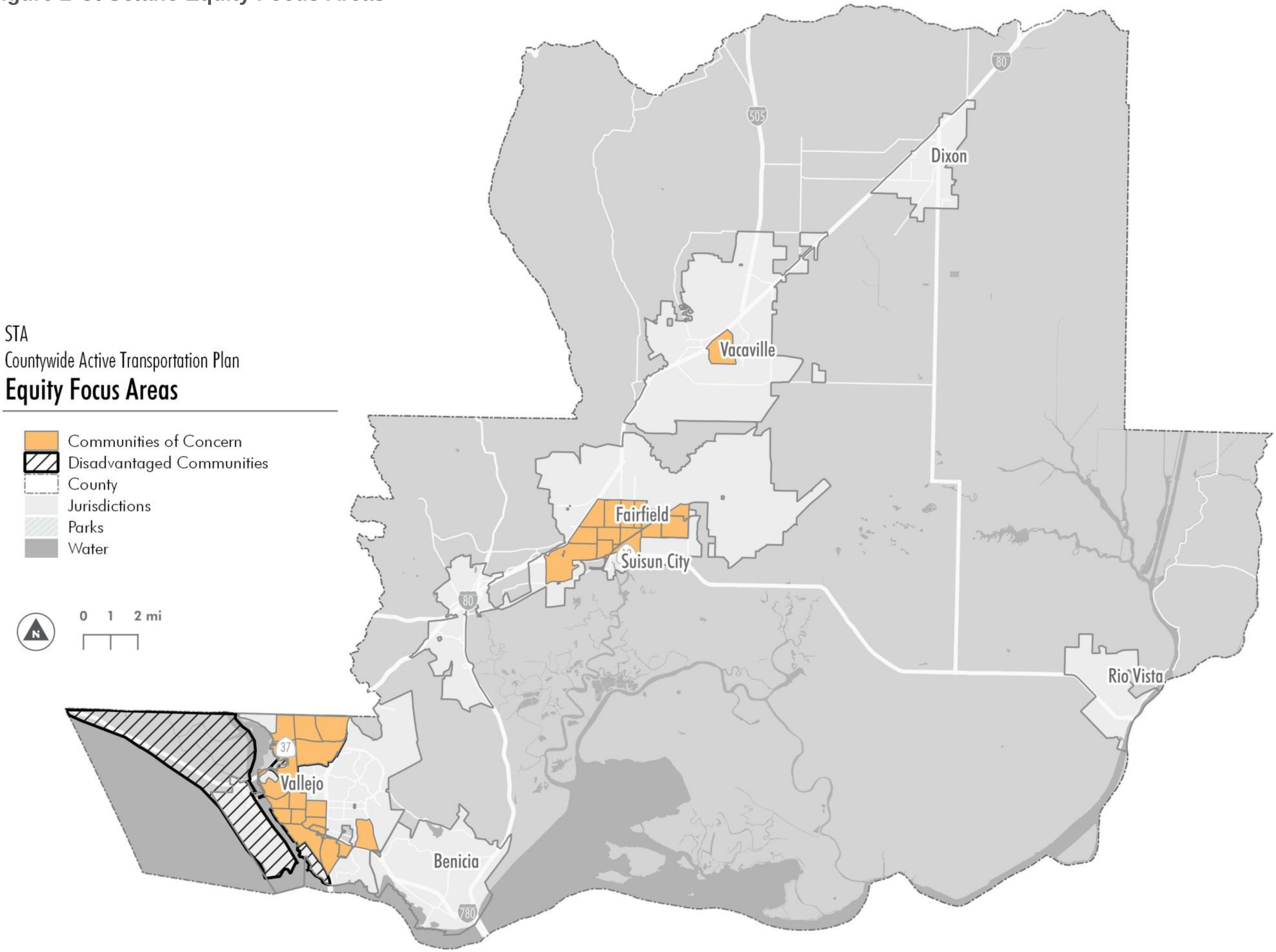


Figure 2-O. Solano Equity Focus Areas



CHAPTER 3
CITY OF BENICIA
ACTIVE TRANSPORTATION
EXISTING CONDITIONS

3. BENICIA ACTIVE TRANSPORTATION EXISTING CONDITIONS

BENICIA OVERVIEW

The City of Benicia is located on the south coast of Solano County and has a small-town waterfront character. Interstates I-680 and I-780 run through the city, and the I-680 bridge that spans the Carquinez Strait connects Benicia with the Contra Costa County cities of Martinez and Concord. Benicia is mostly made up of residential land use, I-780 dividing lower density and newer development to the north from gridded older residential development to the south. Retail development is mainly located in the downtown along First Street. There is an industrial park, which includes the Valero oil refinery northeast of the residential areas. Benicia is the fifth largest city in Solano County, with a population of 28,343 people as of 2017.

SUPPORT FACILITIES AND PROGRAMS

The Solano Countywide Bicycle Plan (2012) states that there are various park and ride locations in Benicia with multimodal connections. Currently, there are no existing locations with bike parking. There are plans for a new park and ride location at the Intermodal Rail Station at the intersection of Laker Herman Road and I-680; the new location will have up to 2,700 planned parking spots, bike parking, and connections to the Benicia Transit and Capitol Corridor. In addition, some Benicia Transit buses have external racks and space is available on board for bicycles in aisles or storage areas.

BENICIA DEMOGRAPHICS OF ACTIVE TRANSPORTATION

Demographics and travel patterns for the City of Benicia are depicted in Figure 3-B. Multiple factors influence a person's ability to walk and bicycle within Benicia, and key trends in these factors are summarized in **Table 3-1**. This section evaluates demographic characteristics of the population who currently walk or ride a bicycle in Benicia using data from the United States Census American Community Survey (2016, 5-year estimates) and the California Household Travel Survey (2012). While these surveys are useful, this data should not be taken at face value given the small sample sizes associated with this data in smaller communities, such as Benicia. It is presented here because these are the only sources of standardized data across all geographies in Solano County and they can help provide an overview of walking and bicycling trips in Benicia.

RACE & ETHNICITY

Approximately 71 percent of Benicia's population is White, 13 percent is Hispanic, 11 percent is Asian, and 5 percent is Black. White residents make up the highest percentage of the population and the highest percentage of people who bike and walk to work. While White residents make a near proportionate number of trips compared to their share of the overall population, Asian and Black residents make disproportionately more bike trips than their share of the overall population (31% and 15%, respectively). Similarly, Hispanics account for a disproportionately high number of walking trips at 25 percent, which is almost double their share of the population.

AGE

Residents aged 25 to 44 and 45 to 64 years old make up the largest commuting age groups in Benicia, accounting for almost 85 percent of the total commuting population. While those aged 25 to 44 years old make an amount of the bicycle commute trips that is proportionate to their share of the population, people aged 45 to 64 make a disproportionately high number of bicycle commute trips. In terms of walking commute trips, people aged 45 to 64 years old walk disproportionately less than their share of the population while those 65 and older walk disproportionately more. The youngest age group, those age 16 to 24 years old, do not account for any of the bicycle commute trips but do make a proportionate amount of walking trips as compared to their share of the population.

GENDER

Residents in Benicia have a near 50/50 percent gender split between men and women. However, American Community Survey data suggests that women are more likely to bike to work than men, while men are more likely to walk to work than women.

INCOME STATUS

Within Benicia, the largest income range for commuters is those that make more than $75,000 per year (37%). However, low-income and middle-income earners make up the majority of people who bike to work (38% and 48%, respectively). While the number of walk trips relative to percentage of the population is more proportional to that of the general population, lower- and middle- income earners make a slightly higher proportion of trips than their share of the population.

GENERAL TRAVEL CHARACTERISTICS FOR ALL MODES

Trip Purposes

Over one-third of trips (33%) in Benicia across all modes are for dining, with only about 17 percent of all trips being for work. Additionally, trips for errands (14%) and recreation (12%) make up almost a quarter of all trips taken in Benicia. The sample size for this data is 782.

Trip Distances

A majority of all trips taken in Benicia by any mode of transportation (61%) are less than three miles in length, which is considered a reasonable biking distance. A third of all trips (34%) are actually even less than one mile, which is considered a reasonable walking distance for most trips. This indicates that almost two-thirds of all trips made within Benicia could be converted to walking or biking trips. Trip distances from three to five miles (6% of all trips in Benicia) and over five miles (32%) are often deemed too far for the “interested but concerned” user to consider walking or bicycling. The sample size for this data is 421.

Mode Share

While a majority of trips in Benicia are short distance and non-work-related, the preferred mode of choice for all trip types is by far the car (86%). Telecommuting and transit each represent 6 percent of trips, while walking (1%) and biking (<1%) make up a minimal share of all preferred modes of travel. The total number of people who reported walking or bicycling to work in Benicia in the United States Census’ American Community Survey is 231.

Table 3-1 presents information about which population groups are walking and bicycling more (or less) than others in Benicia better understand which population groups may be more dependent on active transportation facilities and which population groups may lack access to these types of facilities. This can help Benicia plan for the equitable distribution of active transportation facilities and ensure that outreach efforts are targeting new audiences and considerate of the needs of specific populations. This information can also help Benicia determine which population groups should be engaged to better understand barriers to walking and bicycling.

Table 3-1 Benicia Active Transportation Demographics Findings

Who is Walking More	**Who is Biking More**
• White and Hispanic residents • Young adults and working seniors • Men • Low and medium-low income earners	• White, Black, and Asian residents • Young adults and middle-aged workers • Women • Low and medium-low income earners
Who is Walking Less	**Who is Bicycling Less**
• Black and Asian residents • Middle-aged workers and high school and college students • Women • Medium-high and high-income earners	• Hispanic residents • High school and college students and working seniors • Men • Medium-high and high-income earners

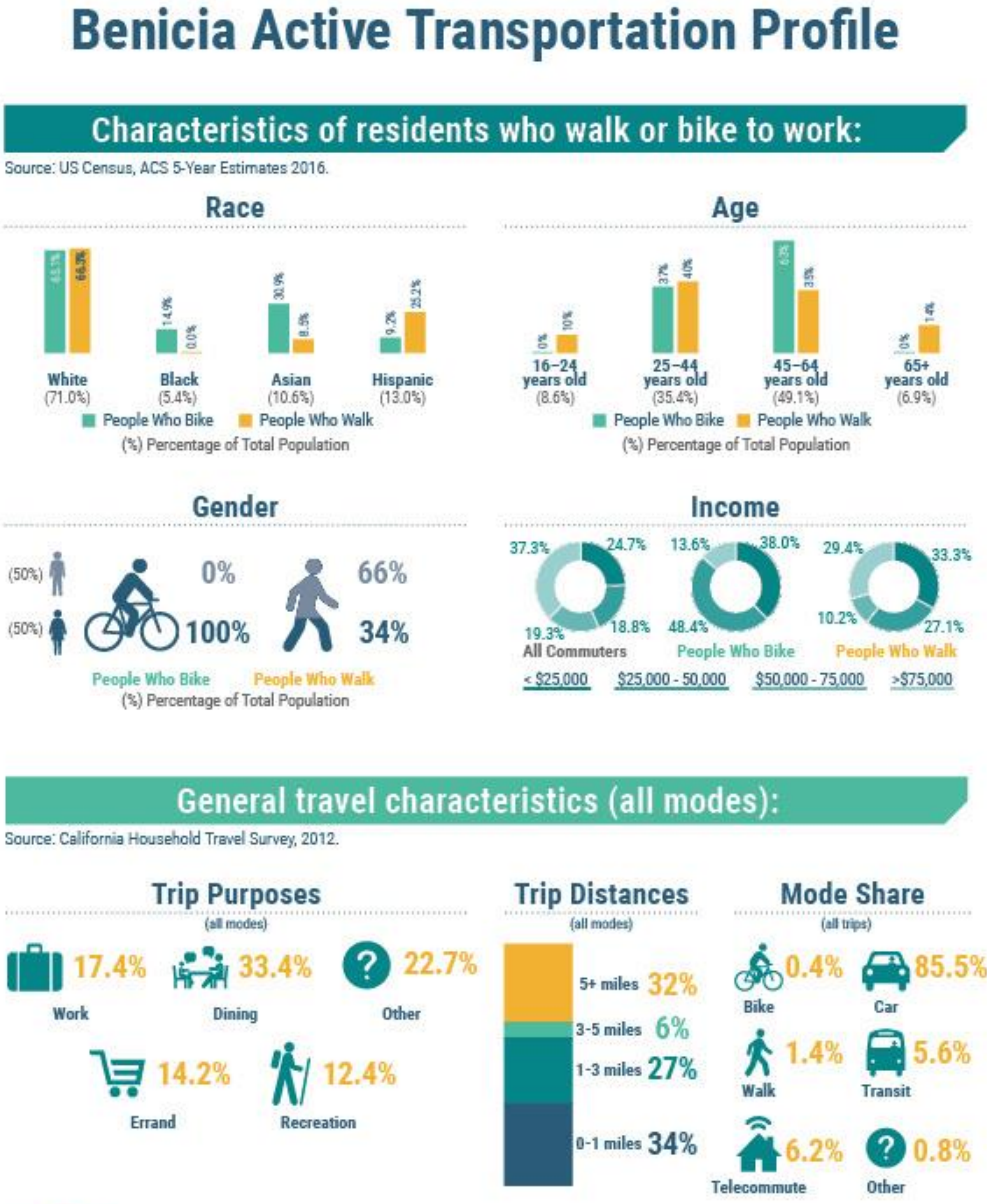


Figure 3-B. Benicia Active Transportation Demographics Infographic

BENICIA EXISTING ACTIVE TRANSPORTATION NETWORK

The active transportation network consists of both pedestrian and bicycle infrastructure that work together to provide mobility options for all those that live, work, study, play, visit, pray, or shop in Benicia. Whether we're aware of it or not, everyone in Benicia uses active transportation infrastructure, such as sidewalks, at some point in their day even if just for short distances to reach their desired destinations.

EXISTING PEDESTRIAN NETWORK

The pedestrian network within City of Benicia consists largely of sidewalk infrastructure supported by crossing treatments, multi-use paved trails, and unpaved recreational trails. Benicia currently has an overall Walk Score of 33 out of 100 according to the real-estate website www.WalkScore.com, indicating that most errands require a car. For the Solano ATP, sidewalk presence was used as the metric for pedestrian accessibility and was inventoried within incorporated jurisdictions and adjacent pockets of unincorporated communities.

Sidewalk Inventory

An inventory of existing sidewalks was conducted to identify sidewalk gaps within Benicia, with results summarized in **Figure 3-C**. The city currently has a total of 96 miles of existing sidewalk infrastructure, which includes measurements of sidewalks on both sides of the street independently. There are approximately 348 miles of maximum sidewalk coverage (total roadway mileage multiplied by two to account for both sides of the street). Depending on land use context, there may be areas of the city with rural characteristics where typical sidewalk infrastructure may not be compatible. However, it was not possible to exclude these areas from the overall sidewalk inventory evaluation.

Sidewalk coverage in Benicia was also evaluated in the equity focus areas (see the Countywide chapter for full descriptions) as designated by the Metropolitan Transportation Commission for Priority Development Areas and Communities of Concern, or CalEnviroScreen Disadvantaged Communities. In Priority Development Areas, there is approximately 6 miles of sidewalk coverage. For Communities of Concern, there is approximately 0.1 miles of sidewalk coverage. Overall, the need for sidewalk infrastructure is greatest in the Priority Development Areas, which need about 37 miles of sidewalk gaps filled.

EXISTING BICYCLE NETWORK

This section discusses the bicycle facilities in Benicia's existing bike network. It also includes an analysis of bicyclist comfort and connectivity – that is, level of traffic stress (LTS) and bicycle network connectivity analysis (BNA), respectively –for the existing network. Additional information on the LTS and BNA methodologies can be found in the Countywide chapter's existing conditions section.

Existing Facilities

Benicia has a 174-mile roadway network, 47 lane miles of which currently have designated bicycle facilities. This includes 20 lane miles of shared-use paths, 16 lane miles of bike lanes, and 11 lane miles of bike routes, as summarized on **Figure 3-C**. Most roadways in the city (73%) do not have any designated bicycle facilities. Benicia's bicycle network consists of disconnected segments of the San Francisco Bay Trail along its waterfront, standard bike lanes throughout the city (e.g., East 5th Street, East 2nd Street, Military West, Southampton Road), and various bike routes throughout the city (e.g., East H St, 1st Street, West J St, Park Road). The existing network provides connections to destinations including downtown businesses on the 1st Street corridor, recreational opportunities such as Benicia Point and Turnbull Park, and schools like Benicia High School as shown on **Figure 3-E**. However, the network has some gaps between facilities and does not serve destinations throughout the city equally.

Bicyclist Comfort and Connectivity

Figure 3-C presents the percentages of bicycle facilities and roadway lane miles in Benicia for each LTS classification. LTS 1 is the most common classification, with 73% of lane miles scoring as very comfortable because a majority of roadway lane miles in the city are on low-speed and low-volume streets as shown on **Figure 3-F**. These streets are typically local neighborhood streets (e.g., East 2nd Street, East J Street) or quiet streets running through industrial areas (e.g., Bayshore Road, Industrial Way). Roads with these characteristics do not necessarily require bicycle facilities to be considered low-stress. Facilities provided on roadways with slightly higher volumes and speeds also contribute to total LTS 1 lane miles (e.g., the bike lanes on East 5th Street).

However, LTS 4 is the second most common comfort classification for roadways in Benicia, accounting for 13 percent of lane miles in the city. These include high-speed and/or high-volume major roadways such as Military West, Military East, 1st Street, East 2nd Street, and Lake Herman Road. Many of these roadways are bike routes or have bike lanes; however, these treatments fall short of reducing LTS given the roadway traffic characteristics and geometries. While these high-stress roadways are less common, they are some of the most direct north-south and east-west routes in the city and are therefore barriers to a connected, low-stress citywide bike network. LTS 2 and 3 facilities account for eight percent and five percent of lane miles in the city, respectively.

Benicia's BNA analysis indicates that a majority of the city has low bicycle connectivity as depicted in **Figure 3-G**. While there are many LTS 1 streets in the city, they are typically isolated low-stress "islands" that require crossing a higher LTS street (e.g., Military West and Military East) or barrier (e.g., I-780) to connect to destinations in adjacent census blocks. Areas of the city with the highest BNA scores include the waterfront and Benicia State Recreation Area, open space near Lake Herman, and undeveloped marshland adjacent to the city's industrial area, where there are creates pockets where using low-stress facilities does not require crossing as many high-stress facilities.

Figure 3-C. Benicia Active Transportation Network Infographic

SIDEWALK NETWORK INVENTORY

	Existing Sidewalk Lane Miles	Full Sidewalk Buildout Lane Miles
Citywide	96	348
Priority Development Areas	6	43
Communities of Concern	0.12	1
Disadvantaged Communities	-	-

BICYCLE NETWORK INVENTORY

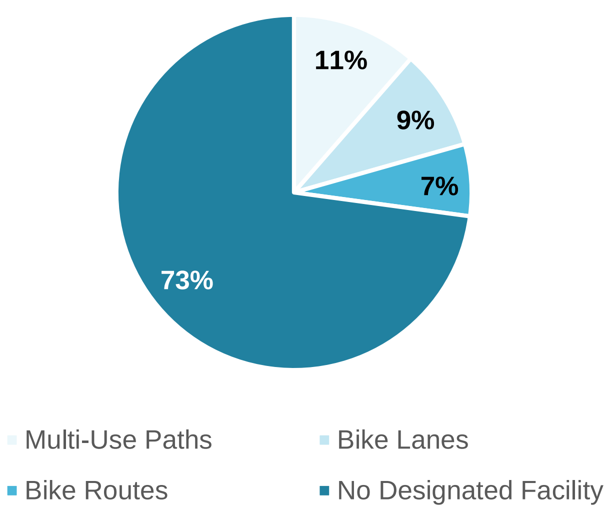
Bike Facilities	**Lane Miles**
Multi-Use Paths (Class I)	165
Bike Lanes (Class II)	199
Bike Routes (Class III)	244
No Designated Facility	2593
All Roadways	3202

Citywide Bicycle Connectivity (BNA) Score

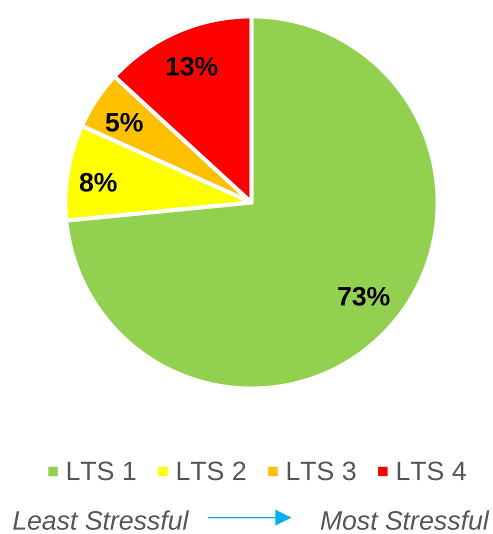
16

Low Connectivity **0 → 100** **High Connectivity**

BICYCLE INVENTORY PERCENT OF ROADWAY MILEAGE



BICYCLIST COMFORT LEVEL OF TRAFFIC STRESS (LTS)



STA

Countywide Active Transportation Plan

Sidewalk Coverage

*Sidewalks determined manually using aerial imagery

Figure 3-E. Benicia Existing Bicycle Facilities

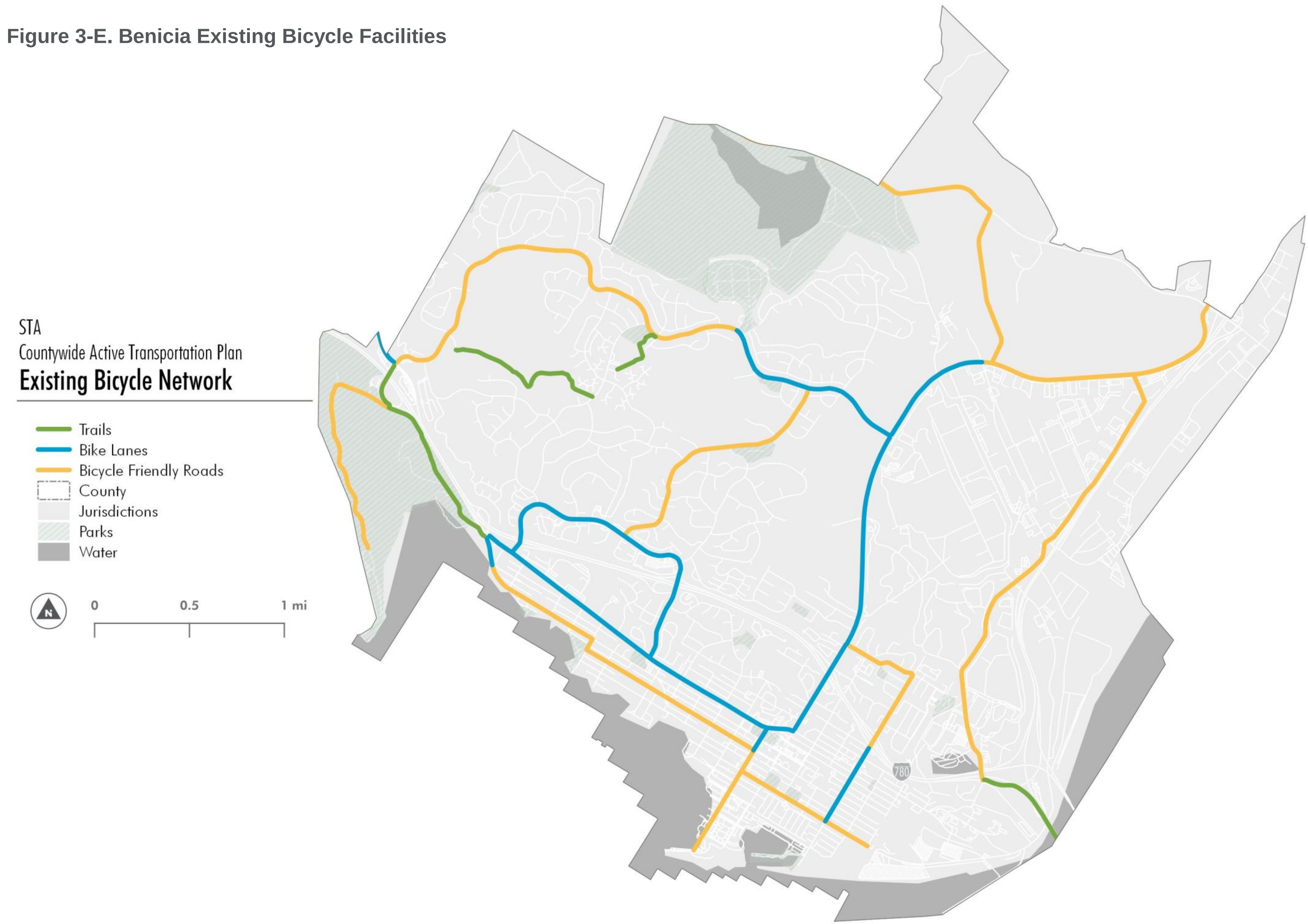


Figure 3-F. Benicia Bicycle Level of Traffic Stress

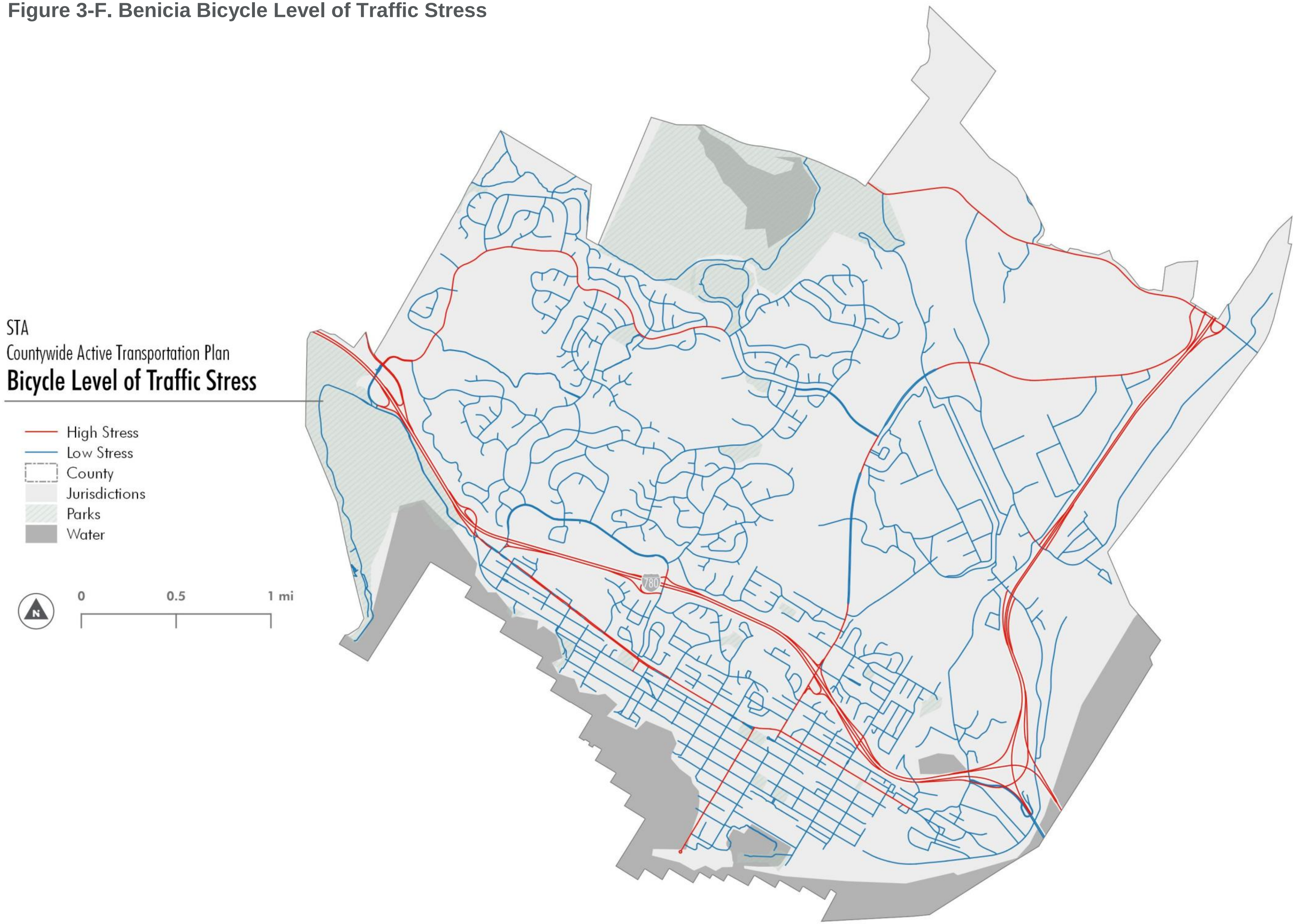


Figure 3-G. Benicia Bicycle Network Analysis

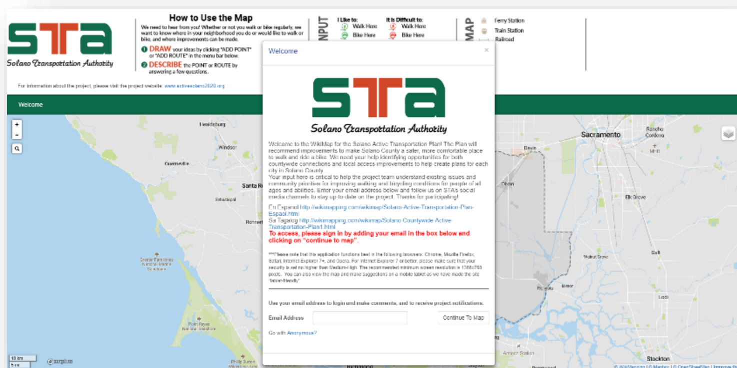
BENICIA PUBLIC OUTREACH PHASE I SUMMARY

As part of the first phase of public outreach for the Solano ATP both online and in-person events were held to try to reach people across all parts of the county. The online and in-person feedback was combined to highlight where all participants had positive or negative input about existing infrastructure throughout the County. Positive comments generally encapsulate where people currently like to walk or bicycle and identify experiences to be highlighted. Negative comments mostly highlight areas where people feel it is dangerous or uncomfortable to walk or bike. Areas that received more comments show as darker than areas with only one or two comments as can be on the heatmaps on **Figure 3-H** to **Figure 3-K**. In total, 1,080 individual line and point comments were collected across Solano County, with 483 comments from in-person events and 597 comments from the project website.

ONLINE PARTICIPATION

An online interactive WikiMap was available on the project website, www.activesolano2020.org, which was hosted by STA. The WikiMap allowed participants to draw lines or drop pins where they like walking or biking and where they want to see improvements to walking or biking. This process helped identify the positive attributes that should be celebrated and the negative attributes that may need new projects to help encourage more people to walk and bicycle in Solano. Additionally, Spanish and Tagalog versions of the WikiMap were accessible on the project website to garner input from all Solano residents.

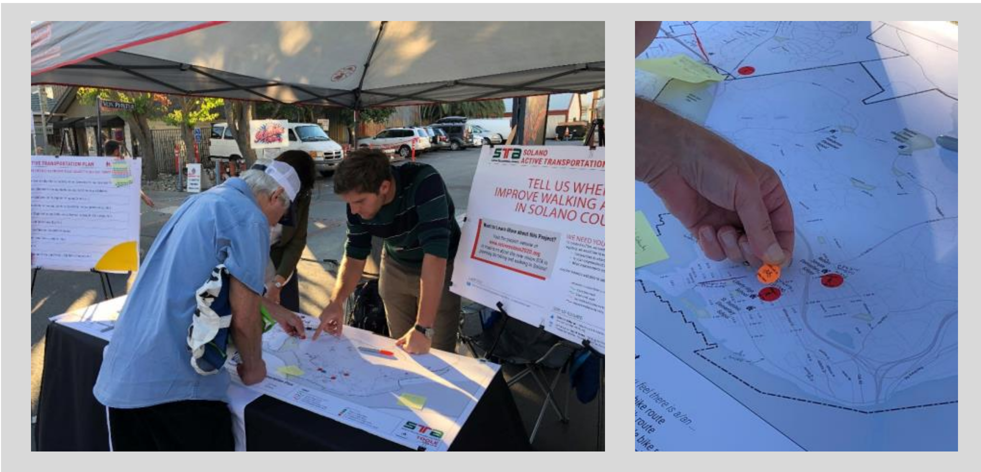
STA's online interactive WikiMap



IN-PERSON POP-UP EVENT – FARMERS MARKET

The Solano ATP team attended Downtown Farmers Market on Thursday, October 18 to solicit input from local residents and visitors. The event features a wide variety of produce vendors and food trucks and is known to attract a large number of people from across Benicia.

For this event there was a slow, constant trickle of residents engaged with the outreach process. However, those that did stop by the booth had very specific ideas for where improvements were needed.



Photos from the Phase I Pop-up Event

SUMMARY OF PUBLIC INPUT FOR WALKING AND BIKING

Most positive comments related to biking in areas near city limits. For example, many people had comments on where Benicia Road ends at Columbus Parkway (northwest edge of the City). Another location a number of people commented on was near the Lake Herman Road and Interstate 680 and along Lopes Road. Within the city center, there was a concentration of comments on the intersection of 1st Street and Military East Street. Additionally, comments for walking were mostly found on a multi-use path between Rose Drive and Hastings Drive. There were also a number of comments along various streets and open spaces (please see Benicia Positive Comments Map). Other comments were found on the north side area or Lake Herman Road.

Regarding negative comments, there was a concentration on Military East Street and between East 5th Street and Adams Street. Other locations included various intersections along West 7th Street, including at Military West Street, Cheryl Drive, and Interstate 780's on and off ramps. Lake Herman Road along the north edge of the city also received negative comments, as did the intersection of Rose Drive and Columbus Parkway. Additionally, walking comments were focused near and around the intersection of Panorama Drive and Southampton Road. There were also comments on Chelsea Hills Drive between Ardmore Way and Warwick Drive.

Pedestrian-focused Input

Good Places to Walk

- Between Palace Court and Hastings Drive there is a multi-use path
- Between Solano Drive and Tustin Court thru unpaved walking path
- Between Bantry Way (and city limits) and Lake Herman Road there is fenced area that residents like to walk on. Pedestrians continue walking on Lake Herman Road until Lake Herman Recreation Area
- Intersection of East 2nd Street and Rose Drive
- Walking in Benicia State Recreation Area
- Intersection of East B Street and 1st Street

Poor Places to Walk

- Near and around the intersection of Panorama Drive and Southampton Road
- On Chelsea Hills Drive between Ardmore Way and Warwick Drive
- On East 2nd Street between Rose Drive to Park Road
- On Park Road between Bay Shore Road and Fir Road

- Multi-use path Between Benicia Community Park and Lake Herman Road
- On West 7th Street interstate 780 between the on and off ramps to Military West
- Between Ninth Street Park via West J Street up to 1st Street

Bicycle-focused Input

Good Places to Bicycle

- Lopes Road and Goodyear Road along interstate 680
- Intersection area of Interstate 680 on and off ramps and Lake Herman Road
- Between Interstate 680 and Reservoir Road on Lake Herman Road
- On East 2nd Street between Rose Drive Lake Herman Road
- On Rose Drive between East 2nd Street and Cambridge Drive
- On Military West Street between Interstate 780 and Adams street and continuing on Park Road until Oak Road
- On Benicia Road near the Columbus Parkway intersection

Poor Places to Bicycle

- On Military East Street between East 5TH Street and Jefferson Street/Grant Street
- Intersection of Military West Street and West 7th Street
- Intersection of Cheryl Drive and West 7th Street
- Area of 780 on and off ramps on West 7th Street
- Intersection and Rose Drive and Columbus Parkway
- On Lake Herman Road between city limits to Reservoir Road

Figure 3-H. Benicia Public Outreach – Positive WikiMap Walking Comments

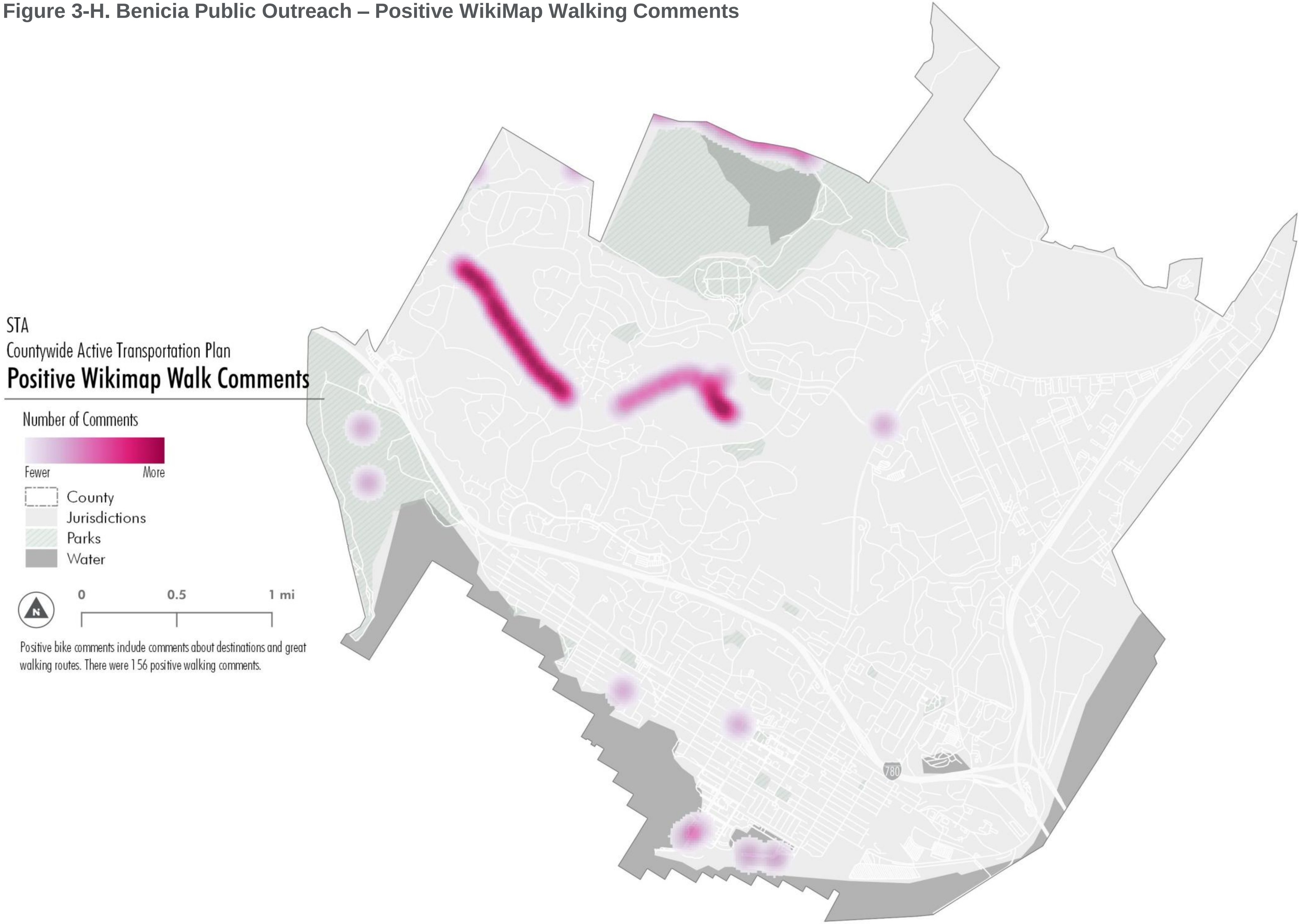


Figure 3-L Benicia Public Outreach – Negative WikiMap Walking Comments

Figure 3-J. Benicia Public Outreach – Positive WikiMap Bicycle Comments

Figure 3-K. Benicia Public Outreach – Negative WikiMap Bicycle Comments

CHAPTER 4
CITY OF DIXON
ACTIVE TRANSPORTATION
EXISTING CONDITIONS

Credit: Solano SR2S

4. DIXON ACTIVE TRANSPORTATION EXISTING CONDITIONS

DIXON OVERVIEW

The City of Dixon is located on the I-80 corridor, and is the last city in Solano County that one enters while travelling north before crossing into Yolo County. Dixon is a small agricultural town with mostly residential land use. The majority of industrial and commercial land use occurs northeast of the residential development. I-80 provides the northwest border of the town, and CA-113/South 1st Street runs straight through the center of town, connecting with CA-12 to Rio Vista (east) and Fairfield (west). While CA-113 is identified as a truck route, its location through downtown Dixon has discouraged regional truck traffic from using it. A railroad line also runs diagonally through Dixon, defining a northwest border to the downtown area. Dixon is the second smallest city in Solano County, with a population of 20,202 people as of 2017.

SUPPORT FACILITIES AND PROGRAMS

Based on the Solano Countywide Bicycle Plan (2012), there are 89 planned park and ride lots across the county. In Dixon, there is currently one at Market Lane and I-80, near Pitt School Road butno new park and ride locations planned for Dixon in the future. At the B Street and Jackson Capitol Corridor Station there are currently 114 spaces, with 225 planned for the future. Both locations currently have bike parking and connect to Fairfield/Suisun City Transit.

DIXON DEMOGRAPHICS OF ACTIVE TRANSPORTATION

Demographics and travel patterns for the City of Dixon are depicted in

Figure 4-A. Multiple factors influence a person's ability to walk and bicycle within Dixon, and key trends in these factors are summarized in Table 4-1 presents information about which population groups are walking and bicycling more (or less) than others in Dixon better understand which population groups may be more dependent on active transportation facilities and which population groups may lack access to these types of facilities. This can help Dixon plan for the equitable distribution of active transportation facilities and ensure that outreach efforts are targeting new audiences and considerate of the needs of specific populations. This information can also help Dixon determine which population groups should be engaged to better understand barriers to walking and bicycling.

Table 4-1. This section evaluates demographic characteristics of the population who currently walk or ride a bicycle in Dixon using data from the United States Census American Community Survey (2016, 5-year estimates) and the California Household Travel Survey (2012). While this information is useful, this data should not be taken at face value given the small sample sizes associated with this data in smaller communities, such as Dixon. It is presented here because it is the only source of standardized data across all geographies in Solano County and can help provide a clearer picture of walking and bicycling trips in Dixon.

RACE & ETHNICITY

Approximately 61 percent of Dixon's population is White, 33 percent is Hispanic, 4 percent is Asian, and 2 percent is Black. Due to the small sample size, no data was available for residents who bike to work in Dixon. However, White residents make up an even higher proportion (72%) of users who walk to work than their share of the population. Hispanics make up the remainder (28%) of walking commuters, which is slightly disproportionately less than their share of the population. No data was available for Asian or Black commuters who walk.

AGE

Residents age 25 to 44 years old make up the largest commuting age group in Dixon, accounting for 41 percent of the population. However, this group makes a disproportionately small amount of walking trips (11%) as compared with their share of the population. The same pattern continues for the next largest group of residents: those age 45 to 64 years old. This group makes up 36 percent of the population but only makes 11 percent of walking commute trips. Unique amount cities in Solano County, commuters age 16 to 24 years old account for only 20 percent of the population but make up a great majority of walking commute trips (80%). Residents over the age of 65 do not account for any of the walking commute trips. No data was available for residents who bike to work in Dixon.

GENDER

Dixon residents have a relatively equal gender split of 54 percent men and 46 percent women. Men make disproportionately more walking trips (64%) relative to their share of the population, while women make disproportionately fewer (36%). No data was available for residents who bike to work in Dixon.

INCOME STATUS

Within Dixon, the largest income range for commuters is those that earn less than $25,000 a year (41%). Those in this income range make disproportionately more bike commute trips (90%) as compared to their share of the population. While those in this income range also makes almost half (46%) of all walking commute trips, this number is relatively proportionate to their share of the population. Those who earn more than $50,000 per year make a low percentage of bike commute trips and none of the walking commute trips. Those who make between $25,000 and $50,000 per year (24%) make disproportionately more walk commute trips (54%) than their share of the population.

GENERAL TRAVEL CHARACTERISTICS FOR ALL MODES

Trip Purposes

Almost one-third of trips (30%) in Dixon across all modes are for dining, with only 13 percent of all trips being for work. Additionally, over one-third of trips are made for either running errands (17%) and recreation (19%) purposes. The remaining trips are made for other miscellaneous purposes.

Trip Distances

A majority of all trips taken in Dixon by any mode of transportation (59%) are less than three miles in length, which is considered a reasonable biking distance. Over a third of all trips (35%) are even less than one mile, which is considered a reasonable walking distance for normal trips. This indicates that almost two-thirds of all trips made within Dixon could be converted to walking or biking trips. Trips distances from three to five miles (3% of all trips in Dixon) and over five miles (38%) are often deemed too far for the “interested but concerned” user to consider walking or bicycling for their trip.

Mode Share

While a majority of trips in Dixon are short distance and non-work-related, the preferred mode of choice for all trip types is by far the car (94%). Telecommuting represents 4 percent of trips, while walking (2%) and transit (<1%) make up a minimal share of all preferred modes of travel. Bicycling does not account for any of the trips. The total number of people who reported walking or bicycling to work in Dixon in the United States Census’ American Community Survey is 139.

Table 4-1 presents information about which population groups are walking and bicycling more (or less) than others in Dixon better understand which population groups may be more dependent on active transportation facilities and which population groups may lack access to these types of facilities. This can help Dixon plan for the equitable distribution of active transportation facilities and ensure that outreach efforts are targeting new audiences and considerate of the needs of specific populations. This information can also help Dixon determine which population groups should be engaged to better understand barriers to walking and bicycling.

Table 4-1 Dixon Active Transportation Demographics Findings

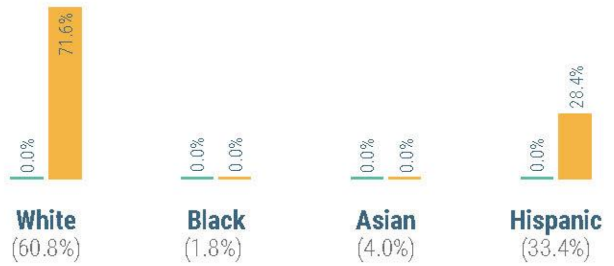
Who is Walking More	Who is Biking More
• White residents • High school and college students • Men • Low and medium-low earners	• Low-income earners • No data available for race, age, and gender

Dixon Active Transportation Profile

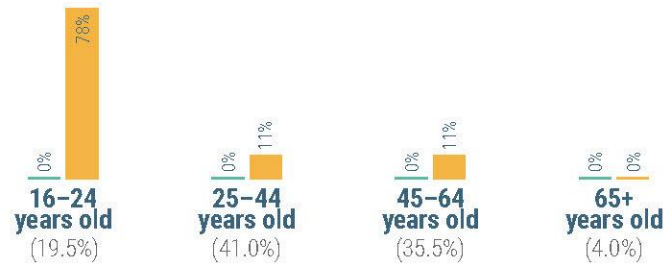
Characteristics of residents who walk or bike to work:

Source: US Census, ACS 5-Year Estimates 2016.

Race

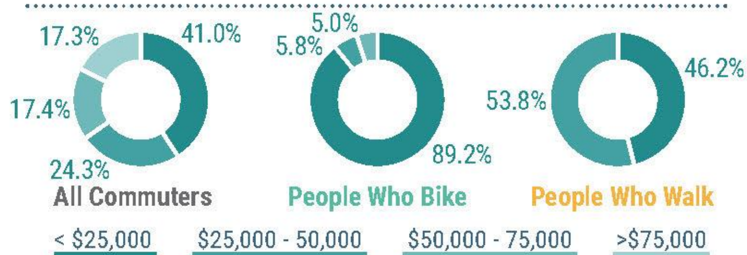


Age



Gender

Income

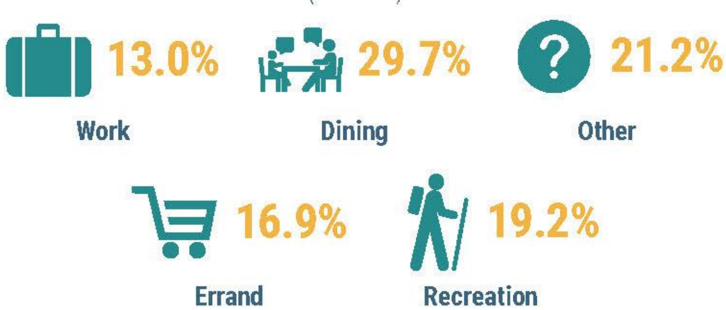


General travel characteristics (all modes):

Source: California Household Travel Survey, 2012.

Trip Purposes

(all modes)

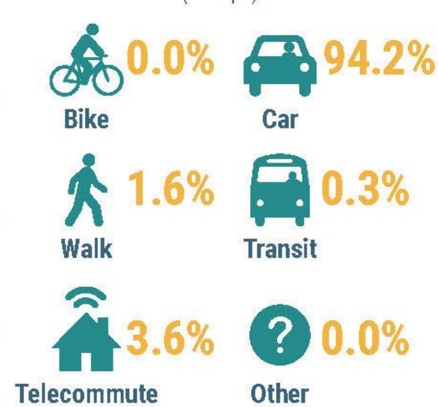


Trip Distances

(all modes)

Mode Share

(all trips)



DIXON ACTIVE TRANSPORTATION GOALS AND POLICIES

Various documents guide how active transportation projects and programs are implemented throughout the County. While Dixon does not have an adopted bicycle, pedestrian, or active transportation plan, the City uses guiding and supportive policies in its adopted General Plans as summarized below. The City may have other planning documents such as specific plans or community plans that were not evaluated individually as part of this effort.

DIXON GENERAL PLAN TRANSPORTATION & CIRCULATION ELEMENT (2010)

The Dixon General Plan's Transportation & Circulation Element is concerned with the movement of people and goods through and around the City. Goals and policies related to active transportation include the following.

- The City shall provide additional transportation alternatives to the private automobile (an improved transit system, park-and-ride lots, bicycle facilities, etc.)
- The City shall support cycling as a transportation mode which promotes personal health, recreation and enjoyment while minimizing energy consumption and air pollution. The City shall improve and expand existing bikeway facilities in accordance with the Bikeways Master Plan, and shall provide connections to newly developed areas, where feasible.
- The City shall support walking as a transportation mode which promotes personal health and recreational enjoyment while minimizing energy consumption and air pollution. The City shall improve and expand existing pedestrian facilities and provide connections to newly developed areas, where feasible.

DIXON EXISTING ACTIVE TRANSPORTATION NETWORK

The active transportation network consists of both pedestrian and bicycle infrastructure that work together to provide mobility options for all those that live, work, study, play, visit, pray, or shop in Dixon. Whether we're aware of it or not, everyone in Dixon uses active transportation infrastructure, such as sidewalks, at some point in their day even if just for short distances to reach their desired destinations.

EXISTING PEDESTRIAN NETWORK

The pedestrian network within the City of Dixon consists largely of sidewalk infrastructure supported by crossing treatments, multi-use paved trails, and unpaved recreational trails. Dixon currently has an overall Walk Score of 44 out of 100 according to the real-estate website www.WalkScore.com, indicating that the City is most errands require a car. As part of the Solano ATP, sidewalk presence was used as the metric for pedestrian accessibility and was inventoried within incorporated jurisdictions and adjacent pockets of unincorporated communities.

Sidewalk Inventory

An inventory of existing sidewalks was conducted to identify sidewalk gaps within Dixon, with results summarized in **Figure 4-B**. The city currently has a total of 73 miles of existing sidewalk infrastructure, which includes measurements of sidewalks on both sides of the street independently. With approximately 187 miles of maximum sidewalk coverage (total roadway mileage multiplied by two to account for both sides of the street). Depending on land use context, there may be areas of the city with rural characteristics where typical sidewalk infrastructure may not be compatible. However, it was not possible to exclude these areas from the overall sidewalk inventory evaluation.

Sidewalk coverage in Dixon was also evaluated in the equity focus areas (see the Countywide chapter for full descriptions) as designated by the Metropolitan Transportation Commission for Priority Development Areas and Communities of Concern, or CalEnviroScreen Disadvantaged Communities. In Priority Development Areas, there is approximately six miles of sidewalk coverage. Dixon does not have any areas that meet the criteria for Communities of Concern or Disadvantaged Communities. Therefore, the need for sidewalk infrastructure is greatest in the Priority Development Areas, which needs about four miles of sidewalk gaps filled.

EXISTING BICYCLE NETWORK

This section discusses the bicycle facilities in Dixon's existing bike network. It also includes an analysis of bicyclist comfort and connectivity – that is, level of traffic stress (LTS) and bicycle network connectivity analysis (BNA), respectively –for the existing network. Additional information on the LTS and BNA methodologies can be found in the Countywide chapter's existing conditions section.

Existing Facilities

Dixon has a 94-mile roadway network, 27 lane miles of which currently have designated bicycle facilities. This includes six lane miles of shared-use paths, 14 lane miles of bike lanes, and seven lane miles of bike routes as summarized on **Figure 4-B**. Most roadways in the city (71%) do not have any bicycle facilities. Dixon's bicycle network consists of several shared-use paths in parks (e.g., Northwest Park, Westside Park, Hall Memorial Park), disconnected bike lanes running on several roads throughout the city (e.g., North 1st Street, Vaughn Road, West A Street, Evans Road), and bike routes throughout the city (e.g., Pitt School Road, West H Street, Porter Road). The existing network provides connections to several neighborhoods, schools (e.g., Tremont Elementary), and businesses along North Adams Street, as shown on **Figure 4-D**. However, the network has major gaps between facilities and does not serve many destinations throughout the city equally.

Bicyclist Comfort and Connectivity

Figure 4-B also presents the percentage of bikeway facility and roadway lane miles in Dixon by LTS classification. LTS 1 is the most common classification, making up 63 percent of facilities because a majority of roadway lane miles in the city are low-speed and low-volume streets as shown on **Figure 4-E**. These streets are typically local neighborhood streets (e.g., North Almond Street, Parkgreen Drive) or quiet streets running through downtown (e.g., 2nd Street, Mayes Street). Roads with these characteristics do not necessarily require bicycle facilities to be considered low-stress. Some facilities provided on roadways with slightly higher volumes and speeds also contribute to total LTS 1 lane miles (e.g., the bike lanes on Vaughn Road and Evans Road).

However, LTS 4 is the second most common comfort score for roadways in Dixon, accounting for 14 percent of lane miles. These include high-speed and/or high-volume major roadways such as North 1st Street, West A Street, Porter Road, Pitt School Road, and North Adams Street. Many of these roadways are currently designated as bike routes or have bike lanes, but these treatments are not comfortable for people of all ages and abilities given the existing roadway traffic characteristics and geometries. While these high-stress roadways are less common, they are some of the most direct north-south and east-west routes in the city and function as barriers to a connected, low-stress citywide bike network. LTS 2 and 3 facilities account for a much lower 11 percent and 13 percent of lane miles in the city, respectively.

Dixon's BNA analysis indicates that the city has a mix of neighborhoods with low, medium, and high connectivity as depicted on **Figure 4-F**. The central part of the city north of downtown has the best connectivity, with multiple bike facilities connecting it to adjacent areas. The area south of the railroad tracks and the non-central area north of the railroad tracks have low-to-medium connectivity. While there are many LTS 1 streets in the city, they are typically isolated low-stress "islands" that require crossing a higher LTS street (e.g., North 1st Street or West A Street) or barrier (e.g., the Union Pacific railroad tracks) to connect to destinations in adjacent census blocks.

Figure 4-B. Dixon Active Transportation Network Infographic

SIDEWALK NETWORK INVENTORY

	Existing Sidewalk Lane Miles	Full Sidewalk Buildout Lane Miles
Citywide	73	187
Priority Development Areas	6	10
Communities of Concern	-	-
Disadvantaged Communities	-	-

BICYCLE NETWORK INVENTORY

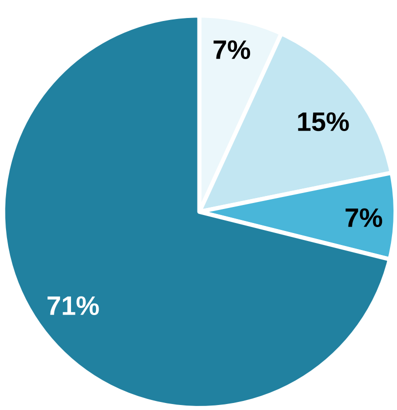
Bike Facilities	**Lane Miles**
Multi-Use Paths (Class I)	6
Bike Lanes (Class II)	14
Bike Routes (Class III)	7
No Designated Facility	67
All Roadways	94

Citywide Bicycle Connectivity (BNA) Score

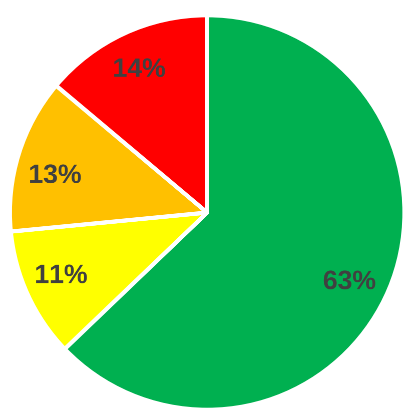
32

Low Connectivity **0 → 100** **High Connectivity**

BICYCLE INVENTORY PERCENT OF ROADWAY MILEAGE



BICYCLIST COMFORT LEVEL OF TRAFFIC STRESS (LTS)



STA

Countywide Active Transportation Plan

Sidewalk Coverage

- Existing Sidewalk*
- Street Network
- County
- Jurisdictions
- Parks
- Water

0 0.5 1 mi

*Sidewalks determined manually using aerial imagery

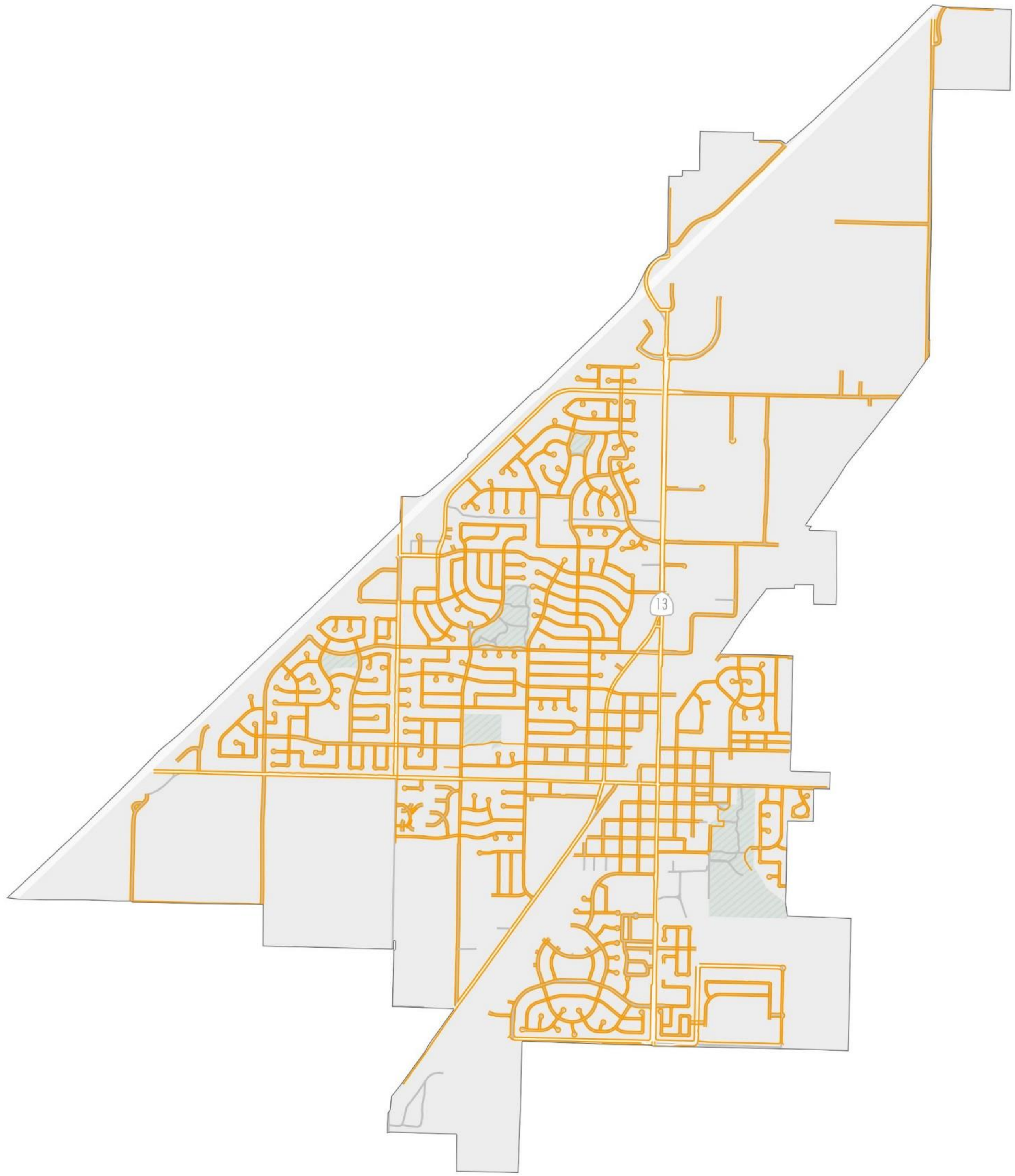


Figure 4-D. Dixon Existing Bicycle Facilities

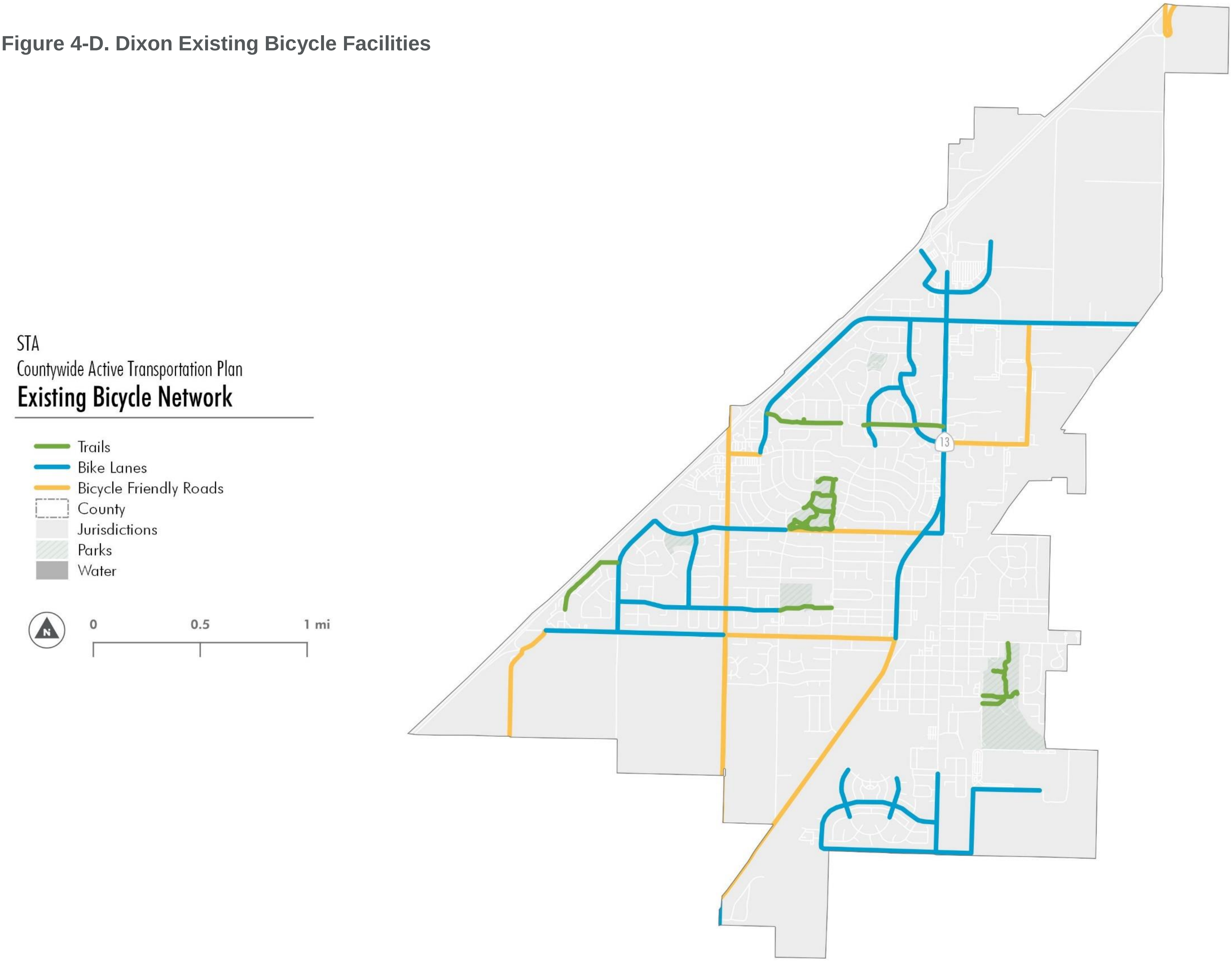


Figure 4-E. Dixon Bicycle Level of Traffic Stress

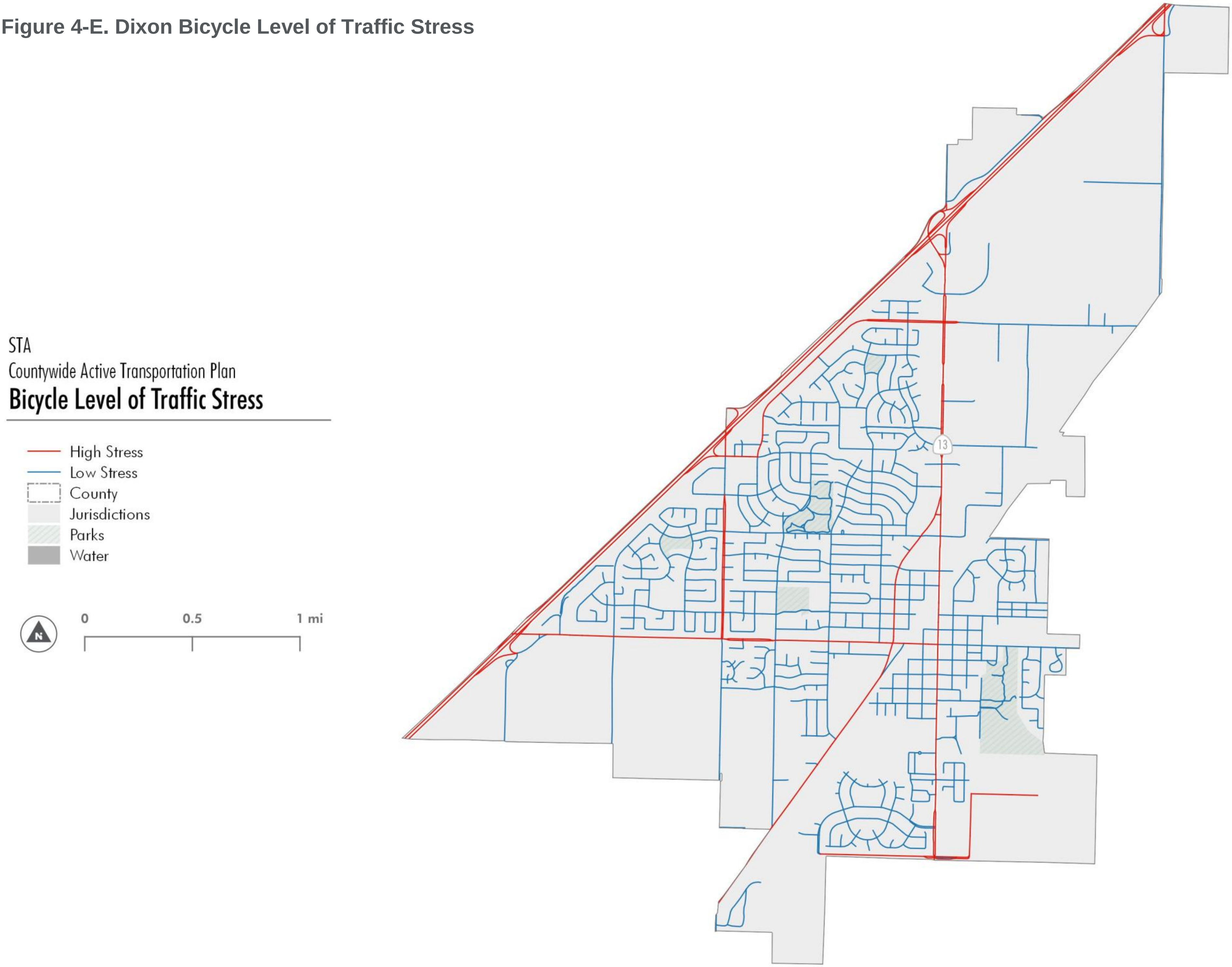
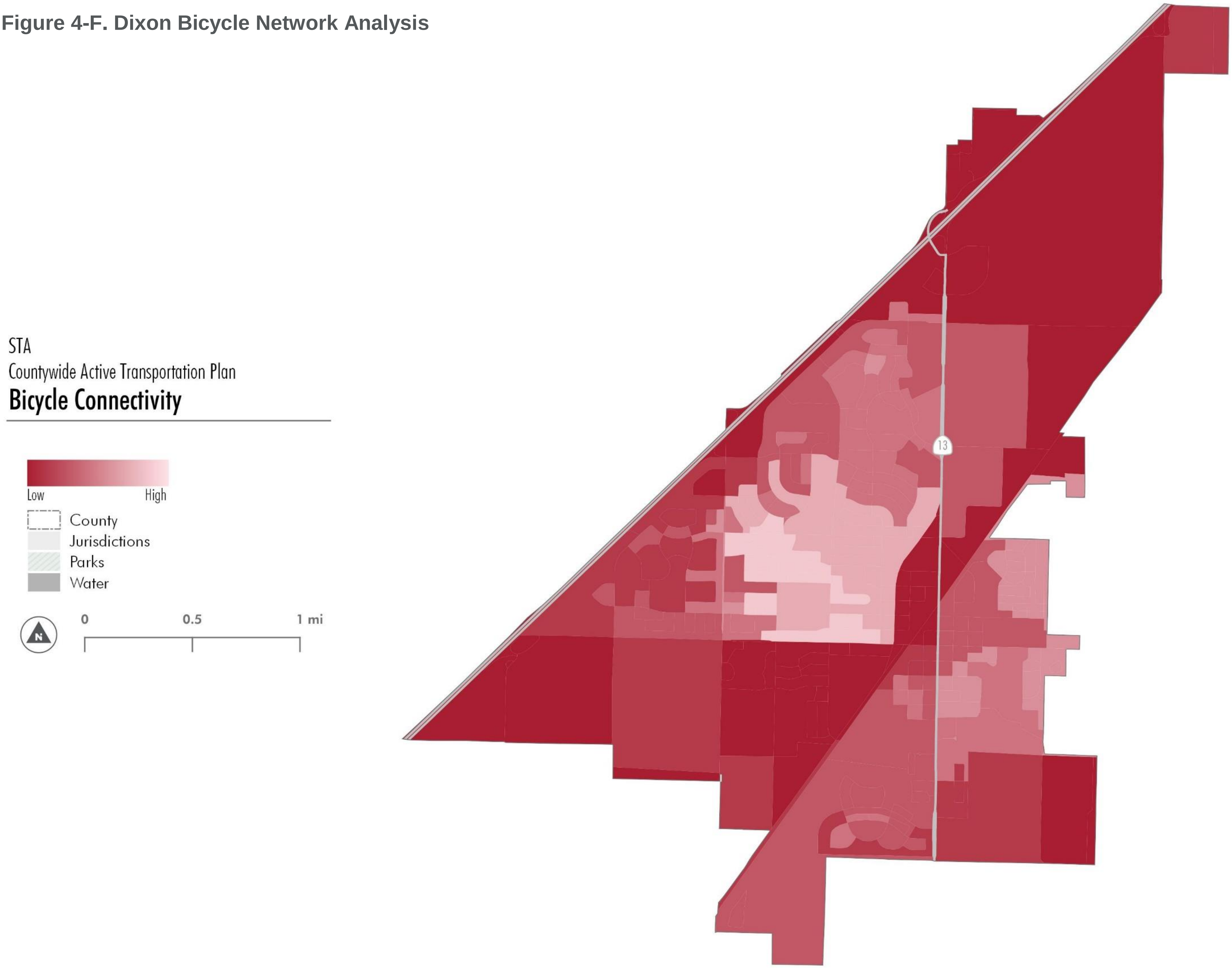


Figure 4-F. Dixon Bicycle Network Analysis



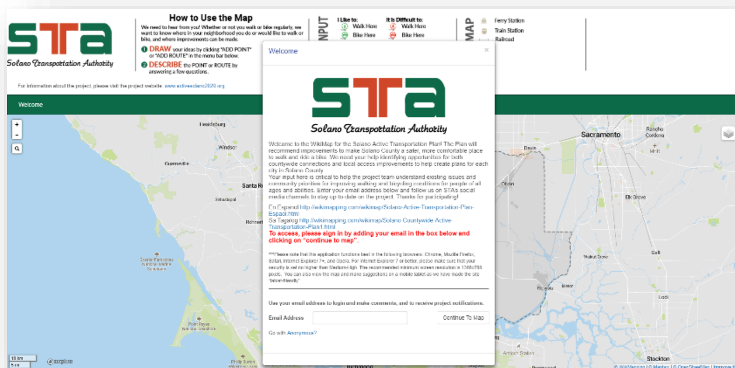
DIXON PUBLIC OUTREACH PHASE I SUMMARY

As part of the first phase of public outreach for the Solano ATP both online and in-person events were held to try to reach people across all parts of the county. The online and in-person feedback was combined to highlight where all participants had positive or negative input about existing infrastructure throughout the County. Positive comments generally encapsulate where people currently like to walk or bicycle and identify experiences to be highlighted. Negative comments mostly highlight areas where people feel it is dangerous or uncomfortable to walk or bike. Areas that received more comments show as darker than areas with only one or two comments as can be on the heatmaps on **Figure 4-G** to **Figure 4-J**. In total, 1,080 individual line and point comments were collected across Solano County, with 483 comments from in-person events and 597 comments from the project website.

ONLINE PARTICIPATION

An online interactive WikiMap was available on the project website, www.activesolano2020.org, which was hosted by STA. The WikiMap allowed participants to draw lines or drop pins where they like walking or biking and where they want to see improvements to walking or biking. This process helped identify the positive attributes that should be celebrated and the negative attributes that may need new projects to help encourage more people to walk and bicycle in Solano. Additionally, Spanish and Tagalog versions of the WikiMap were accessible on the project website to garner input from all Solano residents.

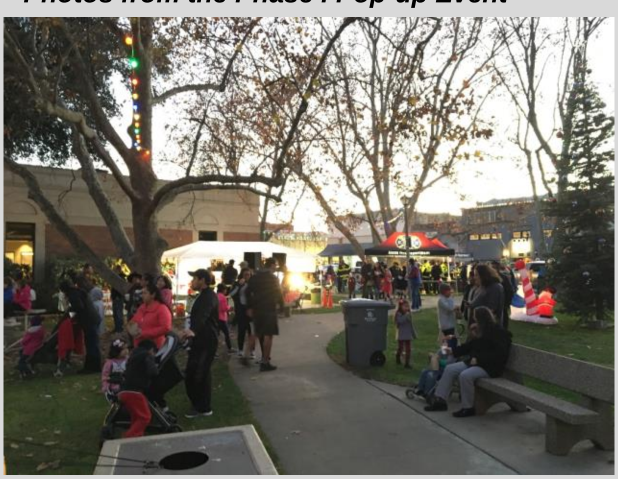
STA's online interactive WikiMap



IN-PERSON POP-UP EVENT – TREE LIGHTING FESTIVAL

The Solano ATP Team attended this event on Thursday, December 6th, 2018 in Downtown Dixon to solicit input from local residents and visitors. This annual event rings in the holidays in Dixon with an abundance of activities.

Photos from the Phase I Pop-up Event



The family event has a craft fair, warm refreshments, youth performance, and even singing by the mayor. It runs from 4:00 PM ton 8:00 PM, and admission is free. This year's event was relatively small but was well-attended by families from across Dixon.

SUMMARY OF PUBLIC INPUT FOR WALKING AND BIKING

In general, most of the positive biking comments in Dixon were on Porter Road between Pitt School and West A Street and at the intersection of North 2nd Street and East D Street (found outside city limits). There were no positive comments for walking in Dixon.

Negative feedback on biking in Dixon was directed at Pedrick Road between Vaughn Road and West A Street Archer. Negative walking comments came on Rio Dixon Road between East Park Boulevard and West H Street.

Pedestrian-focused Input

Good Places to Walk

- No comments

Poor Places to Walk

- Many comments were stated between West A Street and South of East Park Boulevard
- Intersection of HWY 113 (North 1st Street) and West H Street
- On West H Street between North 1st Street and Pitt School Road

Bicycle-focused Input

Good Places to Bicycle

- On Porter Road between Pitt School Road and West A Street
- Near intersection of North 2nd Street and East D Street

Poor Places to Bicycle

- On Pedrick Road between Vaughn Road and East A Street (just outside of city limits)
- On West A Street/East A Street between Pitt School Road and Pedrick Road (extending east outside city limits)

Figure 4-G. Dixon Public Outreach – Positive WikiMap Walking Comments

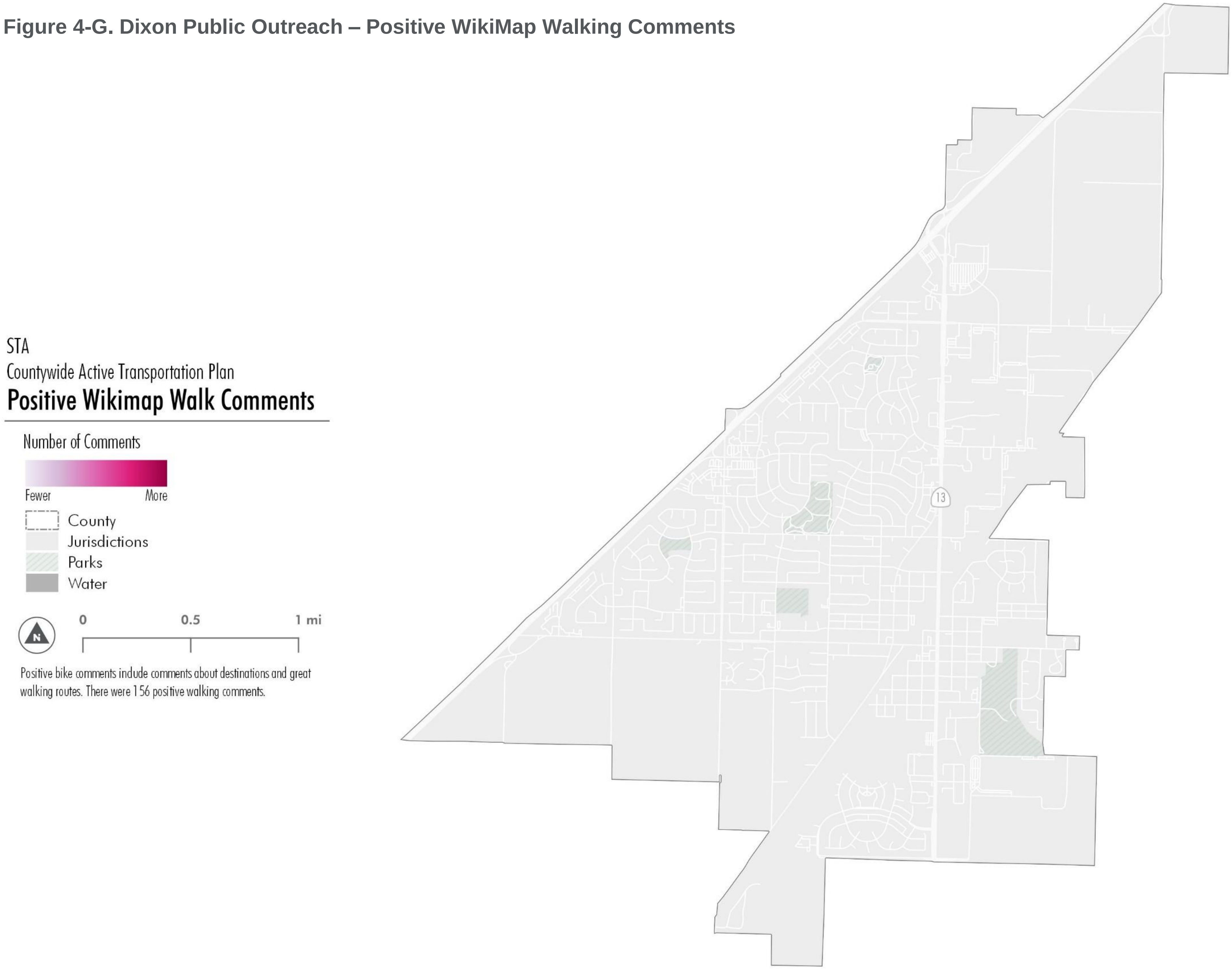


Figure 4-H. Dixon Public Outreach – Negative WikiMap Walking Comments

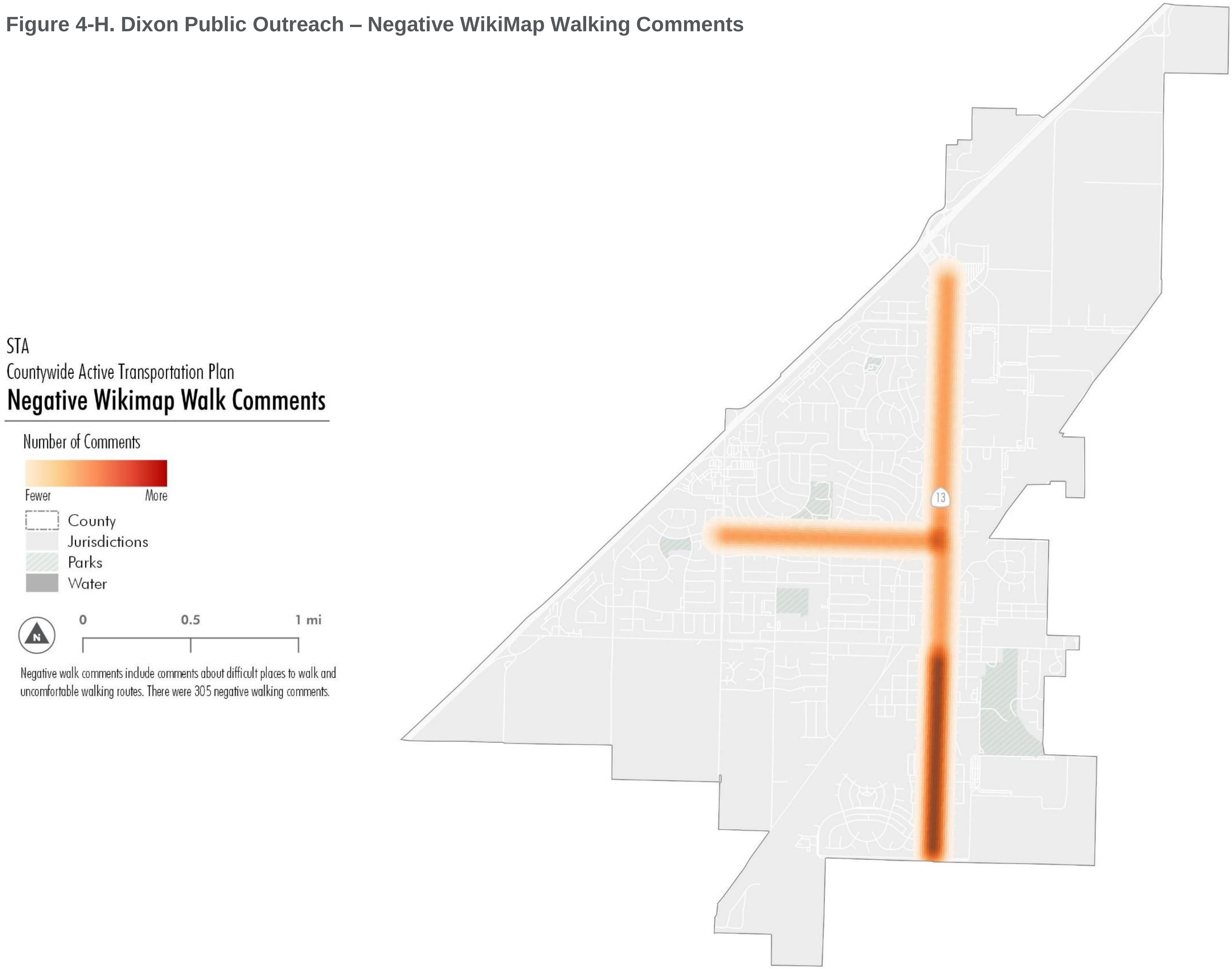


Figure 4-I. Dixon Public Outreach – Positive WikiMap Bicycle Comments

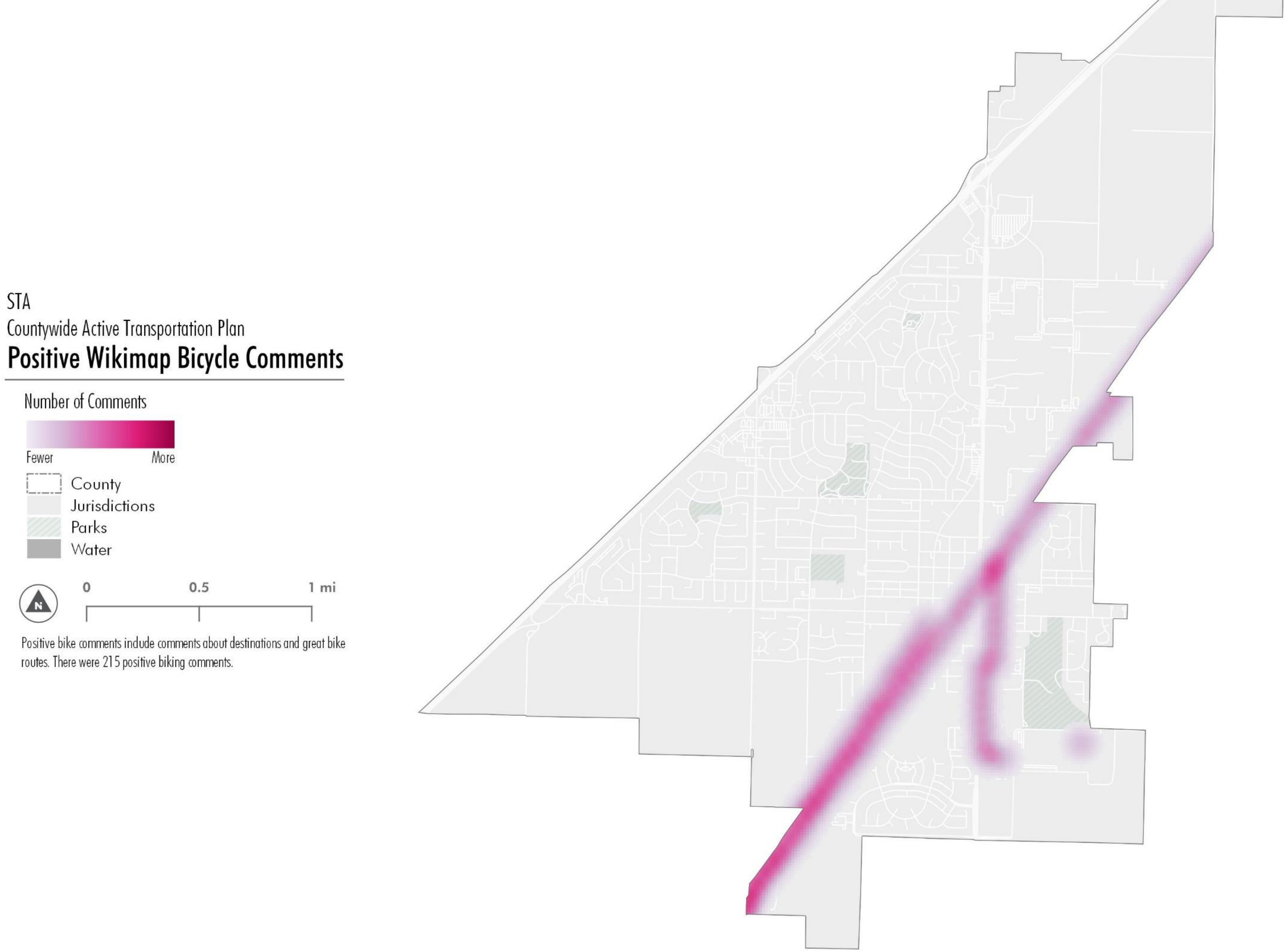
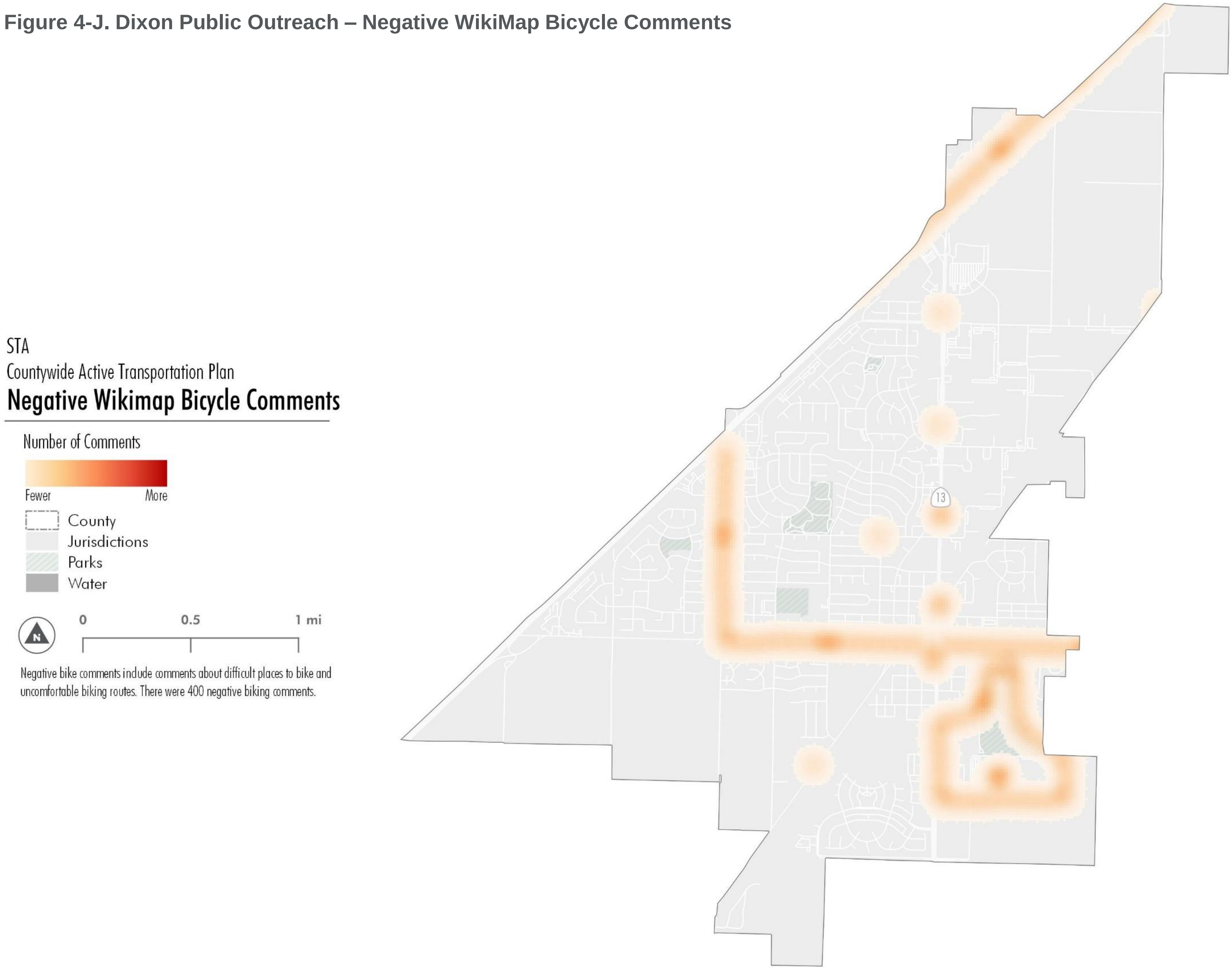


Figure 4-J. Dixon Public Outreach – Negative WikiMap Bicycle Comments



CHAPTER 5
CITY OF FAIRFIELD ACTIVE TRANSPORTATION EXISTING CONDITIONS

5. FAIRFIELD ACTIVE TRANSPORTATION EXISTING CONDITIONS

FAIRFIELD OVERVIEW

The City of Fairfield is the County Seat for Solano County and is located at the junction of many of the county's major roadways: the I-80 corridor provides connections south to the East Bay and north to Sacramento; CA-12 provides connections west to Napa and east to Rio Vista; and I-680 connects south to Martinez and Concord. Several large corporations are located in Fairfield, including Anheuser-Busch, Clorox, and Jelly Belly, and a portion of Travis Airforce Base is also located within the city. Interstate I-80 runs through the northwest portion of the city, there is lower density residential development to the north, and Air Base Parkway runs east to west, creating barriers between residential developments. CA-12 runs along the southern border of Fairfield, separating it from adjacent Suisun City. The Linear Park Pathway also runs diagonally through the city, providing a regional bicycle and pedestrian connection. Fairfield is the second largest city in Solano County, with a population of 116,266 people as of 2017.

SUPPORT FACILITIES AND PROGRAMS

Based on the Solano Countywide Bicycle Plan (2012), there are multiple locations for park and ride facilities foster multi-modal connections. For example, at Magellan near West Texas and Beck Street has existing 400 spaces and has 600 planned spaces. The K-Mart on North Texas near Air Base Highway (unofficial site) has 48 existing spaces and has 48 planned in the future. Both locations have bicycle parking and both locations connect to Fairfield/Suisun City Transit; but, only Magellan location has connection to Vallejo Transit. Stations are planned at Intermodal Rail Station at Peabody Road and Vanden Road plan with 600 parking spots with bike parking and connection to Fairfield/Suisun City Transit. Another location includes Red Top Road and I-80 with 200 new park and ride spots planned which does not currently have plans for bike parking and or local transit connections. Bicycle racks are available on routes 30 and 40 (via Solano BART Express) and bikes can be brought on board if space is available.

FAIRFIELD DEMOGRAPHICS OF ACTIVE TRANSPORTATION

Demographics and travel patterns for the City of Fairfield are depicted in **Figure 5-A**. Multiple factors influence a person's ability to walk and bicycle within Fairfield, and key trends in these factors are summarized in **Table 5-1**. This section evaluates demographic characteristics of the population who currently walk or ride a bicycle in Fairfield using data from the United States Census American Community Survey (2016, 5-year estimates) and the California Household Travel Survey (2012). While this information is useful, this data should not be taken at face value given the small sample sizes associated with this data in smaller communities, such as Fairfield. It is presented here because it is the only source of standardized data across all geographies in Solano County and can help provide a clearer picture of walking and bicycling trips in Fairfield.

RACE & ETHNICITY

Fairfield is one of the more diverse cities in Solano County, with a population that is 44 percent White, 26 percent Hispanic, 17 percent Asian, and 13 percent Black. While White residents make up the highest percentage of both those who bike and walk to work, these numbers are relatively proportional to White residents' share of the population. Asian residents make a significantly higher portion of bike commuters (43%) than their share of the population. Hispanic residents make up over a quarter of all walking commuters (26%), which is relatively proportionate to their share of the population; Hispanic residents account for a disproportionately lower number of bike commuters (12%).

AGE

Residents age 25 to 44 years old make up the largest commuting age group in Fairfield, accounting for about 45 percent of the total commuting population. This group makes up a disproportionately low amount of of commuters who walk (40%) or bicycle (33%). The next largest age group of commuters includes those age 45 to 64, who account for 37 percent of the commuting population. This age group makes up a disproportionately large amount of bike commuters (47%) but a disproportionately low (14%) of walk commuters. While commuters age 16 to 24 make up only 14 percent of the commuter population, they make up about half (51%) of those who walk to work. Commuters over the age of 65 do not account many walking (2%) or biking (6%) commuters.

GENDER

Fairfield commuters have a gender split of 54 percent men and 46 percent women. Almost all of the people who bike to work are women (92%), while men make up only a small percentage of bike commuters (8%). There is a more proportionate split of men (59%) and women (41%) who walk to work.

INCOME STATUS

Within Fairfield, the largest income range for commuters is those that make less than $25,000 per year (35%). This income group accounts for a disproportionately high amount of bike commuters (70%) but a relatively proportionate amount of walk commuters (38%) as compared to their share of the overall population. The highest income range for earners is those that make over $75,000 per year, and those in this range account for 20 percent of the commuter population, a number that is relatively similar to the two other income ranges of between $25,000 to $50,000 (27%) and between $50,000 to $75,000 (18%). However, the highest income range makes up the smallest percentage of people who bike to work (4%) and makes a relatively proportionate amount of walk trips (24%) as compared to their share of the population.

GENERAL TRAVEL CHARACTERISTICS FOR ALL MODES

Trip Purposes

Over one-quarter of trips (26%) of trips in Fairfield across all modes are for dining, with only about 18 percent of all trips being for work. Additionally, trips for errands (20%) and recreation (13%) combine to make up almost a third of all trips taken in Fairfield.

Trip Distances

A majority of all trips taken in Fairfield (58%) by any mode of transportation are less than three miles in length, which is considered a reasonable biking distance. Slightly more than a quarter of all trips (28%) are actually even less than one mile, which is considered a reasonable walking distance for normal trips (California Household Travel Survey, 2012). This indicates that almost two-thirds of all trips made within Fairfield could be converted to walking or biking trips. Trips distances from three to five miles (9% in Fairfield) and over five miles (32%) are often deemed too far for the “interested but concerned” user to consider walking or bicycling for their trip.

Mode Share

While a majority of trips in Fairfield are short distance and non-work-related, the preferred mode of choice for all trip types is by far the car (92%). Telecommuting (3%) and transit (2%) make up the second highest amounts of modes used, while walking (1.7%) and biking (<1%) make up a minimal share of all preferred modes of travel. The total number of people who reported walking or bicycling to work in Fairfield in the United States Census’ American Community Survey is 1,074.

Table 5-1 presents information about which population groups are walking and bicycling more (or less) than others in Fairfield better understand which population groups may be more dependent on active transportation facilities and which population groups may lack access to these types of facilities. This can help Fairfield plan for the equitable distribution of active transportation facilities and ensure that outreach efforts are targeting new audiences and considerate of the needs of specific populations. This information can also help Fairfield determine which population groups should be engaged to better understand barriers to walking and bicycling.

Table 5-1 Fairfield Active Transportation Demographics Findings

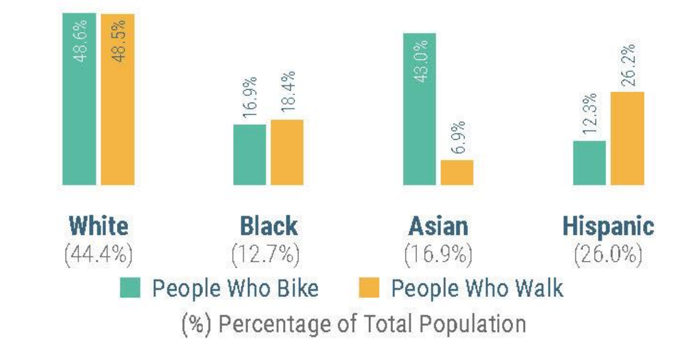
Who is Walking More • White, Black, and Asian residents • High school and college students and young adults • Men • Low-, medium-low, and high-income earners	**Who is Biking More** • White and Asian residents • Young adults and middle-aged workers • Women • Low and medium-low income earners
Who is Walking Less • Asian residents • Middle-aged workers and working seniors • Women • Medium-low income earners	**Who is Bicycling Less** • Hispanic and Black residents • High school and college students and working seniors • Men • Medium-high and high-income earners

Fairfield Active Transportation Profile

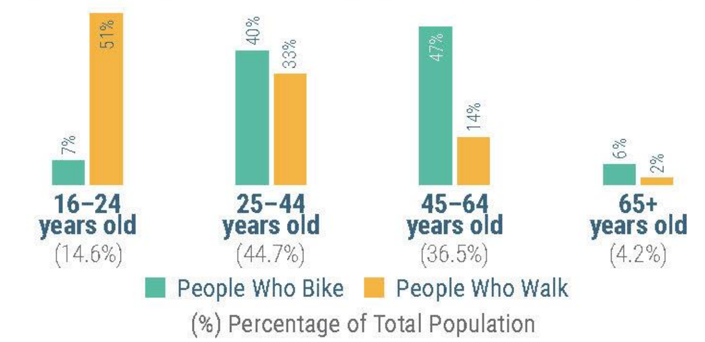
Characteristics of residents who walk or bike to work:

Source: US Census, ACS 5-Year Estimates 2016.

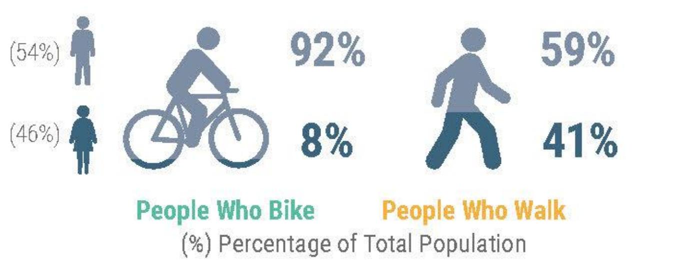
Race



Age



Gender



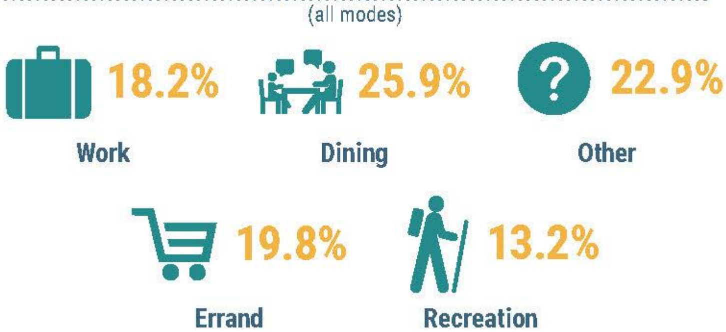
Income

General travel characteristics (all modes):

Source: California Household Travel Survey, 2012.

Trip Purposes

(all modes)

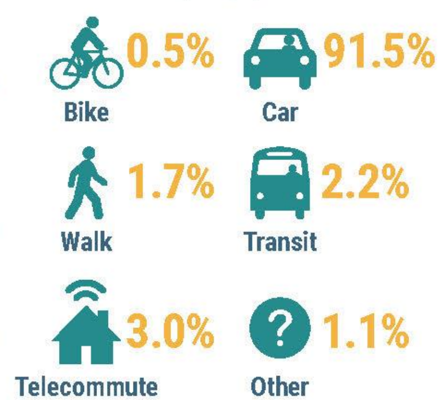


Trip Distances

(all modes)

Mode Share

(all trips)



STA Solano Transportation Authority

Solano Active Transportation Plan

Figure 5-A. Fairfield Active Transportation Demographics Infographic

FAIRFIELD ACTIVE TRANSPORTATION GOALS AND POLICIES

Various documents guide how active transportation projects and programs are implemented throughout the County. While Fairfield does not have an adopted bicycle, pedestrian, or active transportation plan, the City uses guiding and supportive policies in its adopted General Plans as summarized below. The City may have other planning documents such as specific plans or community plans that were not evaluated individually as part of this effort.

FAIRFIELD GENERAL PLAN CIRCULATION ELEMENT (2002)

The Fairfield General Plan's Circulation Element addresses the development of a balanced, multimodal circulation system for the City of Fairfield. It includes topics on roadway development, road safety, public transit, pedestrian and bicycle facilities, and transportation systems management. The goal of the Circulation Element is to create and maintain an efficient, safe, and coordinated multi-modal circulation system that reduces environmental and social impacts of transportation systems, serves the needs of a variety of users and meets the social, economic development, and urban design needs of the community. Objectives and policies related to active transportation include the following.

General Active Transportation:

- Policy CI 1.2: The City's mix of land uses, development patterns, and densities shall be conducive to alternative modes of transportation, such as walking, transit, paratransit and bicycles. Pedestrian travel shall be encouraged through the location of employment centers and commercial development within close proximity of residential areas. In particular, new development in infill areas, such as Priority Development Areas, should support alternative transportation.
- Policy CI 1.3: Acquire the ultimate right-of-way for streets during early stages of development. Include adequate right-of-way for sidewalks, bicycle lanes, and/or multiuse paths identified in the Circulation Element and/or master plans.
- Policy CI 1.5: Plans for new development in higher density infill areas, including Priority Development Areas should facilitate walking and bicycling.
- Policy CI 1.6: Public Works staff shall incorporate appropriate traffic calming and Complete Streets considerations during design of City capital and maintenance projects.
- Policy CI 5.6: Permit reductions in on-site parking in exchange for pedestrian and bicycling improvements, such as secure bicycle parking, private shuttle services, or subsidized transit pass programs.
- Objective CI 13: Continuously evaluate the City's transportation system for implementation of General Plan objectives, policies, and goals, including "complete streets" concepts.

Bicycling-Specific:

- Objective CI 9: Support bicycling as a safe method of everyday transportation for all people in Fairfield. Bicycle facilities should link residences, major activity centers, employment, public services, recreational facilities, and regional bicycle routes.
- Policy CI 9.2: Cooperate with neighboring jurisdictions and regional agencies to expand the countywide bikeway network and to provide linkages, where appropriate, with regional networks.
- Policy CI 9.3: Facilitate and promote bicycling by providing adequate information to bicyclists regarding routes, facilities, and destinations.
- Policy CI 9.4: Design bicycle infrastructure to provide a safe, comfortable environment for cyclists of all levels and experience.
- Policy CI 9.5: Minimize bicycle/pedestrian/motor vehicle conflicts by providing proper trail, street and intersection signage, design and separation. Bicycle trails should cross at marked crosswalks or controlled intersections. Continue to monitor and consider for adoption new tested technologies which improve bicyclists' mobility and convenience while addressing safety considerations.

- Policy CI 9.6: Identify and obtain potential funding sources for construction and maintenance of bicycle facilities. Use these funds to leverage local funds wherever possible.
- Policy CI 9.7: Maintain in a safe condition the City's existing network of bicycle paths, lanes, and routes. Ensure new facilities can be maintained in a safe and usable condition by requiring annexation into a maintenance district or similar funding mechanism.
- Policy CI 9.8: Public and private employers should include appropriate on-site infrastructure and programs to facilitate bicycling.
- Policy CI 9.9: Promote bicycle safety as a priority through public education and outreach.
- Policy CI 9.10: Integrate bicycles into public transit.

Pedestrian-Specific:

- Objective CI 10: Provide pedestrian facilities throughout the City to encourage walking as an alternative to short distance vehicle travel.
- Policy CI 10.2: Implement street standards that include sidewalk or walkways on both sides of streets, where appropriate.
- Policy CI 10.3: Street networks should emphasize short, accessible routes for pedestrians and bicyclists. Provide a connected street grid wherever possible. If cul-de-sacs and loop streets are used, provide pedestrian shortcuts and pathways to reduce the length of trips for pedestrians and cyclists.
- Policy CI 10.4: Consider using landscaping or physical barriers on high capacity arterials to separate vehicles and pedestrians.
- Policy CI 10.5: Consider constructing pedestrian overpasses where heavily traveled pedestrian routes cross busy intersections.
- Policy CI 10.6: Design access ways to school facilities that will ensure the safety of children.
- Policy CI 1.7: Streets and intersections shall be safely and easily usable for all types of pedestrians, including school children, youths, the elderly, and the disabled.
- Policy CI 10.7: Require new commercial and residential developments to provide walkways that are safe and pleasant to the user.
- Policy CI 10.8: Encourage existing facilities and require future facilities to provide access to disabled persons.
- Policy CI 10.9: Encourage the location of basic shopping and services within approximately 1,300 feet of residential and industrial areas.

FAIRFIELD EXISTING ACTIVE TRANSPORTATION NETWORK

The active transportation network consists of both pedestrian and bicycle infrastructure that work together to provide mobility options for all those that live, work, study, play, visit, pray, or shop in Fairfield. Whether we're aware of it or not, everyone in Fairfield uses active transportation infrastructure, such as sidewalks, at some point in their day even if just for short distances to reach their desired destinations.

EXISTING PEDESTRIAN NETWORK

The pedestrian network within Fairfield consists largely of sidewalk infrastructure supported by crossing treatments, multi-use paved trails, and unpaved recreational trails. Fairfield currently has an overall Walk Score of 35 out of 100 according to the real-estate website www.WalkScore.com, indicating that most errands require a car. As part of the Solano ATP, sidewalk presence was used as the metric for pedestrian accessibility and was inventoried within incorporated jurisdictions and adjacent pockets of unincorporated communities.

Sidewalk Inventory

An inventory of existing sidewalks was conducted to identify sidewalk gaps within Fairfield, with results summarized in **Figure 5-B**. The city currently has a total of 116 miles of existing sidewalk infrastructure, which includes measurements of sidewalks on both sides of the street independently. With approximately 1,050 miles of maximum sidewalk coverage (total roadway mileage multiplied by two to account for both sides of the street). Depending on land use context, there may be areas of the city with rural characteristics where typical sidewalk infrastructure may not be compatible. However, it was not possible to exclude these areas from the overall sidewalk inventory evaluation.

Sidewalk coverage in Fairfield was also evaluated in the equity focus areas (see the Countywide chapter for full descriptions) as designated by the Metropolitan Transportation Commission for Priority Development Areas and Communities of Concern, or CalEnviroScreen Disadvantaged Communities. In Priority Development Areas, there is approximately two miles of sidewalk coverage, which indicates that about four percent of these areas have sidewalk coverage. For Communities of Concern, there is approximately 37 miles of sidewalk coverage. Fairfield does not have any areas that meet the criteria for Disadvantaged Communities. Overall, the need for sidewalk infrastructure is greatest in the Communities of Concern equity focus area, which needs about 172 miles of sidewalk gaps filled.

EXISTING BICYCLE NETWORK

This section discusses the bicycle facilities in Fairfield's existing bike network. It also includes an analysis of bicyclist comfort and connectivity – that is, level of traffic stress (LTS) and bicycle network connectivity analysis (BNA), respectively –for the existing network. Additional information on the LTS and BNA methodologies can be found in the Countywide chapter's existing conditions section.

Existing Facilities

Fairfield has a 525-mile roadway network, 73 lane miles of which currently have with designated bicycle facilities. This includes five lane miles of shared-use paths, 39 lane miles of bike lanes, and 30 lane miles of bike routes, as summarized on **Figure 5-B**. A majority of roadways in the city (86%) do not have any designated bicycle facilities. Fairfield's bicycle network consists of several shared-use paths (e.g., the Bay Area Ridge Trail through Cordelia, Linear Park Trail through central Fairfield), a small network of bike lanes running on several roads throughout the city (e.g., Air Base Parkway, North Texas Street, Dover Avenue, Oliver Road), and bike routes throughout the city (e.g., Hilborn Road, Lopes Road). The existing network provides connections to several neighborhoods, schools (e.g., Fairfield High School), and retail areas throughout the city, as shown on **Figure 5-D**. However, the network has some major gaps between facilities and does not serve many destinations throughout the city equally.

Bicyclist Comfort and Connectivity

Figure 5-B also presents the percentage of lane miles in Fairfield by LTS score. LTS 1 is the most common classification, making up 68 percent of lane miles in the city because many have low traffic speeds and volumes streets as shown on **Figure 5-E**. These streets are typically local neighborhood streets (e.g., Pacific Avenue, Capitola Way, Oakbrook Drive) or quiet streets that run through downtown (e.g., Madison Street, Union Avenue). Roads with these characteristics do not necessarily require bicycle facilities to be considered low-stress. Facilities provided on roadways with slightly higher volumes and speeds also contribute to total LTS 1 lane miles (e.g., the bike lanes on Oliver Road).

However, LTS 4 is the second most common comfort classification for facilities in Fairfield, accounting for 19 percent of lane miles. These include high-speed and/or high-volume major roadways such as North Texas Street, Dover Avenue, Air Base Parkway, Lopes Road, Travis Boulevard). Many of these roadways are designated bike routes or have bike lanes that may not be suitable for people of all ages and abilities given existing roadway traffic characteristics and geometries. While these high-stress roadways are less common, they are some of the most direct north-south and east-west routes in the city and function as barriers to a connected, low-stress citywide bike network. LTS 2 and 3 account for only six percent and seven percent of lane miles in the city, respectively.

Fairfield's BNA analysis indicates that a majority of the city has medium or low connectivity as depicted on **Figure 5-F**. While there are many LTS 1 streets in the city, they are typically isolated low-stress "islands" that require crossing a higher LTS street (e.g., Air Base Parkway, North Texas Street, Travis Boulevard) or barrier (e.g., the Union Pacific railroad tracks, I-80) to connect to destinations in adjacent census blocks. Fairfield's network of high-stress arterials spans the city and is larger than other Solano cities, resulting in poor connectivity for a great majority of the city. The areas with the highest connectivity include Travis Air Force Base, where vehicular traffic is controlled, and parts of the Cordelia neighborhood, which has a robust network of short, off-street paths.

Figure 5-B. Fairfield Active Transportation Network Infographic

SIDEWALK NETWORK INVENTORY

	Existing Sidewalk Lane Miles	Full Sidewalk Buildout Lane Miles
Citywide	116	1,050
Priority Development Areas	2	57
Communities of Concern	37	209
Disadvantaged Communities	-	-

BICYCLE NETWORK INVENTORY

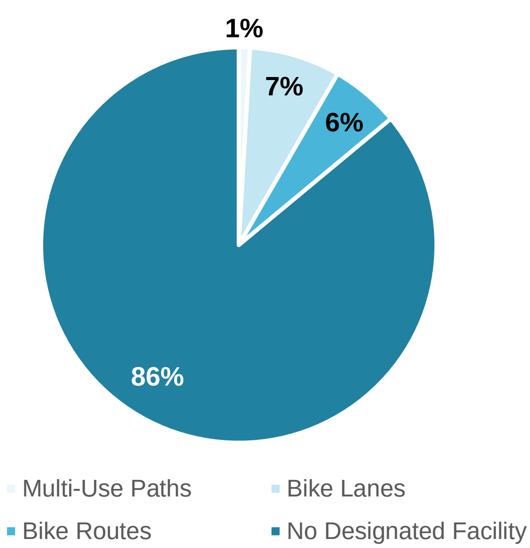
Bike Facilities	**Lane Miles**
Multi-Use Paths (Class I)	5
Bike Lanes (Class II)	39
Bike Routes (Class III)	30
No Designated Facility	452
All Roadways	525

Citywide Bicycle Connectivity (BNA) Score

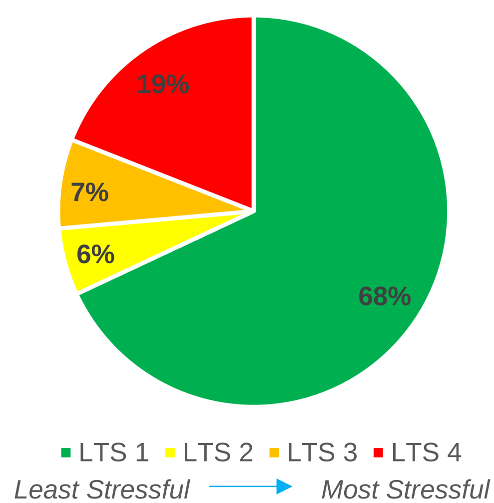
16

Low Connectivity **0 → 100** **High Connectivity**

BICYCLE INVENTORY PERCENT OF ROADWAY MILEAGE



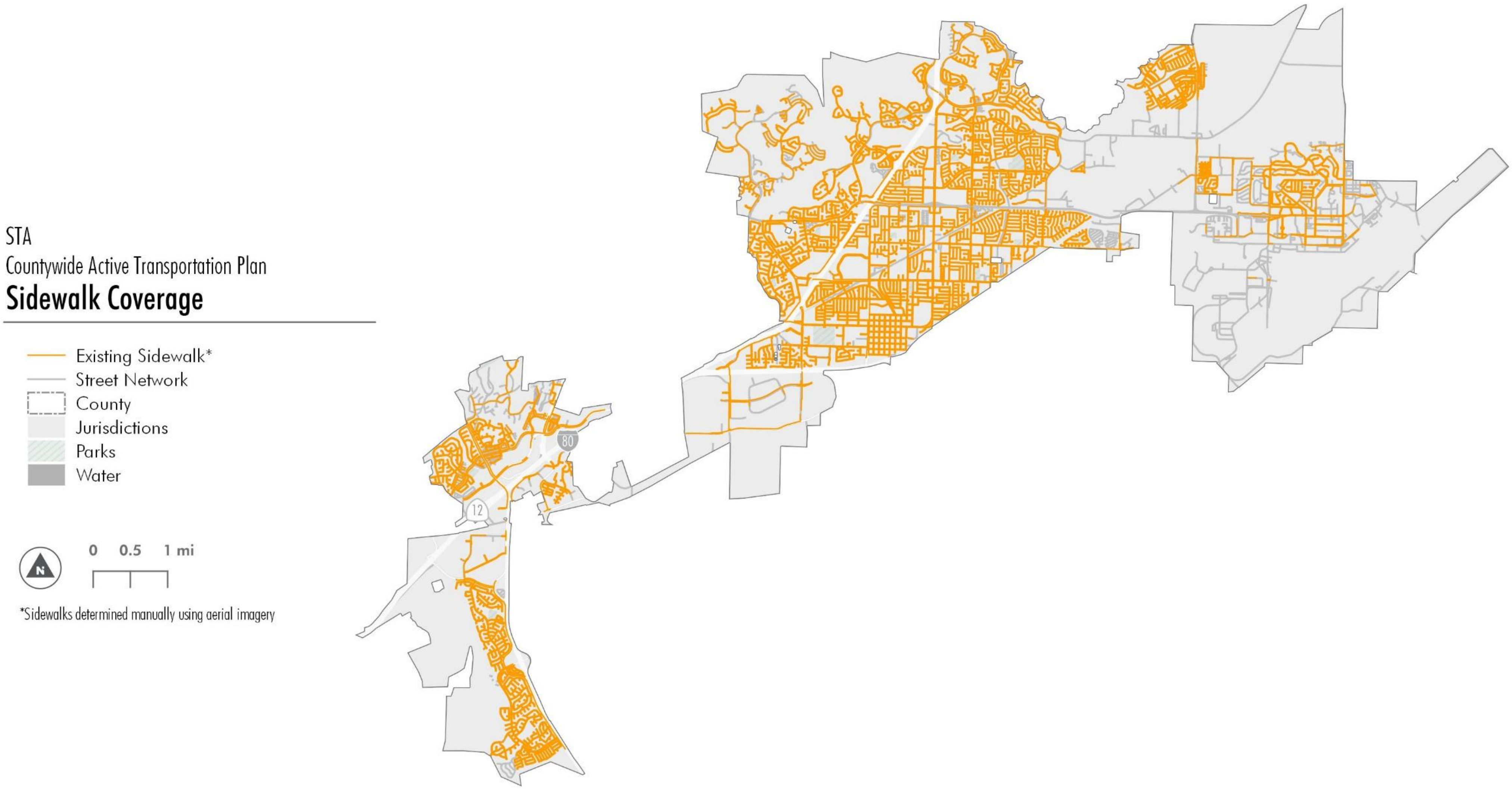
BICYCLIST COMFORT LEVEL OF TRAFFIC STRESS (LTS)



STA

Countywide Active Transportation Plan

Sidewalk Coverage



*Sidewalks determined manually using aerial imagery

Figure 5-D. Fairfield Existing Bicycle Facilities

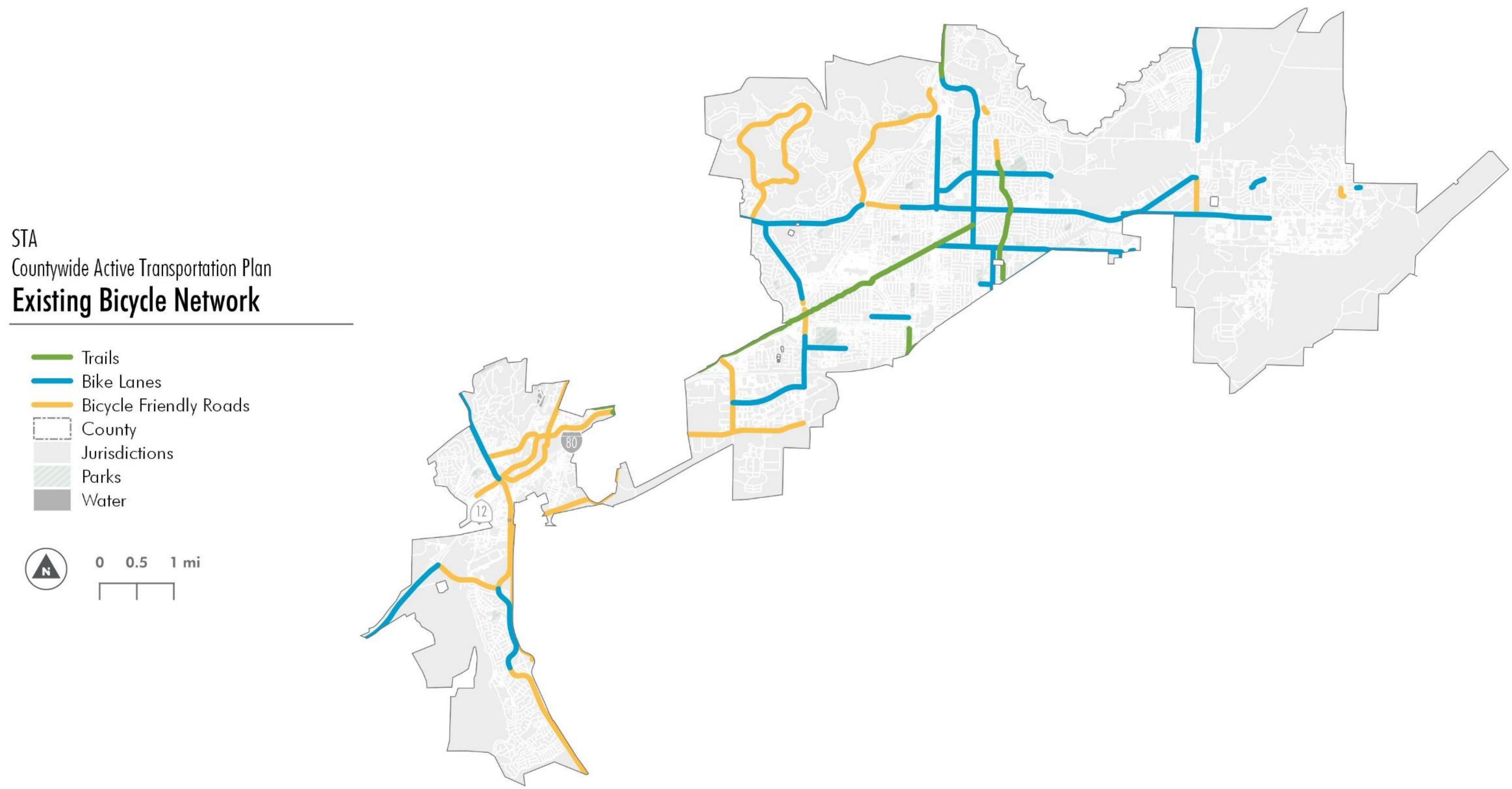


Figure 5-E. Fairfield Bicycle Level of Traffic Stress

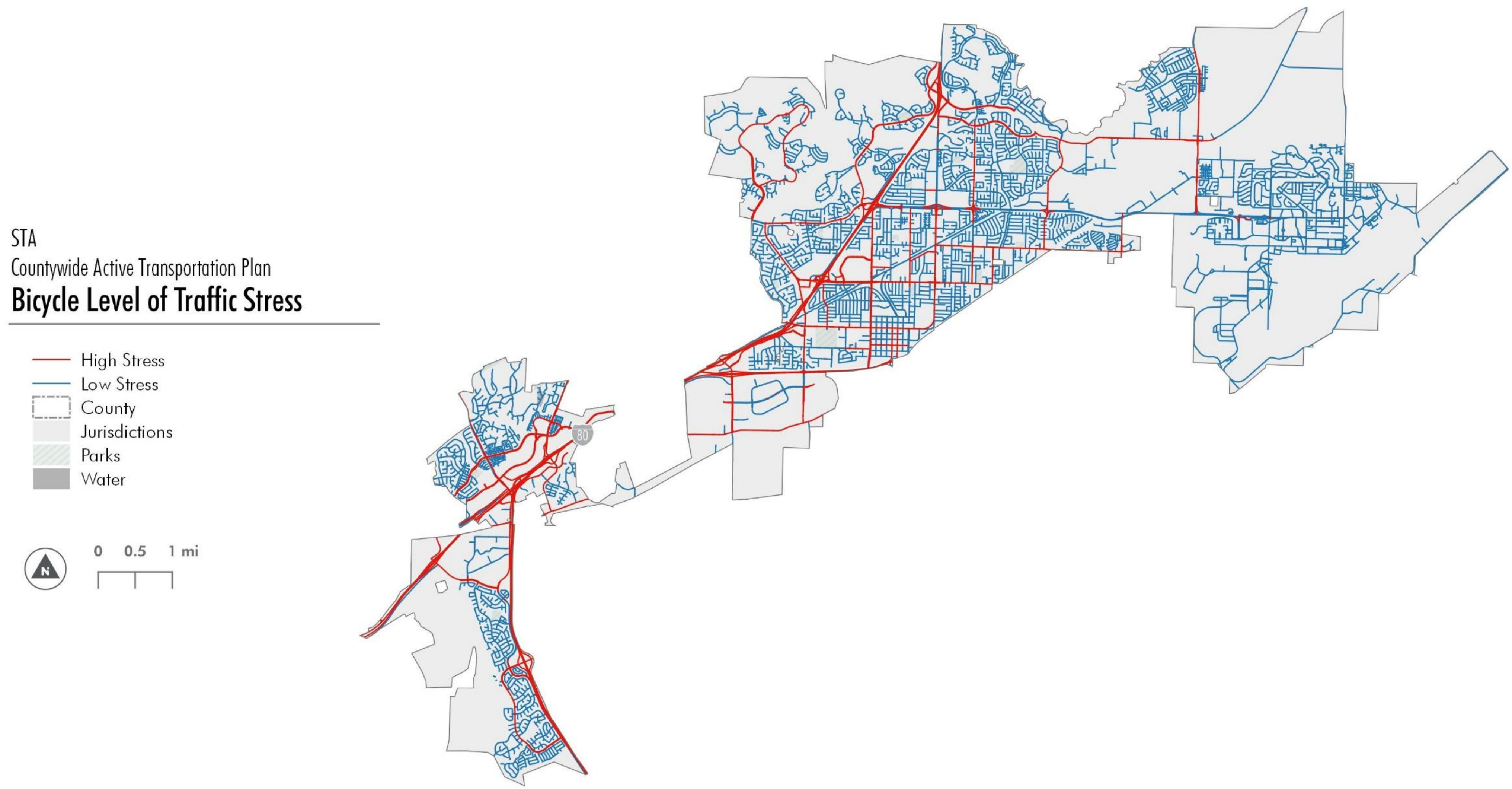
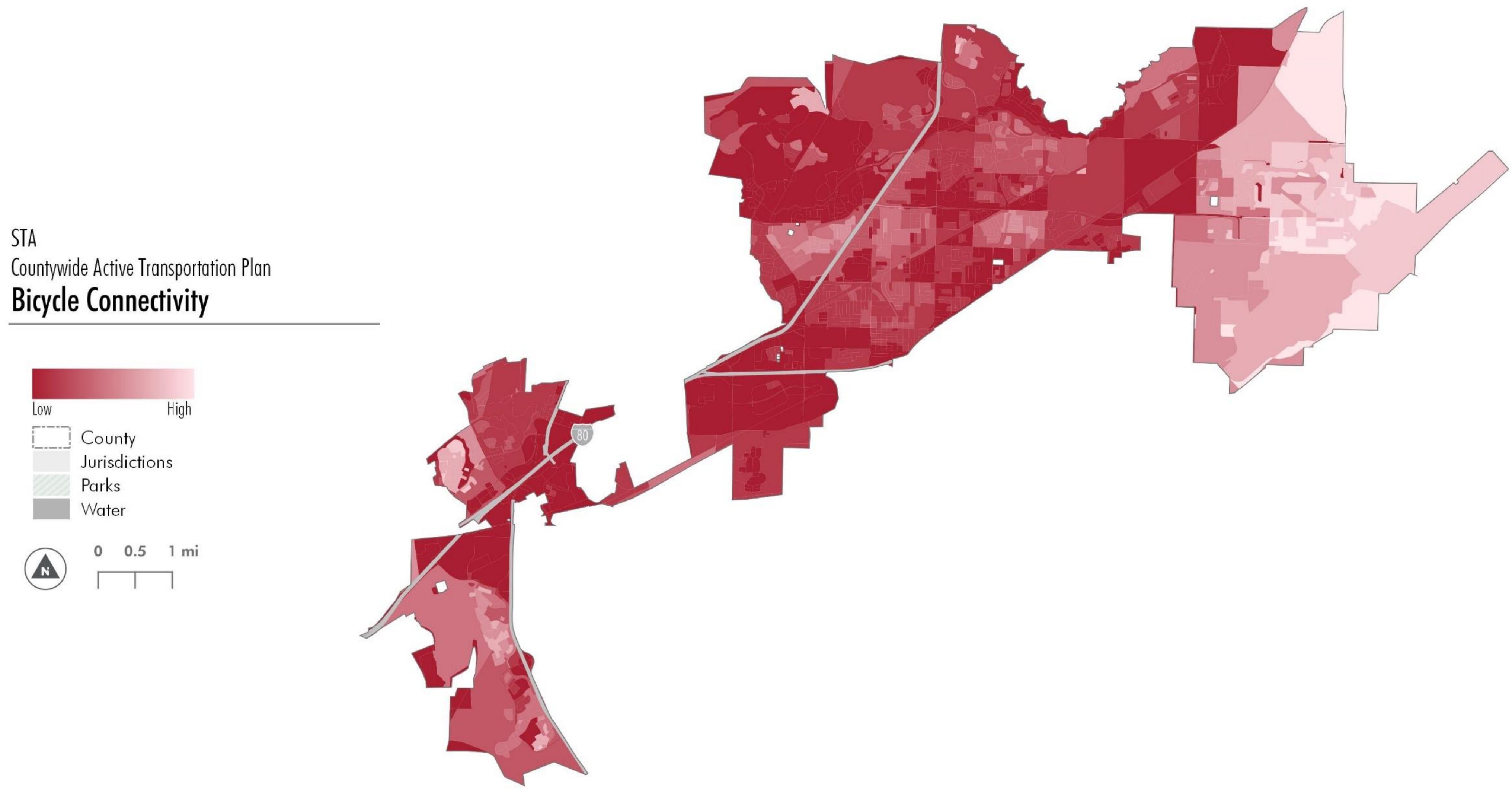


Figure 5-F. Fairfield Bicycle Network Analysis



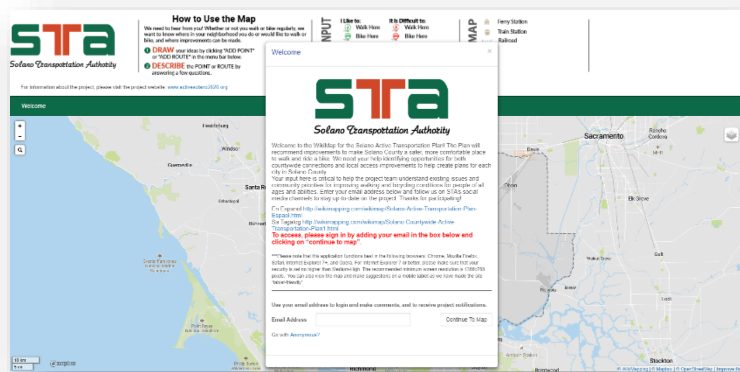
FAIRFIELD PUBLIC OUTREACH PHASE I SUMMARY

As part of the first phase of public outreach for the Solano ATP both online and in-person events were held to try to reach people across all parts of the county. The online and in-person feedback was combined to highlight where all participants had positive or negative input about existing infrastructure throughout the County. Positive comments generally encapsulate where people currently like to walk or bicycle and identify experiences to be highlighted. Negative comments mostly highlight areas where people feel it is dangerous or uncomfortable to walk or bike. Areas that received more comments show as darker than areas with only one or two comments as can be on the heatmaps on **Figure 5-G** to **Figure 5-J**. In total, 1,080 individual line and point comments were collected across Solano County, with 483 comments from in-person events and 597 comments from the project website.

ONLINE PARTICIPATION

An online interactive WikiMap was available on the project website, www.activesolano2020.org, which was hosted by STA. The WikiMap allowed participants to draw lines or drop pins where they like walking or biking and where they want to see improvements to walking or biking. This process helped identify the positive attributes that should be celebrated and the negative attributes that may need new projects to help encourage more people to walk and bicycle in Solano. Additionally, Spanish and Tagalog versions of the WikiMap were accessible on the project website to garner input from all Solano residents.

STA's online interactive WikiMap



IN-PERSON POP-UP EVENT - JELLY BELLY 6TH ANNUAL CANDY PALOOZA

The Solano ATP Team attended the annual Jelly Belly Candy Palooza on Sunday, September 30th, 2018 to solicit input from Fairfield residents and other visitors to Solano County. The event takes place at the Jelly Belly Visitor Center and attracts anywhere from 7,000 to 10,000 visitors each year. It includes tours of the factory, live entertainment, and food, and Jelly Bells offers free vehicle parking. The Candy Palooza is a great place for locals to meet others from Solano County and beyond.

SUMMARY OF PUBLIC INPUT FOR WALKING AND BIKING

Overall, there were a lot of positive comments on bike facilities in Fairfield. For instance, the most came on the far lower west section of Fairfield between Interstate 80 and Interstate 680. Within this area, there is a two-lane road called McGary Road with bike lanes on both lanes. The bike lanes connect with the Ridge Trail and to Red Top Road, and they change to a bike route that eventually continues south on Lopes Road (adjacent to the interstate 680). The second biggest collection of comments were directed toward another bike facility known as Central County Bikeway, which connects Fairfield's central south side with Suisun City. The third highest collection of comments came from the Fairfield Liner Park Trail between Suisun Parkway and Travis Boulevard. The highest number of positive comments for walking were regarding the Ledgewood Creek Trail.

Comments with negative bicycle feedback were mostly directed toward both Cordelia Road between Lopes Road and Main Street in Suisun City. The corridor connects various parts of Fairfield near the south side of South West Suisun City. Another corridor receiving negative comments was Cement Hill Road from North Texas Street to Clay Bank Road. Cement Hill Road does not have any type of bike facility physically present. Another corridor receiving negative feedback was Railroad Avenue between Sunset Avenue and East Tabor Avenue. For the locations mentioned above, nearly all of the negative comments were quite strong. The highest number of negative comments were for Lopes Road between Auto Plaza Court and Red Top Road.

Photos from the Phase I Pop-up Event

Pedestrian-focused Input

Good Places to Walk

- Ledgewood Creek Trail between Rockville Road and Portsmouth Court
- On Mankas Corner Road near intersection of Rancho Solano Parkway along the city limits boarder

Poor Places to Walk

- On Lopes Road between Auto Plaza Court and Red Top Road (along Interstate 680)
- On Red Top Road between River Road and on and off ramps of Interstate (near McGary Road)
- Fairfield Linear Park Trail between Rockville Road intersection of Serrano Drive and Auto Mall Parkway (along the north side of Interstate 80)
- On Suisun Valley Road from Interstate 80 on and off ramps to Business Center Drive
- Bay Area Ridge Trail at the Rockville Road entrance
- Bay Area Ridge Trail near the intersection of Green Valley Road and Westlake Drive

Bicycle-focused Input

Good Places to Bicycle

- On McGary Road and Red Top Road between west city limits and Lopes Road on the east.
- On Lopes Road between Red Top Road and Gold Hill Road (and beyond city limits)
- Along Suisun Parkway (starting from Business Center Drive) and then onto the Fairfield Linear Park Trail (through Linear Park Trail) and ending at Travis Boulevard.

- On Ohio Street between Pennsylvania Avenue and Walters Road (connect with Suisun City and reconnects with Fairfield at East Tabor Avenue)
- Webster Street between Travis Boulevard and Kentucky Street and on Utah Street between 2nd Street and Webster Street.
- Dickson Hill between North Texas Street and Manuel Campos Parkway (Vaden Road)

Poor Places to Bicycle

- Cordelia Road between Lopes Road up to School Street (city limits of Suisun City)
- Red Top Road between McGary Road and Lopes Road
- Intersection of Railroad Avenue and Sunset Avenue (within Suisun City)
- Along the Railroad Avenue between Sunset Avenue and East Tabor Avenue (within Suisun City
- Intersection of Humphrey Drive and Railroad Avenue (within Suisun City)
- Intersection of North Texas Street and East Tabor Avenue
- Manuel Campos Parkway (Vaden Road) between Clay Bank Road and Peabody Road
- Clay Bank Road between Vaden Road and Clement Hill Road

Figure 5-G. Fairfield Public Outreach – Positive WikiMap Walking Comments

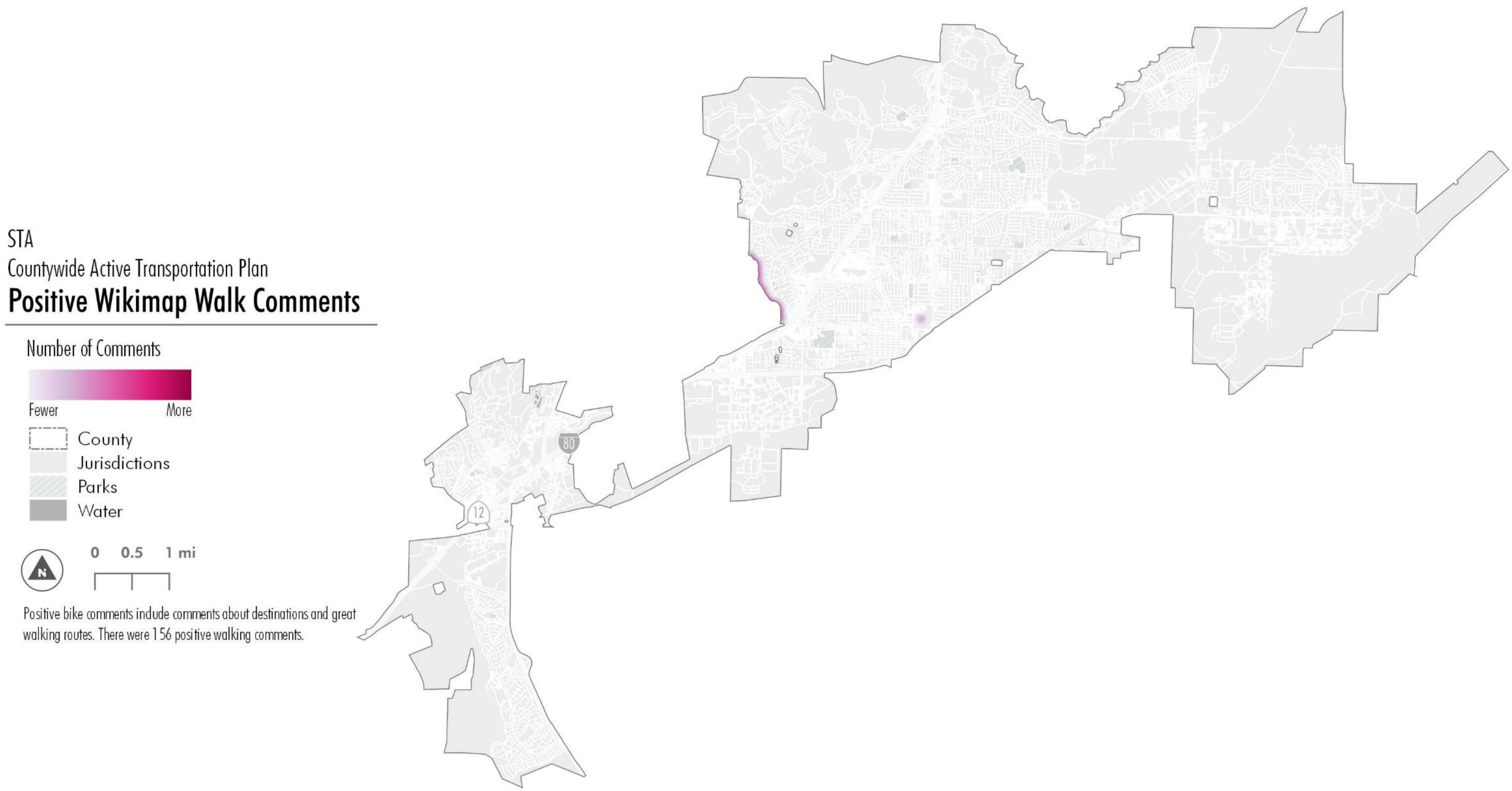


Figure 5-H. Fairfield Public Outreach – Negative WikiMap Walking Comments

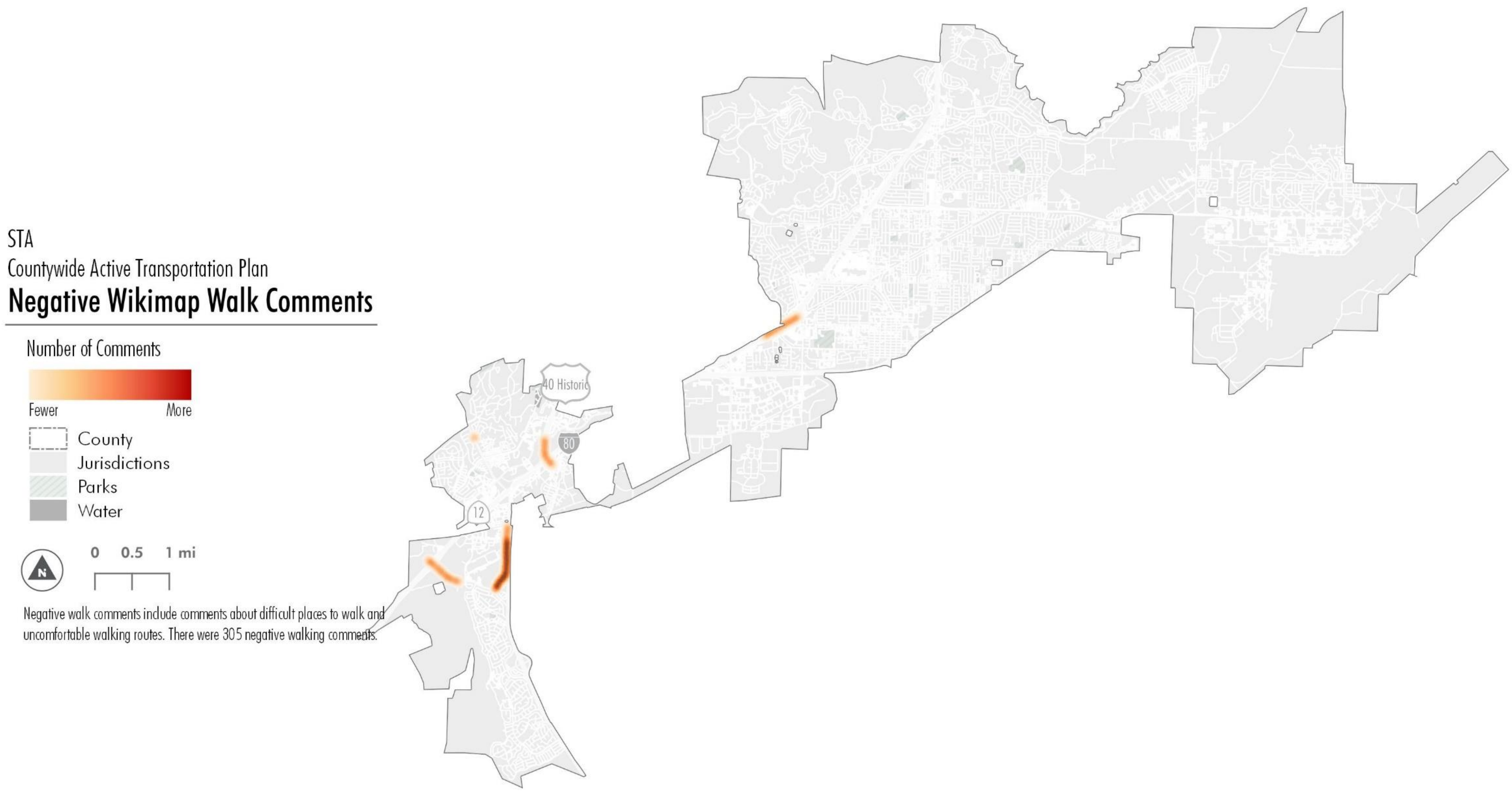


Figure 5-I. Fairfield Public Outreach – Positive WikiMap Bicycle Comments

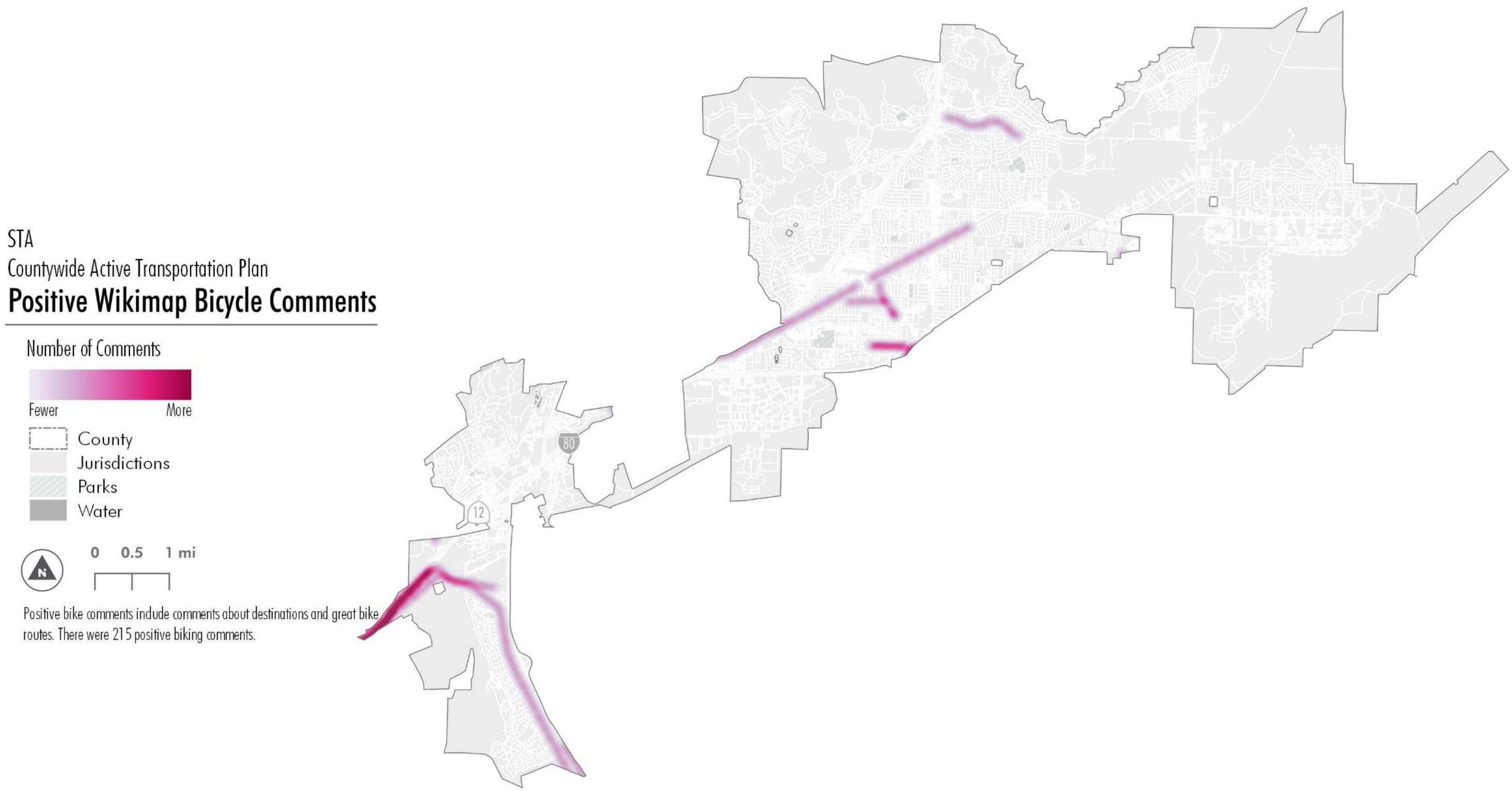
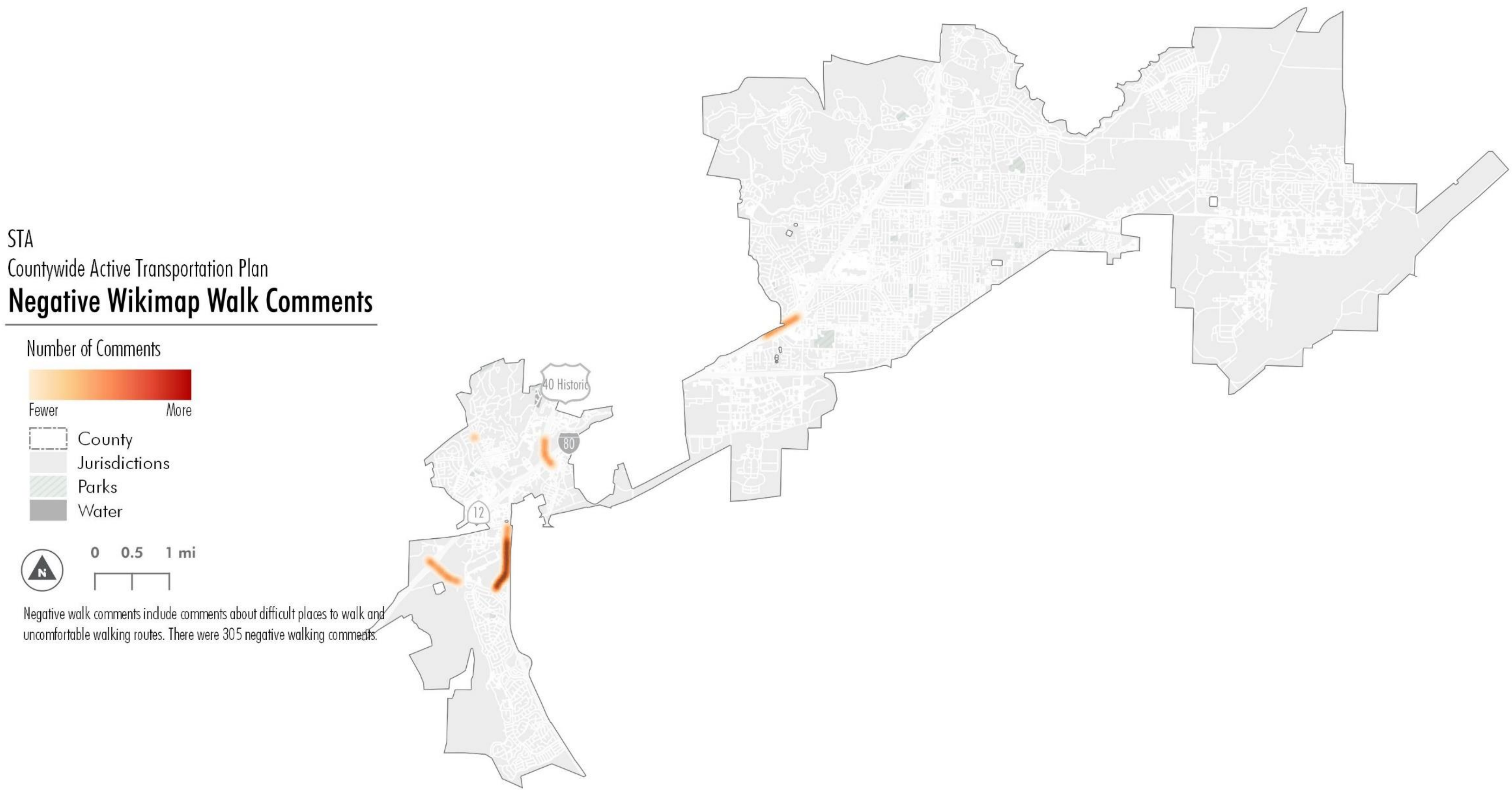


Figure 5-J. Fairfield Public Outreach – Negative WikiMap Bicycle Comments



CHAPTER 6
CITY OF RIO VISTA
ACTIVE TRANSPORTATION
EXISTING CONDITIONS

6. RIO VISTA ACTIVE TRANSPORTATION EXISTING CONDITIONS

RIO VISTA OVERVIEW

The City of Rio Vista is located on the east side of Solano County and, because it is not on the I-80 corridor, is somewhat isolated from the rest of the cities in the county. CA- 12 bisects the city in an east-west direction, serving as the principal connector to I-80 in Fairfield, to CA-113 leading to Dixon, and to Interstate 5 in Stockton. Also, CA-84 starts in Rio Vista and continues north to Sacramento. Rio Vista is as a small waterfront town situated on the west bank of the Sacramento River. Its historic downtown serves as the City's main retail area. Most of Rio Vista is undeveloped, with self-contained pockets of residential development located throughout the city.The largest employer within Rio Vista is Rosetta Resource, a natural gas well operator, though Trilogy and Homecoming were added after recent development. Rio Vista is the smallest city in Solano County, with a population of 9,009 people as of 2017.

SUPPORT FACILITIES AND PROGRAMS

Based on the Solano Countywide Bicycle Plan (2012) there are various park and ride locations that foster multi-modal connections. Currently, there are no existing locations for either park and ride or bike parking. At Church Street and State Route 12 there are plans to open the first park and ride station with 50 parking spots; but there are no planned bike parking or connections to other transit. At the moment, there are no racks on buses to accommodate bikes for multi-modal users.

RIO VISTA DEMOGRAPHICS OF ACTIVE TRANSPORTATION

Demographics and travel patterns for the City of Rio Vista are depicted in **Figure 6-A**. Multiple factors influence people's ability to walk and bicycle within Rio Vista, and key trends in these factors are summarized in **Table 6-1**. This section evaluates demographic characteristics of the population who currently walk or ride a bicycle in Rio Vista using data from the United States Census American Community Survey (2016, 5-year estimates) and the California Household Travel Survey (2012). While this information is useful, this data should not be taken at face value given the small sample sizes and large margins of error associated with this data in smaller communities, such as Rio Vista. It is presented here because it is the only source of standardized data across all geographies in Solano County and can help provide a clearer picture of walking and bicycling trips in Rio Vista.

RACE & ETHNICITY

Approximately 76 percent Rio Vista's population is White, 7 percent is Asian, 6 percent is Hispanic, and 7 percent is Black. All commuters who bike or walk to work in Rio Vista are White. Note that the margins of error associated with this data are high and these statistics should be interpreted with caution.

AGE

Residents age 45 to 64 years old make up the largest commuting group in Rio Vista, accounting for about 48 percent of the total population. However, this group makes a disproportionately higher number of walking trips (79%) than any other group. Rio Vista is unique among Solano County jurisdictions because it has an older working population, with residents age 65 and older accounting for almost 19 percent of the population and a nearly proportionate amount of commuters who walk (21%) and bike (20%). School-aged residents from 16 to 24 years old do not account for any of the walk or bike commuters even though they make up about 11 percent of the population. Note that the margins of error associated with this data are high and these statistics should be interpreted with caution.

GENDER

Residents in Rio Vista have a near 50/50 percent gender split between men and women. However, men make up the entire bicycle commuter share, while women make up a very disproportionately high amount of those who walk to work (79%). Note that the margins of error associated with this data are high and these statistics should be interpreted with caution.

INCOME STATUS

Within Rio Vista, the largest income range for commuters is those that make less than $25,000 per year (34%), with all other income ranges accounting for similar shares of the population (between 19-25% each). A disproportionately high number of commuters who make less than $25,000 account for almost half of those who bike to work (47%). Inversely, the highest income range accounts for over half of all walking commuters (52%).

GENERAL TRAVEL CHARACTERISTICS FOR ALL MODES

Trip Purposes

One-third of trips (33%) in Rio Vista across all modes are for dining, with only about 14 percent of all trips being for work. Additionally, trips for errands (16%) and recreation (11%) make up almost a quarter of all trips taken in Rio Vista. Note that the sample size for this dataset is 166.

Trip Distances

Almost half of all trips taken in Rio Vista by any mode of transportation (51%) are less than three miles in length, which is considered a reasonable biking distance. While over 42 percent of all trips are actually even less than one mile, which is considered a reasonable walking distance for normal trips. This indicates that almost half of all trips made within Rio Vista could be converted to walking or biking trips. Unsurprisingly, trips distances over five miles in length account for 42 percent of all trips due to the City's remote location, and they are often be deemed too far for the "interested but concerned" user to consider walking or bicycling for their trip.

Mode Share

While a majority of trips in Rio Vista are short distance and non-work-related, the preferred mode of choice for all trip types is by far the car (83%). Telecommuting and transit each represent around 5 to 6 percent of trips, while walking (3%) and biking (1%) make up a smaller share of all preferred modes of travel. The total number of people who reported walking or bicycling to work in Rio Vista in the United States Census' American Community Survey is 97.

Table 6-1 presents information about which population groups are walking and bicycling more (or less) than others in Rio Vista better understand which population groups may be more dependent on active transportation facilities and which population groups may lack access to these types of facilities. This can help Rio Vista plan for the equitable distribution of active transportation facilities and ensure that outreach efforts are targeting new audiences and considerate of the needs of specific populations. This information can also help Rio Vista determine which population groups should be engaged to better understand barriers to walking and bicycling.

Table 6-1 Rio Vista Active Transportation Demographics Findings

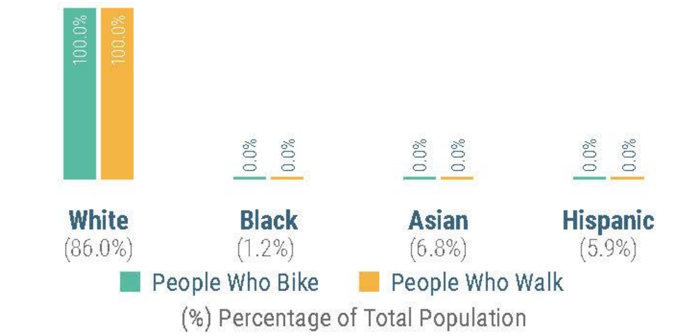
Who is Walking More	**Who is Biking More**
• White residents • Middle-aged workers and working seniors • Women • High and medium-high income earners	• White residents • Young adults, middle-aged workers, and working seniors • Men • Low and medium-low income earners
Who is Walking Less	**Who is Bicycling Less**
• Hispanic, Asian, and Black residents • High school and college students and young adults • Men • Low and medium-low income earners	• Hispanic, Asian, and Black residents • High school and college students • Women • Medium-high and high-income earners

Rio Vista Active Transportation Profile

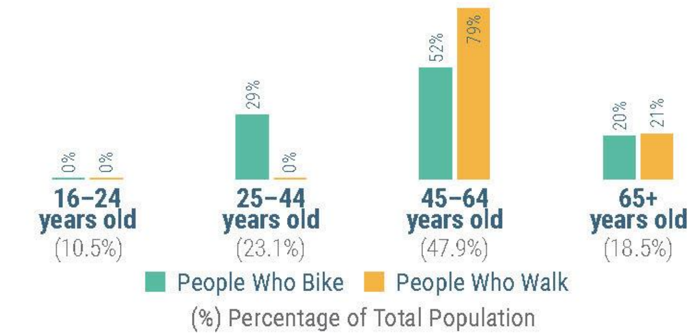
Characteristics of residents who walk or bike to work:

Source: US Census, ACS 5-Year Estimates 2016.

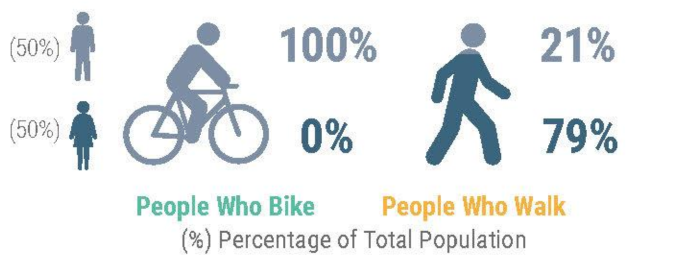
Race



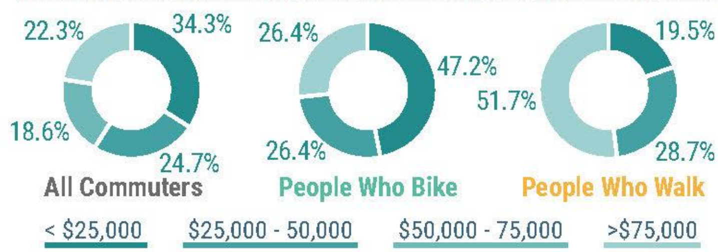
Age



Gender



Income

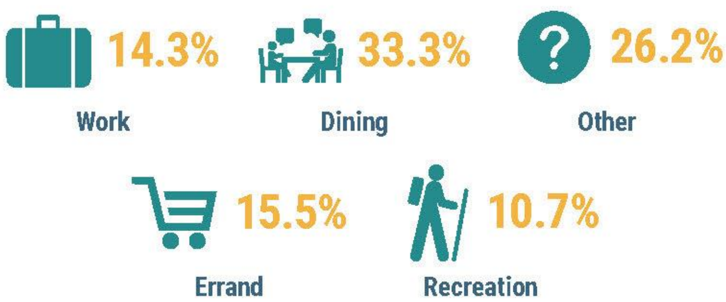


General travel characteristics (all modes):

Source: California Household Travel Survey, 2012.

Trip Purposes

(all modes)



Trip Distances

(all modes)

Mode Share

(all trips)

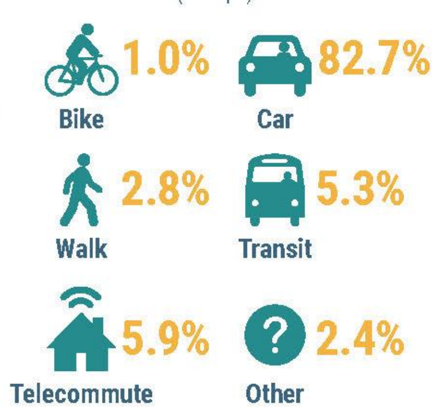


Figure 6-A. Rio Vista Active Transportation Demographics Infographic

RIO VISTA ACTIVE TRANSPORTATION GOALS AND POLICIES

Various documents guide how active transportation projects and programs are implemented throughout the County. While Benicia does not have an adopted bicycle, pedestrian, or active transportation plan, the City uses guiding and supportive policies in its adopted General Plans as summarized below. The City may have other planning documents such as specific plans or community plans that were not evaluated individually as part of this effort.

RIO VISTA GENERAL PLAN CIRCULATION & MOBILITY ELEMENT (2001)

The Rio Vista General Plan's Circulation & Mobility Element is concerned with the movement of people and goods through and around the community. The element focuses on the community's system of regional or cross-town streets (arterials and collectors), local access or neighborhood streets, transit, and bicycle and pedestrian routes. Goals and policies related to active transportation include the following.

- Goal 8.3: To develop a comprehensive pedestrian and bicycle system over time that is coordinated with the city's roadway system.
- Policy 8.3.A: The City shall provide a continuous system of sidewalks along streets.
- Policy 8.3.B: The City shall complete the comprehensive pedestrian and bicycle systems, including off-street multipurpose paths and trails linking major new development areas with the waterfront.
- Policy 8.3.C: The City shall develop pedestrian and bicycle paths in the trail corridor and along the waterfront.
- Policy 8.3.D: The City shall maintain the bicycle pathway system in a condition that provides a safe means of bicycle travel and connects to all parts of the City.
- Policy 8.3.E: The City shall separate bikeways from streets wherever possible. Where off-road bicycle paths are not possible, the City shall designate on-street bicycle lanes.
- Policy 8.3.F: The City shall require maintenance assessment districts, lighting and landscaping districts, homeowner associations, and other appropriate funding mechanisms for maintenance of bikeways and trails.
- Policy 8.3.G: The City shall require nonresidential developments to build clearly identified internal walkways that are distinct from roadways and directly connect building entrances to public sidewalks and transit stops.
- Policy 8.3.H: The City shall ensure that developments are designed carefully to prevent parking lots, loading and delivery areas, and sound walls and buffers from becoming barriers to pedestrians and bicyclists. The City shall ensure that adjacent land uses do not prevent access between buildings, walkways, and parking areas.
- Policy 8.3.I: As bikeways are constructed, the City shall ensure that they provide direct routes to major employment centers from residential areas.
- Policy 8.3.J: The City shall incorporate bicycle facilities into the design of arterial streets, intersections, and other street improvement projects.
- Policy 8.3.K: The City shall provide for safe walkways, and pedestrian and bicycle crossings for arterial streets, Highway 12, creeks, and other physical barriers.
- Policy 8.3.L: The City shall construct sidewalks on new or reconstructed streets with a separation from the curb by including a landscaped parkway or greenbelt wide enough to allow for planting of shade trees.
- Policy 8.3.M: The City shall ensure the provision of secure bicycle parking at centers of public and private activity. The City shall require new commercial development to provide bicycle parking.
- Policy 8.3.N: The City shall actively promote bicycling and bicycle safety.
- Policy 8.3.O: The City shall plan for a multi-modal transfer site that incorporates automobile parking areas, bike parking, transit, pedestrian paths, and park-and-ride pick-up points.

RIO VISTA EXISTING ACTIVE TRANSPORTATION NETWORK

The active transportation network consists of both pedestrian and bicycle infrastructure that work together to provide mobility options for all those that live, work, study, play, visit, pray, or shop in Rio Vista. Whether we're aware of it or not, everyone in Rio Vista uses active transportation infrastructure, such as sidewalks, at some point in their day even if just for short distances to reach their desired destinations.

EXISTING PEDESTRIAN NETWORK

The pedestrian network within Rio Vista consists largely of sidewalk infrastructure supported by crossing treatments, multi-use paved trails, and unpaved recreational trails. Rio Vista currently has an overall Walk Score of 75 out of 100 according to the real-estate website www.WalkScore.com, indicating that it is very walkable, with most errands able to be accomplished on foot. As part of the Solano ATP, sidewalk presence was used as the metric for pedestrian accessibility and was inventoried within incorporated jurisdictions and adjacent pockets of unincorporated communities.

Sidewalk Inventory

An inventory of existing sidewalks was conducted to identify sidewalk gaps within Rio Vista, with results summarized in **Figure 6-B**. The city currently has a total of 36 miles of existing sidewalk infrastructure, which includes measurements of sidewalks on both sides of the street independently. With approximately 143 miles of maximum sidewalk coverage (total roadway mileage multiplied by two to account for both sides of the street).. Depending on land use context, there may be areas of the city with rural characteristics where typical sidewalk infrastructure may not be compatible. However, it was not possible to exclude these areas from the overall sidewalk inventory evaluation.

Sidewalk coverage in Rio Vista was also evaluated in the equity focus areas (see the Countywide chapter for full descriptions) as designated by the Metropolitan Transportation Commission for Priority Development Areas and Communities of Concern, or CalEnviroScreen Disadvantaged Communities. However, Rio Vista does not have any areas that meet the criteria for any of the aforementioned categories. Overall, Rio Vista needs about 107 miles of sidewalk gaps filled citywide.

EXISTING BICYCLE NETWORK

This section discusses the bicycle facilities in Rio Vista's existing bike network. It also includes an analysis of bicyclist comfort and connectivity – that is, level of traffic stress (LTS) and bicycle network connectivity analysis (BNA), respectively –for the existing network. Additional information on the LTS and BNA methodologies can be found in the Countywide chapter's existing conditions section.

Existing Facilities

Rio Vista has a 72-mile roadway network, but less than one lane-mile has a designated bike route, as summarized on **Figure 6-B**. A majority of roadways in the city (99%) do not have any bicycle facilities. Rio Vista's bicycle network consists of a riverside bike route along Front Street and River Road. The existing network is too small to effectively connect Rio Vista's neighborhoods and businesses as shown on **Figure 6-D**. The network primarily serves recreational bicyclists riding along the Sacramento River.

Bicyclist Comfort and Connectivity

Figure 6-B presents the percentage of lane miles of facilities in Rio Vista by LTS score. LTS 1 is the most common classification, making up 92 percent of lane miles in the city because a majority of roadway lane miles are on low-speed and low-volume streets as depicted on **Figure 6-EError! Reference source not found.**. These

streets are typically local neighborhood streets (e.g., Summerset Drive, Gardiner Way) or quiet streets running through downtown (e.g., North 2nd Street, North 4th Street). Roads with these characteristics do not necessarily require bicycle facilities to be considered low-stress.

However, LTS 4 is the second most common comfort classification for roadways in Rio Vista, accounting for five percent of lane miles. These include the high-speed and high-volume CA-12 and CA-84 (River Road). Even though CA-84 is classified as a bike route, this treatment is inadequate for people of all ages and abilities given the existing roadway traffic characteristics and geometry. While these high-stress roadways are less common, they are some of the most direct north-south and east-west routes in the city and function as barriers to a connected, low-stress citywide bike network. LTS 2 and 3 account for only two percent and one percent of lane miles in the city, respectively.

Rio Vista's BNA analysis indicates that a majority of populated areas have high connectivity as shown on **Figure 6-F**. The city's small population and numerous low-speed, low-volume streets help to increase connectivity scores, even without an extensive existing bicycle network. However, while there are many LTS 1 streets in the city, they are typically isolated low-stress "islands" that require crossing a higher LTS street (e.g., CA-12) to connect to destinations in adjacent census blocks. For example, it is not possible to make an entirely low-stress trip on bike from the internally highly connected Trilogy development in the northern part of the city to high-scoring downtown without crossing through areas with low connectivity scores and high-stress barriers.

Figure 6-B. Rio Vista Active Transportation Network Infographic

SIDEWALK NETWORK INVENTORY

	Existing Sidewalk Lane Miles	Full Sidewalk Buildout Lane Miles
Citywide	36	143
Priority Development Areas	-	0
Communities of Concern	-	0
Disadvantaged Communities	-	-

BICYCLE NETWORK INVENTORY

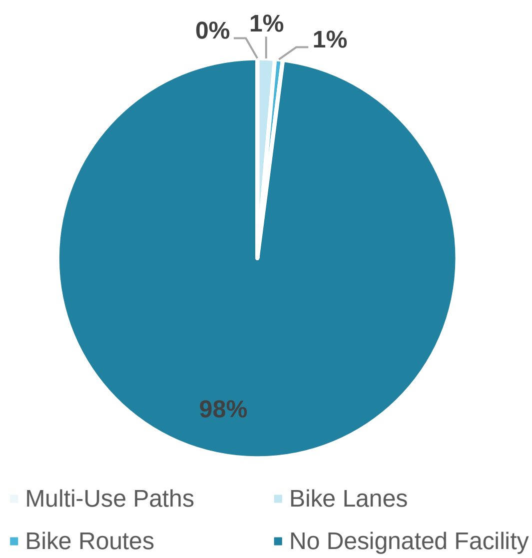
Bike Facilities	**Lane Miles**
Multi-Use Paths (Class I)	0
Bike Lanes (Class II)	0
Bike Routes (Class III)	0.5
No Designated Facility	71
All Roadways	72

Citywide Bicycle Connectivity (BNA) Score

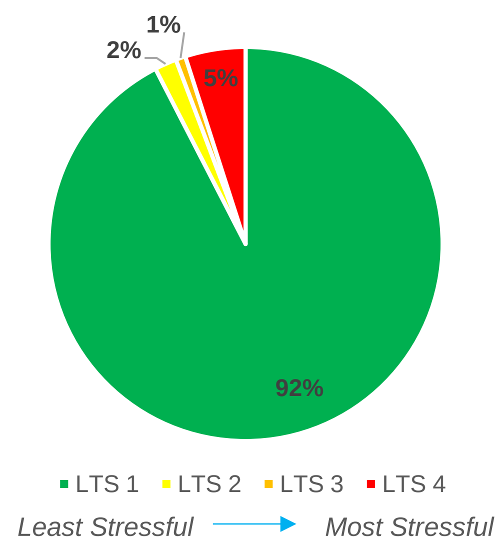
54

Low Connectivity **0 → 100** **High Connectivity**

BICYCLE INVENTORY PERCENT OF ROADWAY MILEAGE



BICYCLIST COMFORT LEVEL OF TRAFFIC STRESS (LTS)



STA

Countywide Active Transportation Plan

Sidewalk Coverage

- Existing Sidewalk*
- Street Network
- County
- Jurisdictions
- Parks
- Water

0 0.5 1 mi

*Sidewalks determined manually using aerial imagery

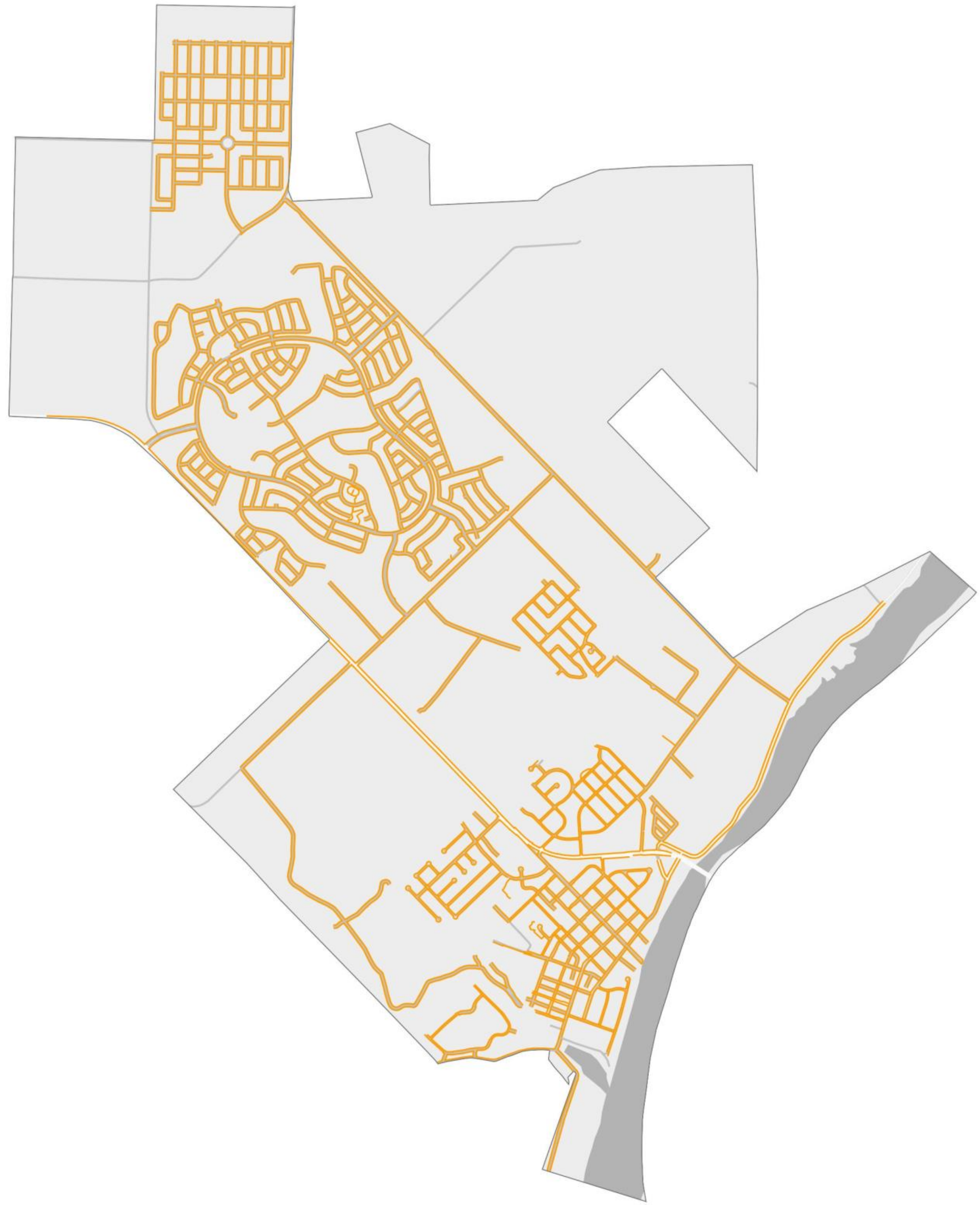


Figure 6-D. Rio Vista Existing Bicycle Facilities

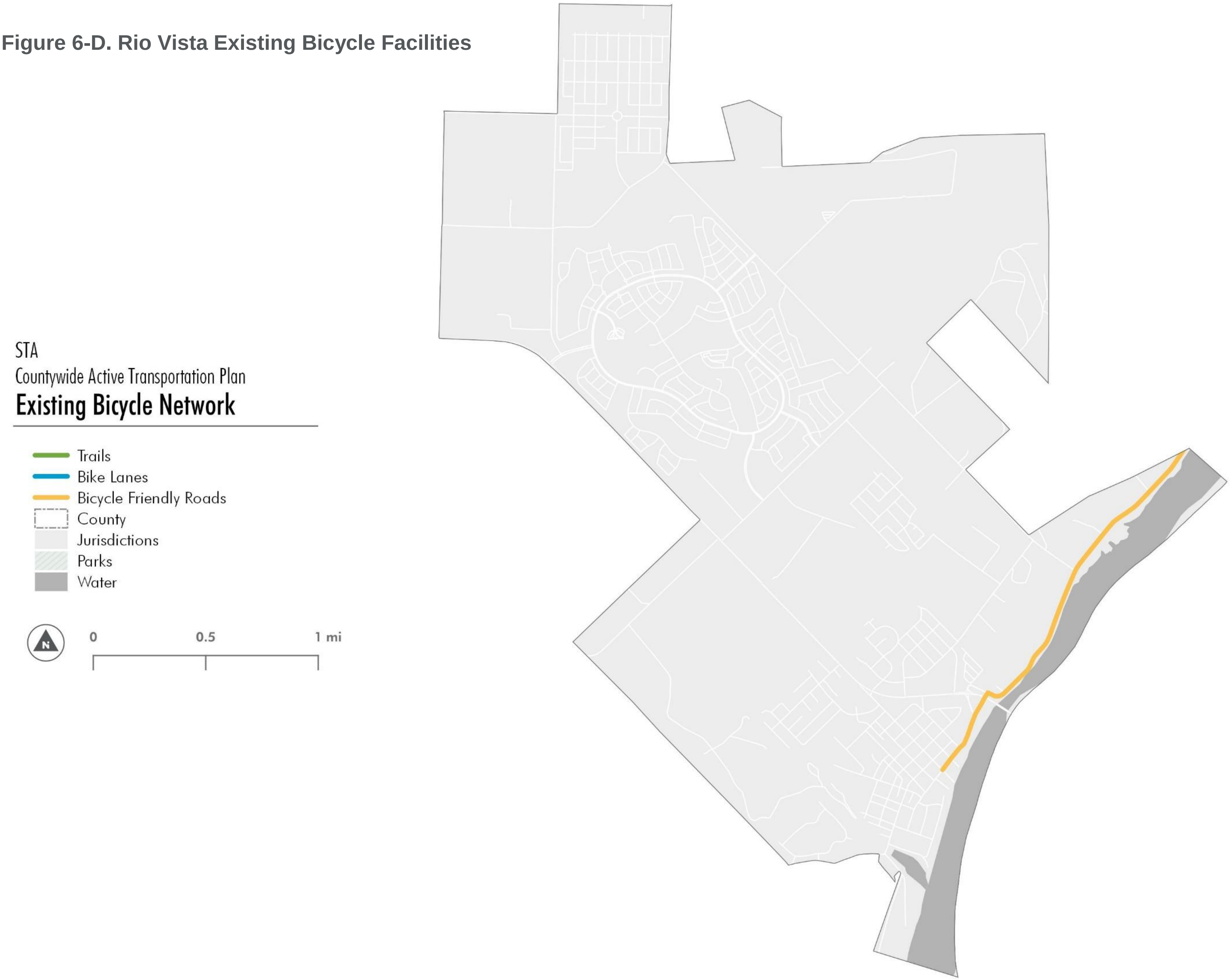


Figure 6-E. Rio Vista Bicycle Level of Traffic Stress

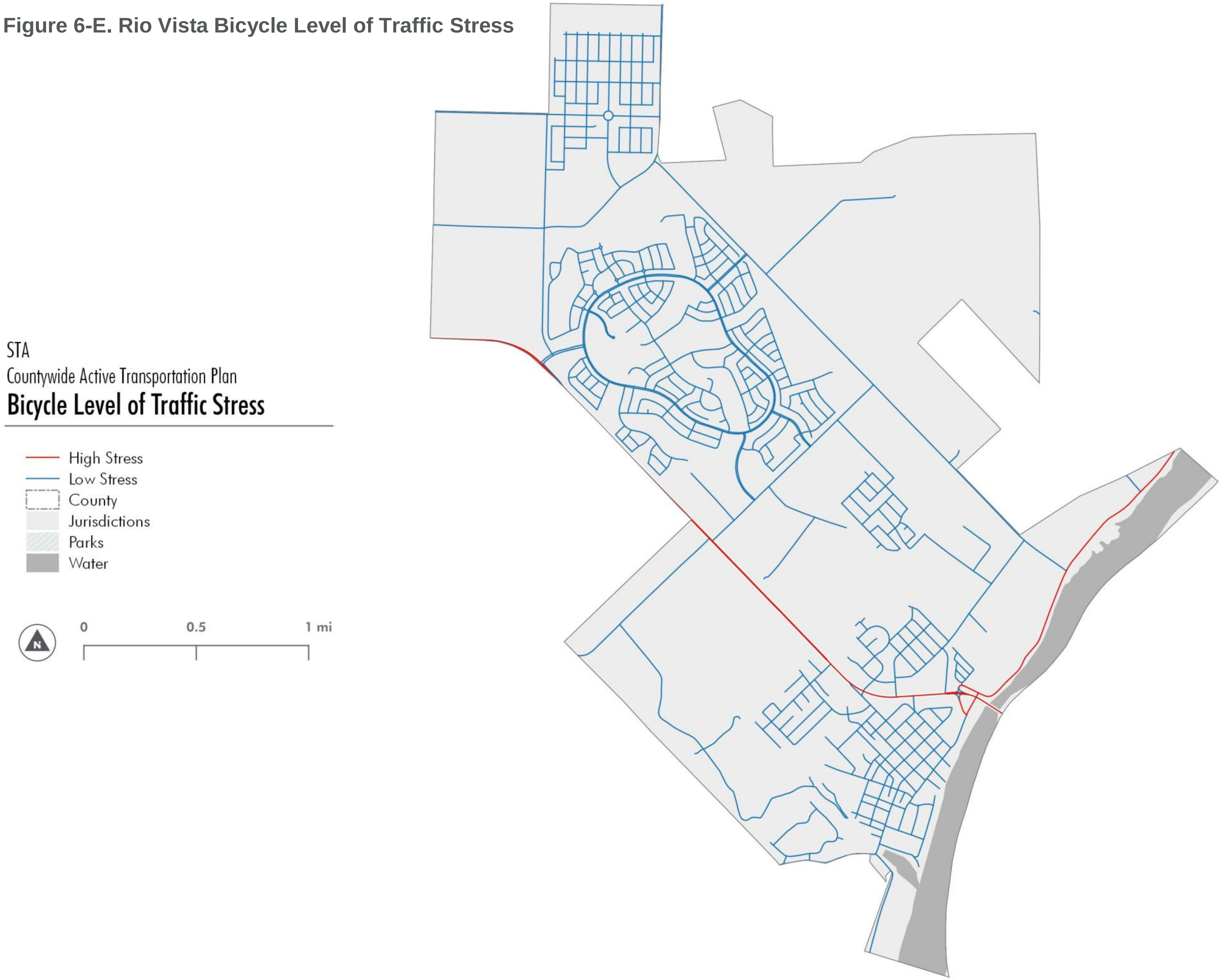
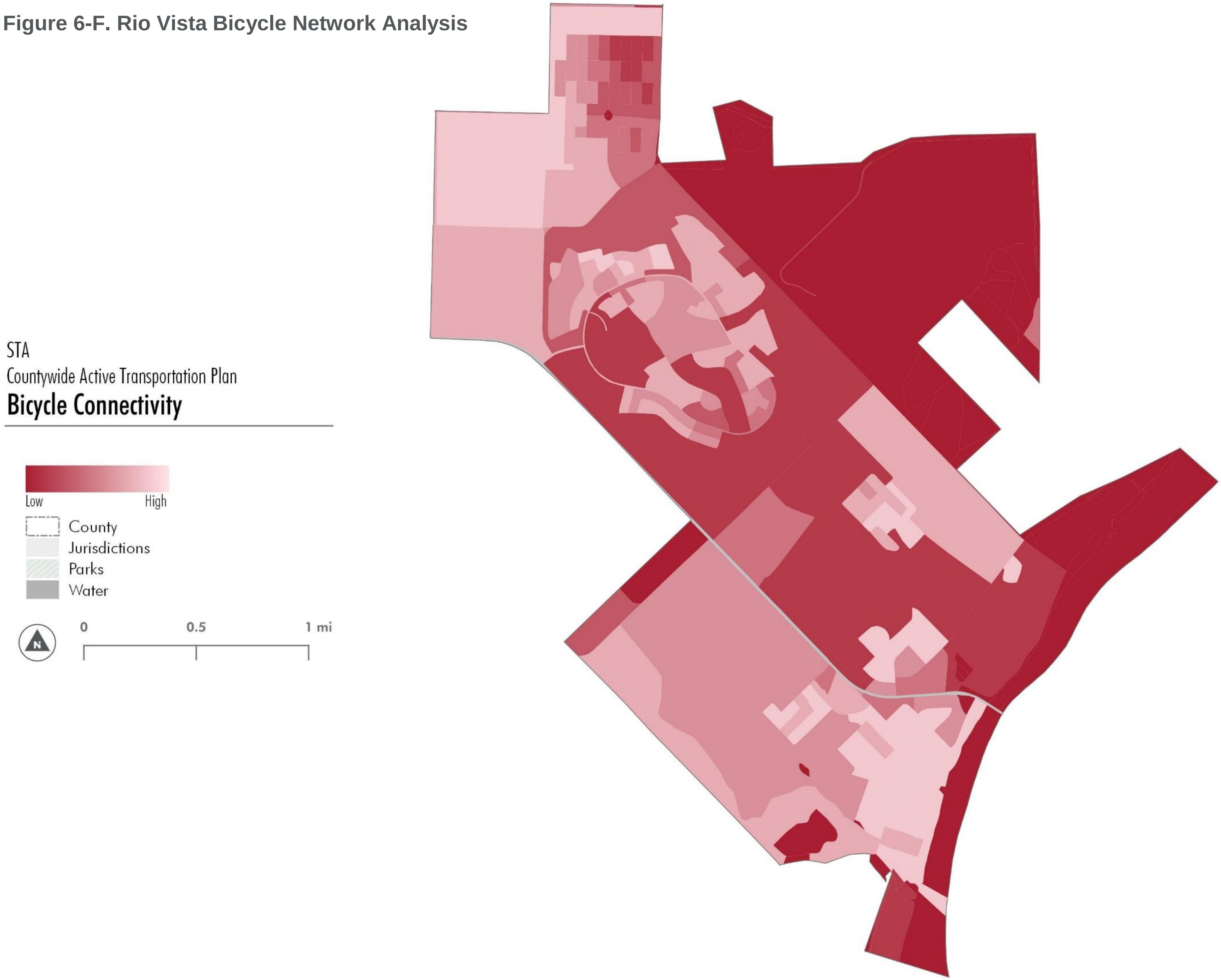


Figure 6-F. Rio Vista Bicycle Network Analysis



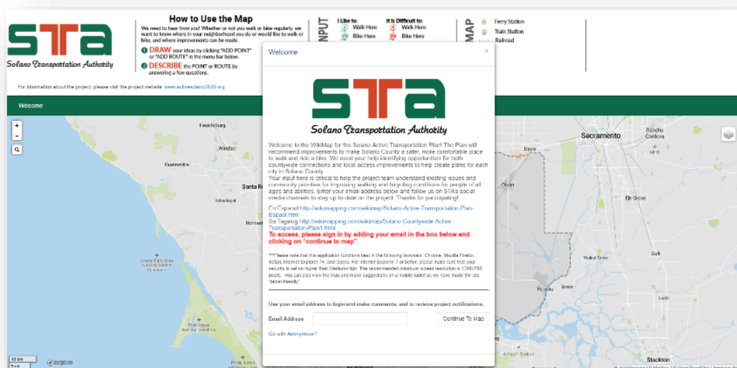
RIO VISTA PUBLIC OUTREACH PHASE I SUMMARY

As part of the first phase of public outreach for the Solano ATP both online and in-person events were held to try to reach people across all parts of the county. The online and in-person feedback was combined to highlight where all participants had positive or negative input about existing infrastructure throughout the County. Positive comments generally encapsulate where people currently like to walk or bicycle and identify experiences to be highlighted. Negative comments mostly highlight areas where people feel it is dangerous or uncomfortable to walk or bike. Areas that received more comments show as darker than areas with only one or two comments as can be on the heatmaps on **Figure 6-G** to **Figure 6-J**. In total, 1,080 individual line and point comments were collected across Solano County, with 483 comments from in-person events and 597 comments from the project website.

ONLINE PARTICIPATION

An online interactive WikiMap was available on the project website, www.activesolano2020.org, which was hosted by STA. The WikiMap allowed participants to draw lines or drop pins where they like walking or biking and where they want to see improvements to walking or biking. This process helped identify the positive attributes that should be celebrated and the negative attributes that may need new projects to help encourage more people to walk and bicycle in Solano. Additionally, Spanish and Tagalog versions of the WikiMap were accessible on the project website to garner input from all Solano residents.

STA's online interactive WikiMap



IN-PERSON POP-UP EVENT – BASS DERBY & FESTIVAL

The Solano ATP Team attended this annual event on Sunday, October 14th, 2018 to solicit input from local residents and visitors. This popular event takes place in the heart of the California Delta and provides fun entertainment for entire families. Taking place along the riverfront, this event is the oldest of its type on the West Coast. There are different type of challenges and cash prizes for participants as well as plenty of entertainment for those who do not participate.

The event was well attended, but many people ignored the booth. There were, however, people who engaged and gave back meaningful feedback that showed an interest in pedestrian and bicycling issues. One common and strong suggestion was connecting the retirement community to the city center.

SUMMARY OF PUBLIC INPUT FOR WALKING AND BIKING

Rio Vista residents did not have many positive comments for biking. Two locations found downtown on Main Street did, however, receive positive comments. These included the intersection of CA-12 and Gardiner Way as well as the intersection of Bruning Avenue and South Front Street. Another, location outside of downtown that received positive feedback was along River Road near the eastern city limits. There were no positive comments for walking in Rio Vista.

Most negative comments for biking were found along all of Airport Boulevard with an emphasize being placed near the intersection Church Road. Negative comments also came in for the intersection of Main Street and North Front Street. Negative comments for walking were directed toward Airport Boulevard between Church Road and River Road.

Pedestrian-focused Input

Good Places to Walk

- On Airport Road between Church Road and State Route 84

Poor Places to Walk

- No comments

Bicycle-focused Input

Good Places to Bicycle

- Along Airport Boulevard adjacent to housing development close to Palisades Drive.
- On 60 River Road or State Road 84 near the Sacramento River Front and Industrial area. Between Airport Road and end of Rio Vista.
- Intersection of HWY 12 and Gardiner Way
- Intersection of Bruning Avenue and South Front Street
- Dickson Hill between North Texas Street and Manuel Campos Parkway (Vaden Road)

Poor Places to Bicycle

- Airport Boulevard between Liberty Islands Road and State Route 84
- Near the intersection of Airport Road and Church Road
- Between Harris Road and Diamond Hills Drive along Church Road
- Intersection of Main Street and North Front Street

Photos from the Phase I Pop-up Event

Figure 6-G. Rio Vista Public Outreach – Positive WikiMap Walking Comments

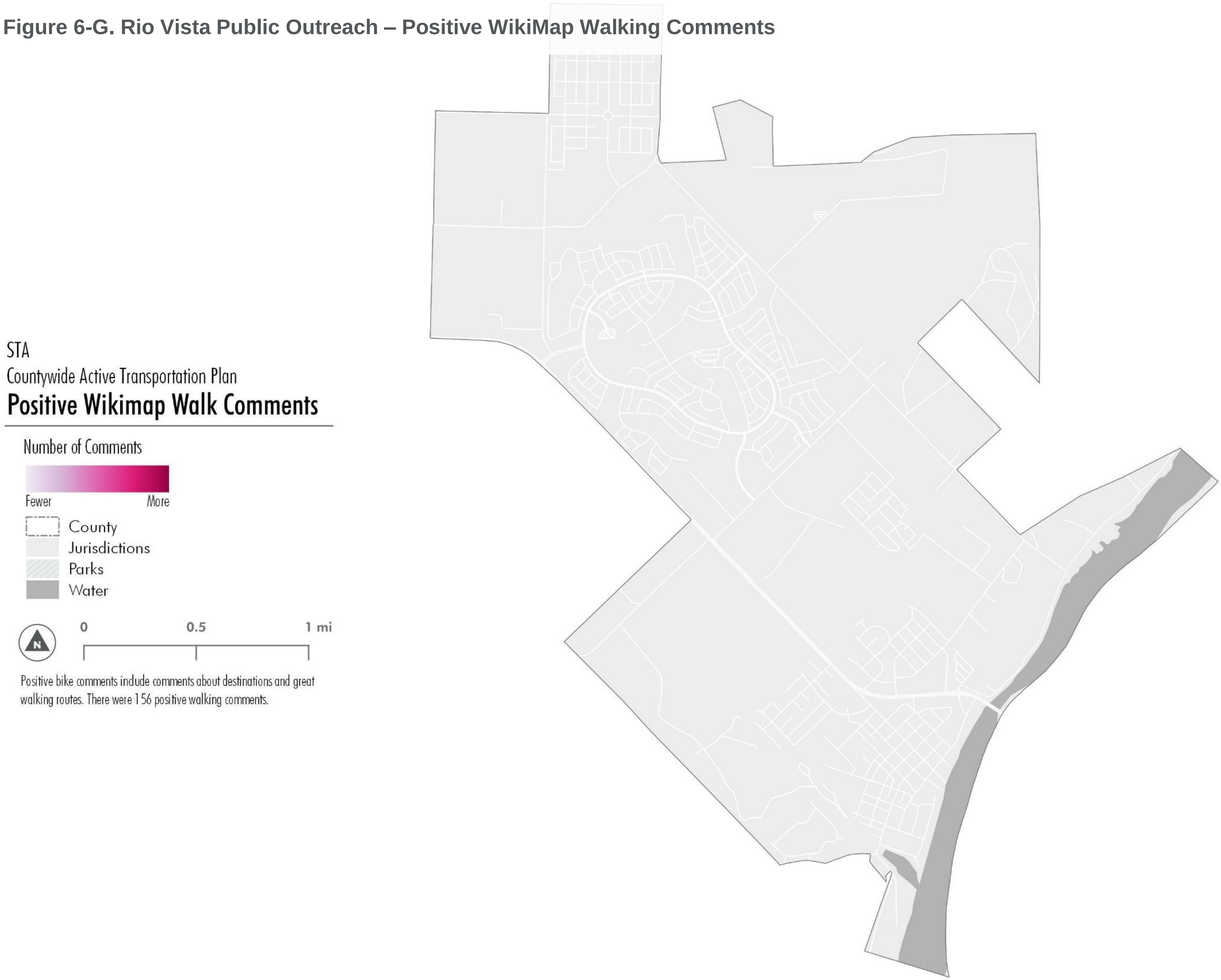


Figure 6-H. Rio Vista Public Outreach – Negative WikiMap Walking Comments

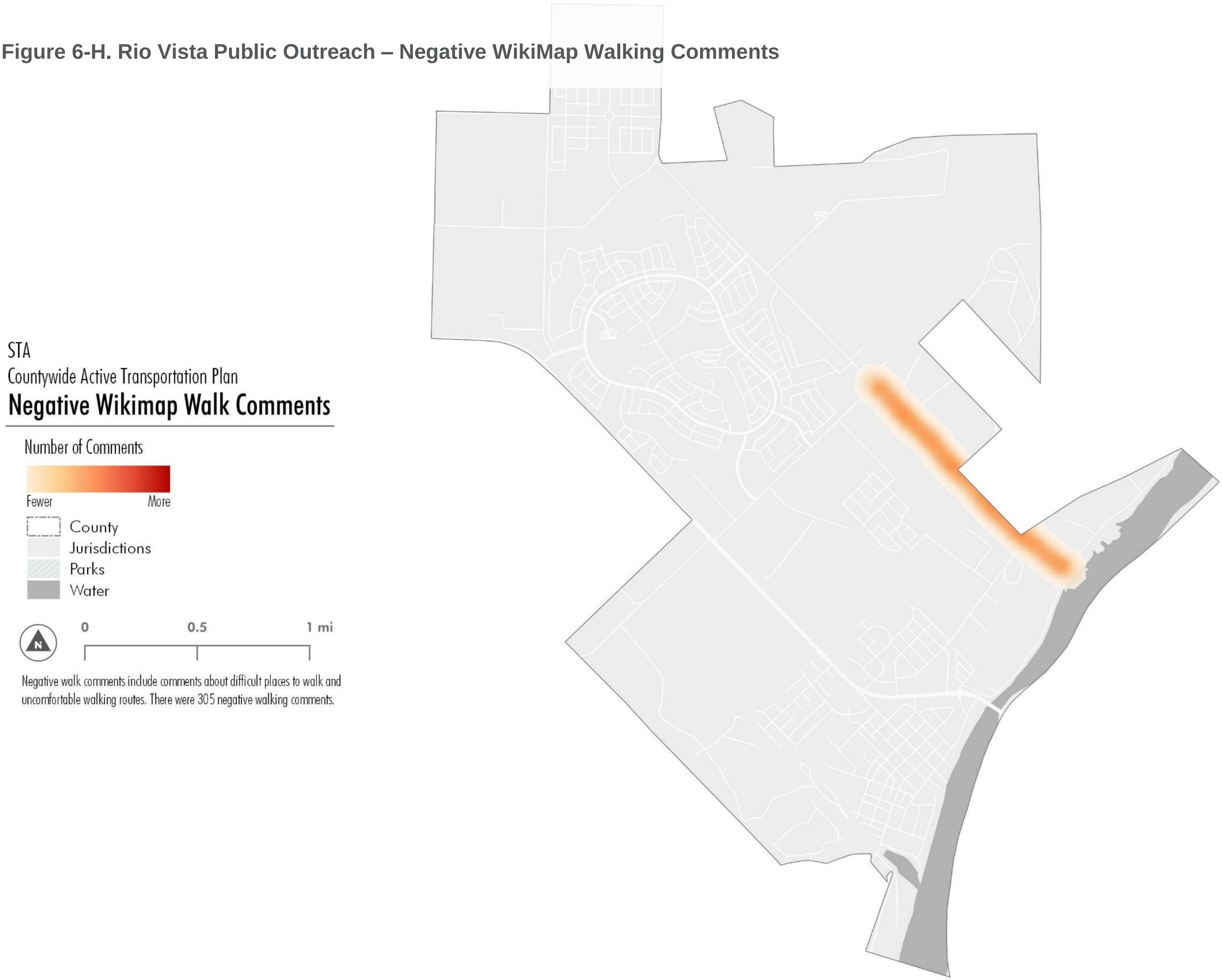
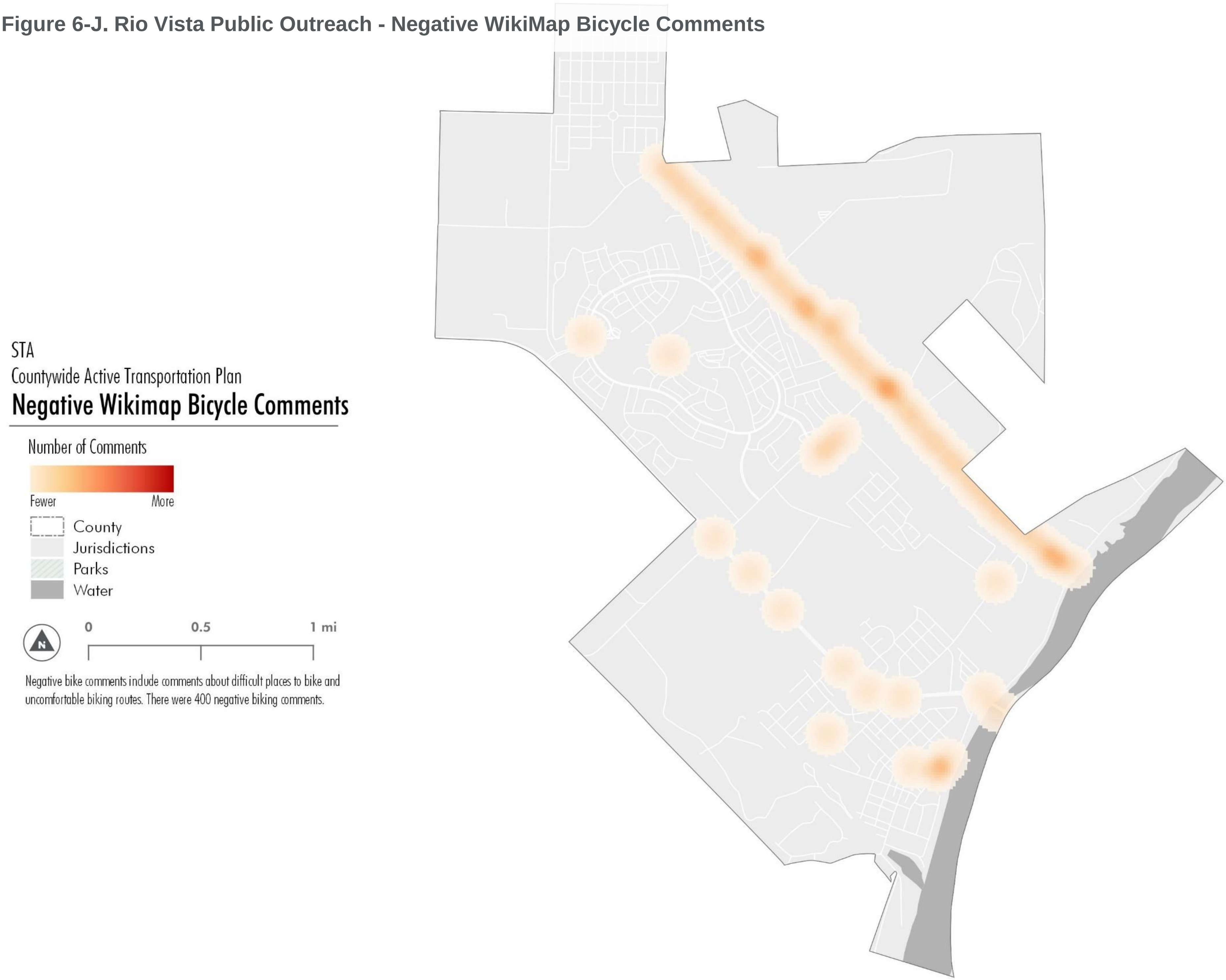


Figure 6-I. Rio Vista Public Outreach – Positive WikiMap Bicycle Comments

Figure 6-J. Rio Vista Public Outreach - Negative WikiMap Bicycle Comments



CHAPTER 7
CITY OF SUISUN CITY ACTIVE TRANSPORTATION EXISTING CONDITIONS

7. SUISUN CITY ACTIVE TRANSPORTATION EXISTING CONDITIONS

SUISUN CITY OVERVIEW

The City of Suisun City is located off CA-12, adjacent to the City of Fairfield. CA-12, which provides a connection to Rio Vista to the east and I-80 to the west, divides Suisun City's downtown area on the water from the rest of the city. Waterways also provide a barrier between the west and east portions of the city. The railroad provides a northwest border between Suisun City and Fairfield. Most of the retail is located on Main Street in the downtown area and along Sunset Avenue north of CA-12. Suisun City is near natural resource preservation and recreation areas and programs, such as those offered from the Suisun Wildlife Center, and it has direct waterfront access to the Suisun Slough. With its location just south of Fairfield, Suisan City residents have close access to additional employment and consumer opportunities. Suisun City is the fourth largest city in Solano County, with a population of 29,639 people as off 2017.

SUPPORT FACILITIES AND PROGRAMS

Based on the Solano Countywide Bicycle Plan (2004) there are multiple park and ride locations that foster multi-modal connections. For instance, at Main Street at State Route 12 there 80 existing spots and 160 planned spots. The location also has bike parking and connections to Capitol Corridor, Fairfield/Suisun City Transit and Vallejo Transit. There are no additional park and ride locations planned in the future.

SUISUN CITY DEMOGRAPHICS OF ACTIVE TRANSPORTATION

Demographics and travel patterns for the City of Suisun City are depicted in **Figure 7-A**. Multiple factors influence people's ability to walk and bicycle within Suisun City, and key trends in these factors are summarized in **Table 7-1**. This section evaluates demographic characteristics of the population who currently walk or ride a bicycle in Suisun City using data from the United States Census American Community Survey (2016, 5-year estimates) and the California Household Travel Survey (2012). While this information is useful, this data should not be taken at face value given the small sample sizes associated with this data in smaller communities, such as Suisun City. It is presented here because it is the only source of standardized data across all geographies in Solano County and can help provide a clearer picture of walking and bicycling trips in Suisun City.

RACE & ETHNICITY

Suisun City is one of the more diverse cities in Solano County, with a population that is 40 percent White, 21 percent Asian, 21 percent Hispanic, and 18 percent Black. White residents make up disproportionately higher amounts of commuters who bike (49%) and walk (55%) to work than their share of the population. Despite being the second largest group in the city, Asians make up disproportionately lower amounts of commuters who bike (12%) or walk (6%) to work. Black residents make up a higher proportion of people who bike (29%) compared to their share of the population. Similarly, Hispanic residents make up a slightly higher proportion of people who walk (25%) than their share of the population.

AGE

Residents age 25 to 44 years old make up almost half of all commuters (48%) in Suisun City. The next largest group, which includes those age 45 to 64, accounts for almost a third of all commuters (35%). Almost all users who walk to work are part of these two groups. While commuters age 16 to 24 years old only account for 14 percent of the population, they make up a disproportionately high number of people who bike to work (25%).

GENDER

Suisun City residents have a near equal gender split of 51 percent men and 49 percent women. One hundred percent of the residents who bike to work are men. Men also make up a higher percentage of those who walk to work (60%), which is proportionately higher than their share of the population.

INCOME STATUS

Within Suisun City, the largest income range for commuters is those that make less than $25,000 a year (37%). People who make between $25,000 and $50,000 per year (26%) or between $50,000 and $75,000 per year (22%) make up almost equal percentages of commuters, while the highest income range (those making over $75,000 per year) has the lowest percentage of commuters (15%). Of those who bike to work, almost 70 percent make under $25,000 per year. For those who walk to work, almost half (48%) have an annual income of less than $25,000. By far, the lowest income bracket has a disproportionately higher share of those who walk and bike to work than any other income bracket in Suisun City.

GENERAL TRAVEL CHARACTERISTICS FOR ALL MODES

Trip Purposes

Almost one-third of trips in Suisun City (31%) across all modes of transportation are for dining, with only about 10 percent of all trips being for work. Additionally, trips for errands (12%) and recreation (16%) combine to make up over a quarter of all trips taken in Suisun City.

Trip Distances

A majority of all trips taken in Suisun City by any mode of transportation are less than three miles in length (70%), which is considered a reasonable biking distance. A third of all trips (33%) are actually even less than one mile, which is considered a reasonable walking distance for normal trips. This indicates that over two-thirds of all trips made within Suisun City could be converted to walking or biking trips. Trips distances from three to five miles (11% in Suisun City) and over five miles (19%) are often deemed too far for the "interested but concerned" user to consider walking or bicycling for their trip.

Mode Share

While a majority of trips in Suisun City are short distance and non-work-related, the preferred mode of choice for all trip types is by far the car (90%). Transit represents the next largest share at 4 percent of trips, while telecommuting and walking each make up 3 percent of trips followed by biking (<1%) as the preferred modes of travel. c

Table 7-1 presents information about which population groups are walking and bicycling more (or less) than others in Suisun City better understand which population groups may be more dependent on active transportation facilities and which population groups may lack access to these types of facilities. This can help Suisun City plan for the equitable distribution of active transportation facilities and ensure that outreach efforts are targeting new audiences and considerate of the needs of specific populations. This information can also help Suisun City determine which population groups should be engaged to better understand barriers to walking and bicycling.

Table 7-1 Suisun City Active Transportation Demographics Findings

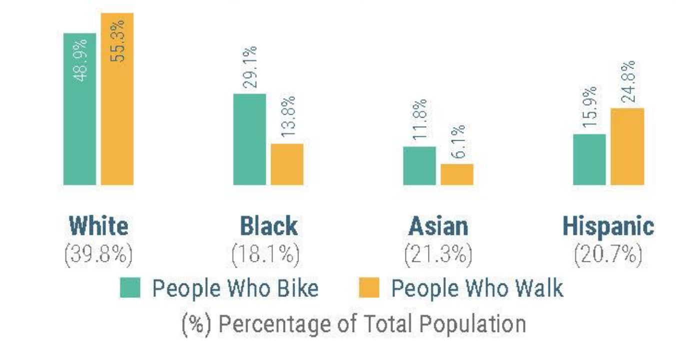
Who is Walking More	Who is Biking More
• White and Hispanic residents • Young adults and middle-aged workers • Men • Low-income earners	• White and Black residents • High school and college students, young adults, and middle-aged workers • Men • Low-income and medium-high earners
Who is Walking Less	**Who is Bicycling Less**
• Black and Asian residents • High school and college students and working seniors • Women • Medium-low, medium-high, and high-income earners	• Hispanic and Asian residents • Working seniors • Women • Medium-low and high-income earners

Suisun City Active Transportation Profile

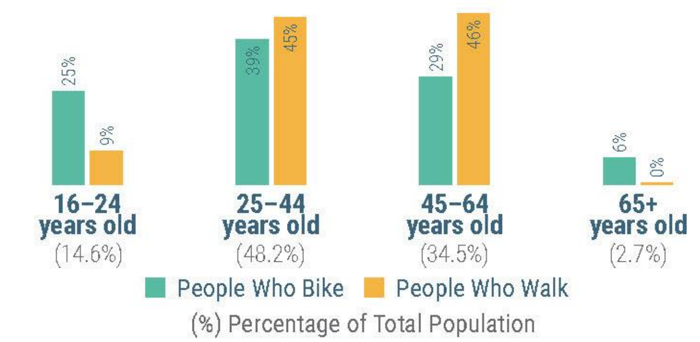
Characteristics of residents who walk or bike to work:

Source: US Census, ACS 5-Year Estimates 2016.

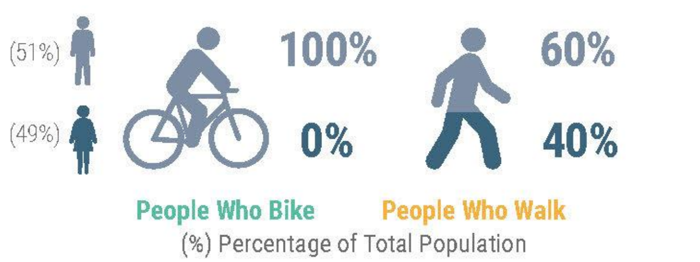
Race



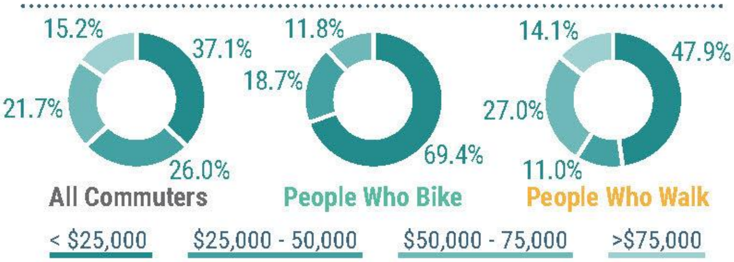
Age



Gender



Income



General travel characteristics (all modes):

Source: California Household Travel Survey, 2012.

Trip Purposes

(all modes)

- Work 9.8%
- Dining 30.8%
- Other 31.3%
- Errand 11.7%
- Recreation 16.4%

Trip Distances

(all modes)

Mode Share

(all trips)

- Bike 0.3%
- Car 89.7%
- Walk 2.7%
- Transit 3.9%
- Telecommute 2.5%
- Other 0.5%

Figure 7-A. Suisun City Active Transportation Demographics Infographic

SUISUN CITY ACTIVE TRANSPORTATION GOALS AND POLICIES

Various documents guide how active transportation projects and programs are implemented throughout the County. While Suisun City does not have an adopted bicycle, pedestrian, or active transportation plan, the City uses guiding and supportive policies in its adopted General Plans as summarized below. The City may have other planning documents such as specific plans or community plans that were not evaluated individually as part of this effort.

SUISUN CITY GENERAL PLAN TRANSPORTATION ELEMENT (2015)

The Suisun City General Plan's Transportation Element addresses the movement of people and goods within and around Suisun City. Implementation of this Element will allow residents, workers, and visitors in Suisun City to reach their destinations comfortably and conveniently by car, bike, transit, or on foot. Goals and policies related to active transportation include the following.

- Policy T-1.3: The City's Level of Service policy will be implemented in consideration of the need for pedestrian and bicycle access, the need for emergency vehicle access, and policies designed to reduce vehicle miles traveled.
- Policy T-1.6: The City will design and operate streets and intersections to enable safe access for all users, including pedestrians, bicyclists, motorists, and transit riders of all ages and abilities.
- Policy T-1.7: The City will maintain a traffic impact fee program designed to collect fair-share contributions from new developments to construct off-site vehicular, bicycle, and pedestrian improvements.
- Policy T-2.1: The City will require and maintain an interconnected street network with short blocks to support pedestrian, bicycle, transit, automobile, and emergency access.
- Policy T-2.2: New streets shall be arranged in a grid or other highly connected pattern so that pedestrians, bicyclists, and drivers have multiple, direct routes to nearby destinations.
- Policy T-2.5: The City prefers direct connections that allow cars, bikes, and pedestrian through traffic over "doglegs" or "T" intersections
- Policy T-2.6: In instances where the City allows new cul-de-sacs, pedestrian, bicycle, and emergency through access is required, with lighting installed to ensure safety and security.
- Policy T-2.8: The City will use unified streetscapes and signage to create visual links for pedestrians, cyclists, and motorists and communicate routes that connect to the Downtown Waterfront Area.
- Policy T-3.3: The City will support programs to provide education, information, facilities, and incentives to encourage City employees to walk, bike, or take transit to work, as funding is available.
- Policy T-6.1: The City will facilitate construction and maintenance of an accessible, safe, pleasant, convenient, and integrated bicycle and pedestrian system that connects local destinations and surrounding communities. The City will support development of a safe and accessible trail network connected to the on-street bicycle and transportation system that provides transportation and recreational opportunities for Suisun City residents and employees.
- Policy T-6.2: The City will require design, construction, operation, and maintenance of "complete streets" that provide safe and convenient access and travel for pedestrians, bicyclists, motorists, and transit users of all ages and abilities.
- Policy T-6.3: The City will proactively coordinate with regional transportation and transit agencies to enhance the local transportation network in a way that encourages bicycling, walking, and transit use.
- Policy T-6.5: The City will prioritize construction of bike lanes, bike paths, and pedestrian amenities, such as wider sidewalks, street lighting, and crosswalks near commercial services, retail, parks, schools, other civic uses, trails, and transit stops.

- Policy T-6.7: The City will prioritize pedestrian connections that allow children to walk safely to school, including safe, convenient locations to cross collectors, arterials, expressways, and rail lines. Key locations and connections are those where informal and unsafe routes or crossings are presently used.
- Policy T-6.12: New building frontages shall be oriented to pedestrians. Primary pedestrian entries to nonresidential buildings should be from the sidewalk, not from parking areas.
- Policy T-6.15: The City will proactively coordinate with utility companies and other relevant service providers to establish bicycle and pedestrian travelways along power transmission lines and other utility corridors, irrigation canals and creeks, and other existing easements and rights-of-way.

SUISUN CITY EXISTING ACTIVE TRANSPORTATION NETWORK

The active transportation network consists of both pedestrian and bicycle infrastructure that work together to provide mobility options for all those that live, work, study, play, visit, pray, or shop in Suisun City. Whether we're aware of it or not, everyone in Suisun City uses active transportation infrastructure, such as sidewalks, at some point in their day even if just for short distances to reach their desired destinations.

EXISTING PEDESTRIAN NETWORK

The pedestrian network within Suisun City consists largely of sidewalk infrastructure supported by crossing treatments, multi-use paved trails, and unpaved recreational trails. Suisun City currently has an overall Walk Score of 37 out of 100 according to the real-estate website www.WalkScore.com, indicating that most errands require a car. As part of the Solano ATP, sidewalk presence was used as the metric for pedestrian accessibility and was inventoried within incorporated jurisdictions and adjacent pockets of unincorporated communities.

Sidewalk Inventory

An inventory of existing sidewalks was conducted to identify sidewalk gaps within Suisun City, with results summarized in **Figure 7-B**. The city currently has a total of 69 miles of existing sidewalk infrastructure, which includes measurements of sidewalks on both sides of the street independently. With approximately 198 miles of maximum sidewalk coverage (total roadway mileage multiplied by two to account for both sides of the street). Depending on land use context, there may be areas of the city with rural characteristics where typical sidewalk infrastructure may not be compatible. However, it was not possible to exclude these areas from the overall sidewalk inventory evaluation.

Sidewalk coverage in Suisun City was also evaluated in the equity focus areas (see the Countywide chapter for full descriptions) as designated by the Metropolitan Transportation Commission for Priority Development Areas and Communities of Concern, or CalEnviroScreen Disadvantaged Communities. In Priority Development Areas, there is approximately 10 miles of sidewalk coverage. For Communities of Concern, there is approximately 14 miles of sidewalk coverage. Suisun City does not have any areas that meet the criteria for Disadvantaged Communities. Overall, the need for sidewalk infrastructure is greatest in the Communities of Concern equity focus area, which needs about 29 miles of sidewalk gaps filled.

EXISTING BICYCLE NETWORK

This section discusses the bicycle facilities in Suisan City's existing bike network. It also includes an analysis of bicyclist comfort and connectivity – that is, level of traffic stress (LTS) and bicycle network connectivity analysis (BNA), respectively –for the existing network. Additional information on the LTS and BNA methodologies can be found in the Countywide chapter's existing conditions section.

Existing Facilities

Suisun City has a 99-mile roadway network, 30 lane miles of which currently have designated bicycle facilities. This includes 6 lane miles of shared-use paths, 15 lane miles of bike lanes, and 10 lane miles of bike routes, as summarized on **Figure 7-B**. A majority of roadways in the city (70%) do not have any bicycle facilities. Suisun City's bicycle network consists of several shared-use paths (e.g., the Central County Bikeway and Grizzly Island Trail, the McCoy Creek Path, and the downtown Waterfront District path), bike lanes running on several roads throughout the city (e.g., Marina Boulevard, Railroad Avenue, Village Drive, Sunset Avenue), and bike routes throughout the city (e.g., Pintail Drive, Emperor Drive, Main Street). The existing network provides connections to downtown, residential neighborhoods to the east, local schools (e.g., Suisun Elementary School, Crystal Middle School), and retail centers, as shown on **Figure 7-D**. However, the network has major gaps between facilities and does not serve destinations throughout the city equally.

Bicyclist Comfort and Connectivity

Figure 7-B also presents the percentage of facilities in Suisun City by LTS score. LTS 1 is the most common classification, making up 72 percent of lane miles in the city because a majority of are on low-speed and low-volume streets as depicted on **Figure 7-E**. These streets are typically local neighborhood streets (e.g., Anderson Drive, Blossom Avenue, Bella Vista Drive) or quiet streets running through downtown (e.g., Walnut Street, Suisun Street). Roads with these characteristics do not necessarily require bicycle facilities to be considered low-stress. Facilities provided on roadways with slightly higher volumes and speeds also contribute to total LTS 1 lane miles (e.g., the bike lanes on Railroad Avenue and Sunset Avenue). LTS 2 is the second most common comfort classification for roadways in Suisun City accounting for 14 percent of citywide lane miles.

High-stress streets make up a much smaller number of facilities in Suisun City, with LTS 4 facilities accounting for only seven percent lane miles. These include high-speed and/or high-volume major roadways such as CA-12, Main Street, and Pintail Drive. Many of these roadways are designated bike routes or have bike lanes. However, these treatments are inadequate for people of all ages and abilities given existing roadway traffic characteristics and geometries. While less common, these facilities are some of the most direct north-south and east-west routes in the city, and they function as barriers to a connected, low-stress citywide bike network. Lastly, LTS 3 facilities only account for 6 percent of facilities in the city.

Suisun City's BNA analysis indicates that the city has a mix of neighborhoods with low, medium, and high connectivity, as shown on **Figure 7-F**. The city's southern and eastern neighborhoods have the best connectivity, with multiple bike facilities connecting them to adjacent areas. Downtown and the outlying areas of the southern and eastern neighborhoods have low-to-medium connectivity. While there are many LTS 1 streets in the city, they are typically isolated low-stress "islands" that require crossing a higher LTS street (e.g., CA-12, Main Street) or barrier (e.g., the Union Pacific railroad tracks) to connect to destinations in adjacent census blocks.

Figure 7-B. Suisun City Active Transportation Network Infographic

SIDEWALK NETWORK INVENTORY

	Existing Sidewalk Lane Miles	Full Sidewalk Buildout Lane Miles
Citywide	69	198
Priority Development Areas	10	29
Communities of Concern	14	43
Disadvantaged Communities	-	-

BICYCLE NETWORK INVENTORY

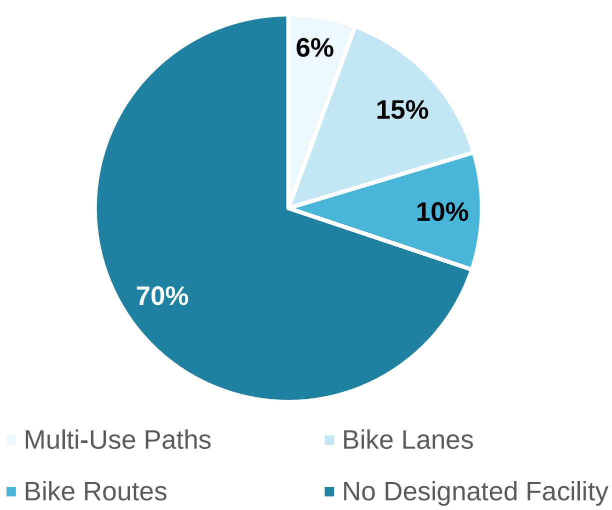
Bike Facilities	**Lane Miles**
Multi-Use Paths (Class I)	6
Bike Lanes (Class II)	15
Bike Routes (Class III)	10
No Designated Facility	69
All Roadways	99

Citywide Bicycle Connectivity (BNA) Score

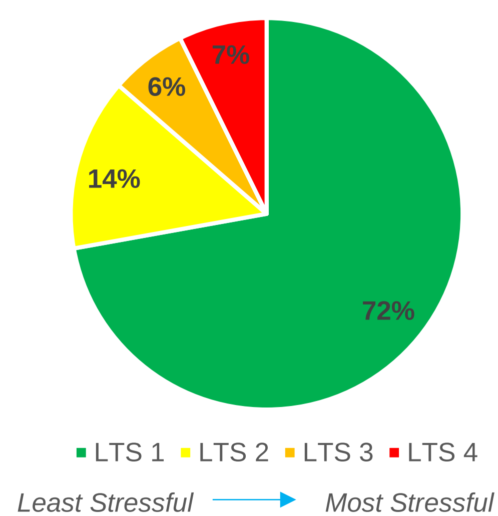
26

Low Connectivity **0 → 100** **High Connectivity**

BICYCLE INVENTORY
PERCENT OF ROADWAY MILEAGE



BICYCLIST COMFORT
LEVEL OF TRAFFIC STRESS (LTS)



STA

Countywide Active Transportation Plan

Sidewalk Coverage

*Sidewalks determined manually using aerial imagery

Figure 7-D. Suisun City Existing Bicycle Facilities

Figure 7-E. Suisun City Bicycle Level of Traffic Stress

Figure 7-F. Suisun City Bicycle Network Analysis

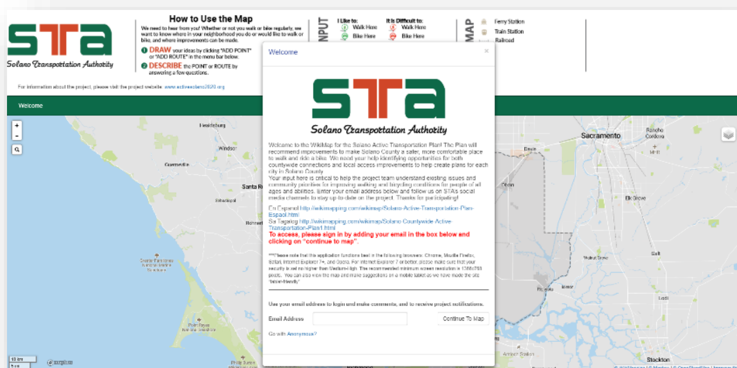
SUISUN CITY PUBLIC OUTREACH PHASE I SUMMARY

As part of the first phase of public outreach for the Solano ATP both online and in-person events were held to try to reach people across all parts of the county. The online and in-person feedback was combined to highlight where all participants had positive or negative input about existing infrastructure throughout the County. Positive comments generally encapsulate where people currently like to walk or bicycle and identify experiences to be highlighted. Negative comments mostly highlight areas where people feel it is dangerous or uncomfortable to walk or bike. Areas that received more comments show as darker than areas with only one or two comments as can be on the heatmaps on **Figure 7-G** to **Figure 7-J**. In total, 1,080 individual line and point comments were collected across Solano County, with 483 comments from in-person events and 597 comments from the project website.

ONLINE PARTICIPATION

An online interactive WikiMap was available on the project website, www.activesolano2020.org, which was hosted by STA. The WikiMap allowed participants to draw lines or drop pins where they like walking or biking and where they want to see improvements to walking or biking. This process helped identify the positive attributes that should be celebrated and the negative attributes that may need new projects to help encourage more people to walk and bicycle in Solano. Additionally, Spanish and Tagalog versions of the WikiMap were accessible on the project website to garner input from all Solano residents.

STA's online interactive WikiMap



IN-PERSON POP-UP EVENT – 14TH ANNUAL ART, WINE, AND CHOCOLATE FESTIVAL

The Solano ATP Team attended this annual event on Saturday, October 6th, 2018 to solicit input from local residents and visitors. This event at the Suisun Waterfront provides a chance for Solano County residents (and others) to sample variety of different wines offered by local and regional wineries. Aside from wine, there is local food, chocolate candy, artists selling hand craft items, cupcakes, and many more items.

The event was well-attended and plenty of people interacted with the booth in the afternoon. The Solano ATP team informed participants on the plan's impact, providing a careful understanding of what was being asked, including the use of a map (even Google Maps) to demonstrate helped them understand the value of planning together. Also, event-goers who did not have time to participate received small business cards with the project website URL, where they could provide further comment.

Photos from the Phase I Pop-up Event

SUMMARY OF PUBLIC INPUT FOR WALKING AND BIKING

A number of positive comments were directed toward the Central County Bikeway, which connects Fairfield and Suisun. Additionally, Walters Road saw a number of comments, as it connects with the Central Count Bikeway. A number of positive comments were directed toward Main Street heading south on Union Street, and toward Todd Park.

Unfavorable feedback on bike conditions within Suisun City was focused on intersections along Railroad Avenue, especially at Sunset Avenue and Worley Road. Parts of Cordella Road run into Suisun City, and they also received a high amount of negative feedback. There were no negative comments related to walking in Suisun City.

Pedestrian-focused Input

Good Places to Walk

- Around and in Todd Park

Poor Places to Walk

- No comments

Bicycle-focused Input

Good Places to Bicycle

- On Ohio Street between Pennsylvania Avenue to Walters Road
- On Main Street between Ohio Street and Maple Street
- McCoy Creek Path between Hwy 12 and Pintail Drive
- On Walters Road between Ohio Street East Tabor Avenue

Poor Places to Bicycle

- Intersection of Sunset Avenue and Railroad Avenue
- Intersection of Worley Road and Railroad Avenue
- On Railroad Avenue between Sunset Avenue and East Tabor Avenue
- On Cordelia Street between Pennsylvania Avenue and Railroad Tracks near West Street
- Intersection of North Texas Street and East Tabor Avenue
- Intersection of Travis Boulevard and Pennsylvania Avenue
- On Pintail Drive between Cackling Drive and East Wigeon Way

Figure 7-G. Suisun City Public Outreach – Positive WikiMap Walking Comments

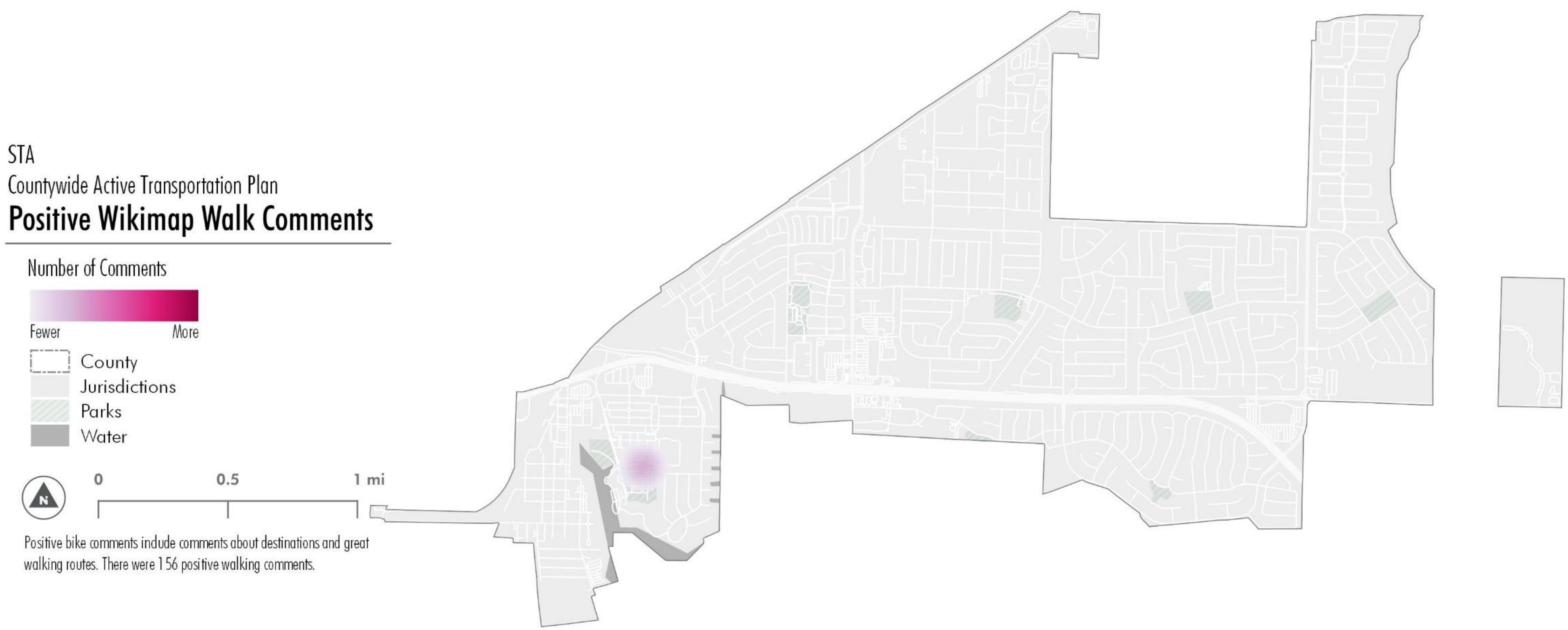


Figure 7-H. Suisun City Public Outreach – Negative WikiMap Walking Comments

Figure 7-I. Suisun City Public Outreach – Positive WikiMap Bicycle Comments

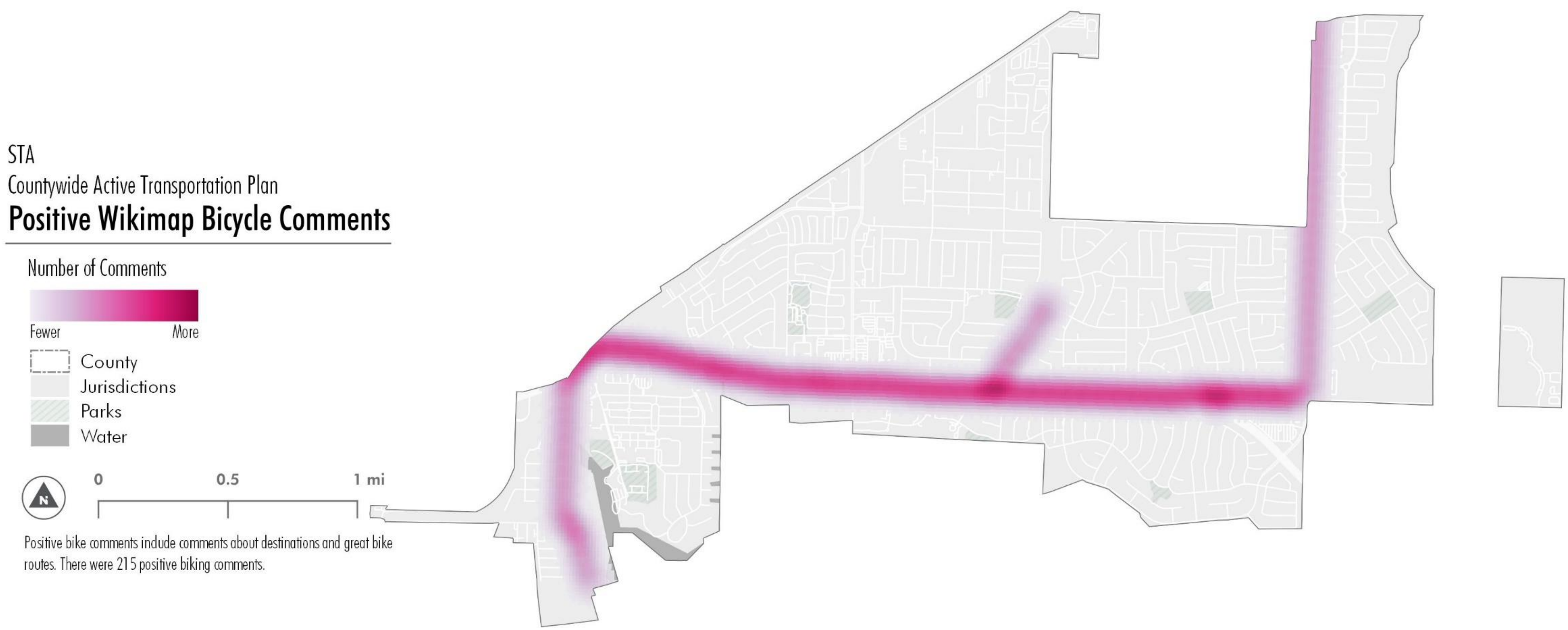
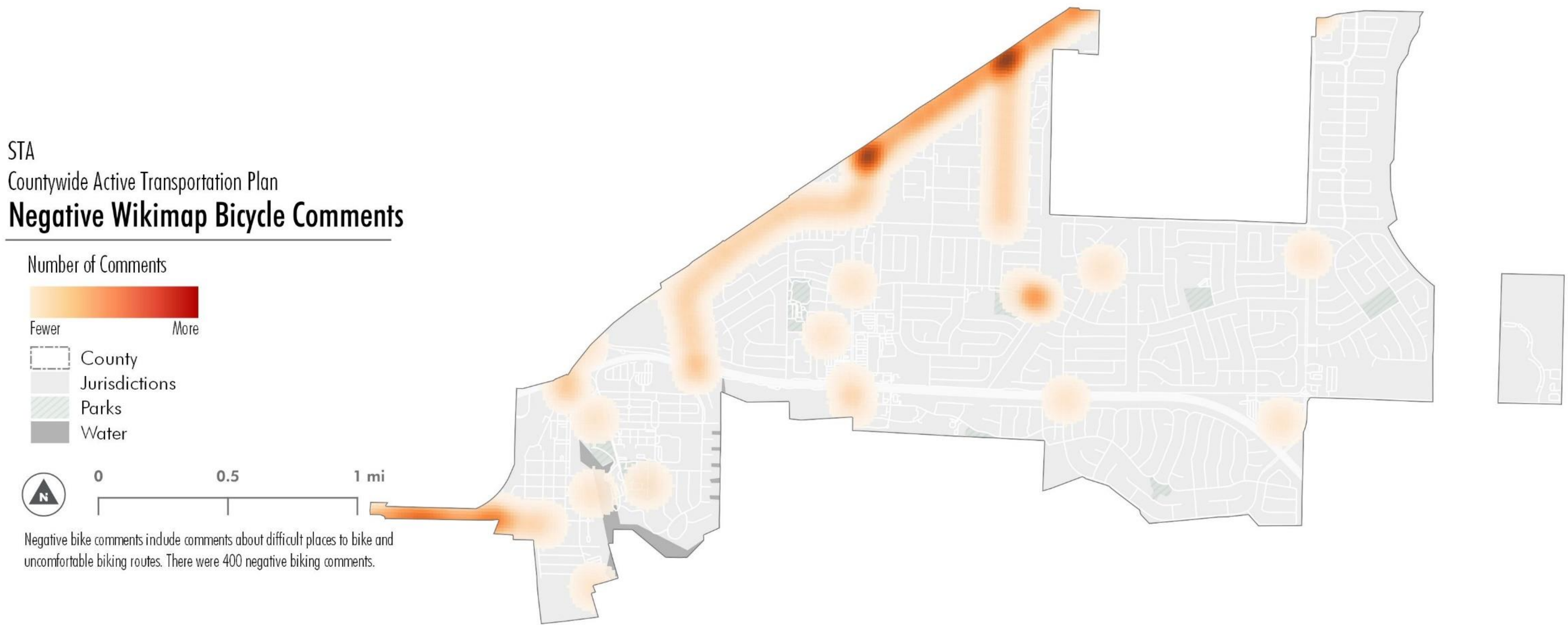


Figure 7-J. Suisun City Public Outreach – Negative WikiMap Bicycle Comments



CHAPTER 8
CITY OF VACAVILLE
ACTIVE TRANSPORTATION
EXISTING CONDITIONS

8. VACAVILLE ACTIVE TRANSPORTATION EXISTING CONDITIONS

VACAVILLE OVERVIEW

The City of Vacaville is located along the I-80 corridor in Solano County. I-80 runs through the center of the city, separating the north and south portions and providing connections to Sacramento to the north Fairfield to the south. Additionally, I-505 begins in Vacaville and connects north to I-5. While the majority of the city is residential, the northeast region is industrial focused. There are also two large retail centers located along I-80— the Vacaville Premium Outlets and Nut Tree—both of which have regional draws. Vacaville is the third largest city in Solano County, with a population of 100,032 people as of 2017.

SUPPORT FACILITIES AND PROGRAMS

Based on the Solano Countywide Bicycle Plan (2012) there are multiple locations for park and ride facilities to foster multi-modal travel. For instance, at Cliffside and I-80 there are currently 128 existing spots and 128 additional spots are planned to be installed. Also, at Davis Street and I-80 there are 250 existing spots with an additional 250 planned spots. Both locations will accommodate bicycle parking facilities. In addition, there are more multi-modal connection at the David Street at I-80 location which provides connections to both Vallejo Transit and Fairfield/Suisun Transit. All buses are equipped with bike racks and bikes can be brought onboard if space is available: also, Bay Link buses do not have bike racks.

VACAVILLE DEMOGRAPHICS OF ACTIVE TRANSPORTATION

Demographics and travel patterns for the City of Vacaville are depicted in **Figure 8-A**. Multiple factors influence people's ability to walk and bicycle within Vacaville, and key trends in these factors are summarized in **Table 8-1**. This section evaluates demographic characteristics of the population who currently walk or ride a bicycle in Vacaville using data from the United States Census American Community Survey (2016, 5-year estimates) and the California Household Travel Survey (2012). While this information is useful, this data should not be taken at face value given the small sample sizes associated with this data in smaller communities, such as Vacaville. It is presented here because it is the only source of standardized data across all geographies in Solano County and can help provide a clearer picture of walking and bicycling trips in Vacaville.

RACE & ETHNICITY

Approximately 66 percent of Vacaville's population is White, 20 percent is Hispanic, 7 percent is Asian, and 6 percent is Black. While White residents make up the largest share of the population, they also make up a relatively proportional share of people who walk (57%) or bike (59%) to work. Hispanic residents make up a disproportionately high number of people who bike to work (36%) as compared to their share of the population even though they make a proportional amount of walk trips (24%). Asian and Black residents make up low percentages of both walk and bicycle commuters, which is fairly proportional to their lower share of the population.

AGE

Residents age 25 to 44 years old (44%) and those age 45 to 64 years old (37%) make up the majority of Vacaville's total population. These groups also make up the largest share of people who bike to work (74% combined). While commuters age 16 to 24 years old only represent 14 percent of the population, they account for disproportionately high amounts of walking commuters (55%) and bike commuters (25%) as compared to their share of the population. The remainder of walking commuters are split between those age 25 to 44 and 45 to 64 years old.

GENDER

Vacaville residents have a fairly equal gender split of 52 percent men and 48 percent women. Men make up a disproportionately high amount of those who bike to work (84%), while women make up a disproportionately low amount (16%). Men and women make up fairly equal proportions of walk commuters, which is similar to their shares of the population.

INCOME STATUS

Within Vacaville, the largest income range for commuters is those that make less than $25,000 per year (31%) followed closely by those that earn between $25,000 and $50,000 per year (27%). Over 80 percent of people who bike to work earn less than $25,000 per year, and almost half of people who walk to work also earn less than $25,000 per year. This indicates that the lowest income ranges make up a disproportionately high number of both walk and bike commuters.

GENERAL TRAVEL CHARACTERISTICS FOR ALL MODES

Trip Purposes

Almost one-quarter of trips (25%) in Vacaville across all modes are for dining, with only about 20 percent of all trips being for work. Additionally, trips for errands (23%) and recreation (10%) combine to make up almost a third of all trips taken in Vacaville.

Trip Distances

A majority of all trips taken in Vacaville by any mode of transportation are less than three miles in length (62%), which is considered a reasonable biking distance. Almost a quarter of all trips (24%) are actually even less than one mile, which is considered a reasonable walking distance for normal trips. This indicates that almost two-thirds of all trips made within Vacaville could be converted to walking or biking trips. Trips distances from three to five miles (10% in Vacaville) and over five miles (28%) are often deemed too far for the “interested but concerned” user to consider walking or bicycling for their trip.

Mode Share

While a majority of trips in Vacaville are short distance and non-work-related, the preferred mode of choice for all trip types is by far the car (93%). Telecommuting represents a distant 3 percent of trips, while transit (1%), walking (1%), and biking (<1%) make up a minimal share of all preferred modes of travel. The total number of people who reported walking or bicycling to work in Vacaville in the United States Census’ American Community Survey is 650.

Table 8-1 presents information about which population groups are walking and bicycling more (or less) than others in Vacaville better understand which population groups may be more dependent on active transportation facilities and which population groups may lack access to these types of facilities. This can help Vacaville plan for the equitable distribution of active transportation facilities and ensure that outreach efforts are targeting new audiences and considerate of the needs of specific populations. This information can also help Vacaville determine which population groups should be engaged to better understand barriers to walking and bicycling.

Table 8-1 Vacaville Active Transportation Demographics Findings

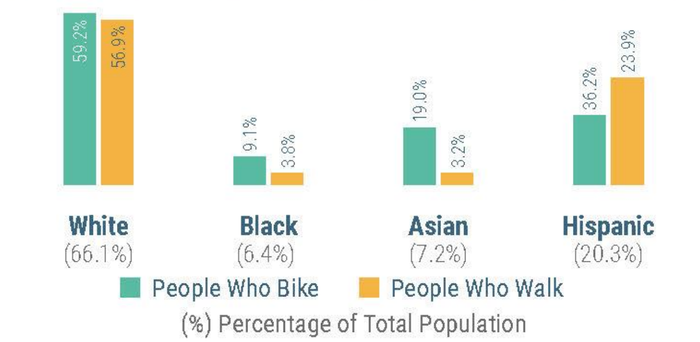
Who is Walking More • White and Hispanic residents • High school and college students and young adults • Men • High and low-income earners	**Who is Biking More** • White and Hispanic residents • High school and college students, young adults, and middle-aged workers • Men • Low income earners
Who is Walking Less • Black and Asian residents • Middle-aged workers and working seniors • Women • Medium-low and medium-high income earners	**Who is Bicycling Less** • Black and Asian residents • Working seniors • Women • Medium-low, medium-high, and high-income earners

Vacaville Active Transportation Profile

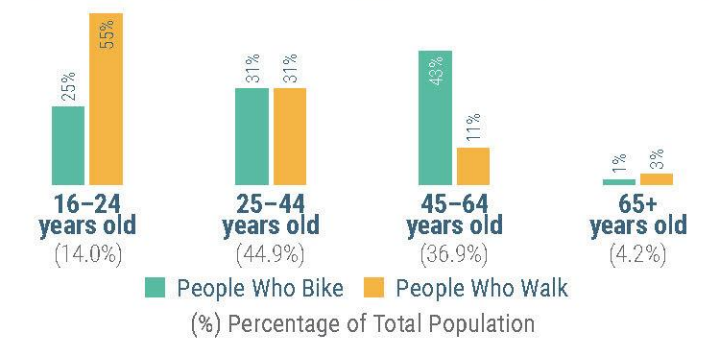
Characteristics of residents who walk or bike to work:

Source: US Census, ACS 5-Year Estimates 2016.

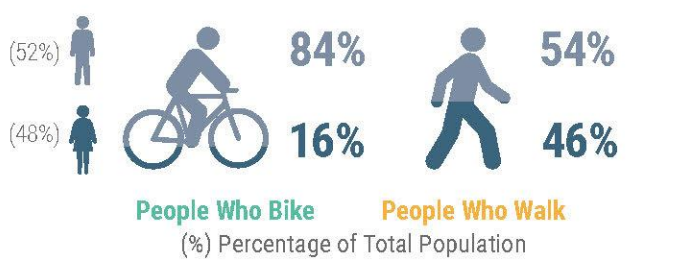
Race



Age



Gender



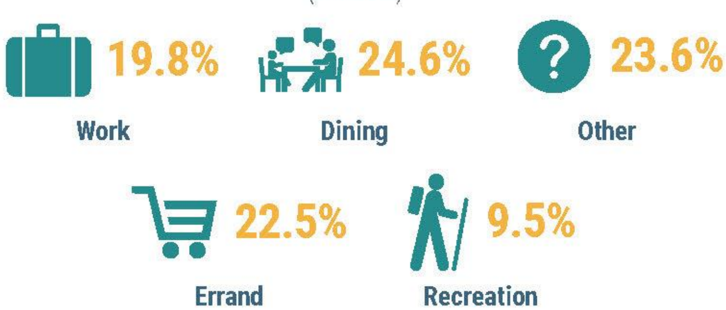
Income

General travel characteristics (all modes):

Source: California Household Travel Survey, 2012.

Trip Purposes

(all modes)



Trip Distances

(all modes)

Mode Share

(all trips)

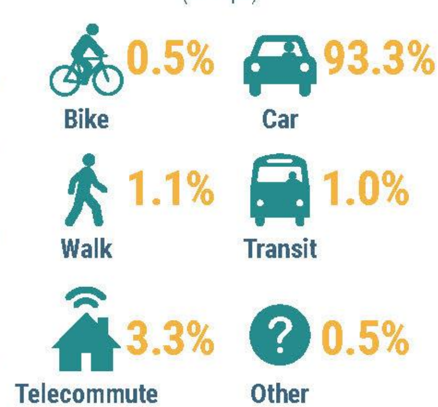


Figure 8-A. Vacaville Active Transportation Demographics Infographic

VACAVILLE ACTIVE TRANSPORTATION GOALS AND POLICIES

Various documents guide how active transportation projects and programs are implemented throughout the County. While Vacaville does not have an adopted bicycle, pedestrian, or active transportation plan, the City uses guiding and supportive policies in its adopted General Plans as summarized below. The City may have other planning documents such as specific plans or community plans that were not evaluated individually as part of this effort.

VACAVILLE GENERAL PLAN TRANSPORTATION ELEMENT (2015)

The Vacaville General Plan's Transportation Element defines the long-term vision for citywide mobility by setting goals and policies that respond to existing conditions and future changes. The goal of the Transportation Element is to provide efficient and reliable ways to move people and goods by multiple transportation modes and routes with the overall vision of Vacaville as a safe, attractive community with walkable neighborhoods, vibrant retail districts, and economically strong employment areas. Goals and policies related to active transportation include the following.

Complete Streets:

- Goal TR-7: Provide a balanced, multimodal transportation network that meets the needs of all users.
- Policy TR-P7.1: Continue to implement a local Complete Streets Policy.
- Policy TR-P7.7: Require that new roadway networks be designed as a grid pattern to reduce circuitous travel patterns and improve access and circulation for all modes.
- Policy TR-P7.8: Prioritize transportation improvements that support and enhance travel by transit, bicycle, and pedestrian modes to and from designated Priority Development Areas (PDA).

Bicycling:

- Policy TR-P7.2: Require that new and existing on-street bicycle lanes be striped, signed, and maintained to encourage their use.
- Policy TR-P7.5: Where existing street widths or traffic volumes do not support creation or maintenance of striped bicycle lanes or shoulders, but where cyclists can be safely accommodated and other conditions permit, consider use of mechanisms such as "sharrows" (i.e. markings painted on roadways indicating that auto traffic is expected to share the lane with cyclists), pavement markings, or "share the road" signage to indicate to both drivers and bicyclists that bicycle use is permitted and should be expected.
- Policy TR-P7.6: Require that new development applications design roadway networks to accommodate on-street bicycle lanes, and only allow bicycle routes with sharrows when on-street bicycle lanes are impractical or infeasible.
- Goal TR-8: Increase bicycling by improving the network of bikeway and support facilities.
- Policy TR-P8.1: Construct the comprehensive network of on- and off-roadway bike routes to encourage the use of bikes for commute, recreational, and other trips as part of new development and as funding allows in existing developed areas.
- Policy TR-P8.2: Continue to designate bike lanes and cross-city bike paths to facilitate non-motorized trips.
- Policy TR-P8.3: Give priority to the development of bike routes that provide access to schools, historic sites, governmental services, major commercial centers, parks, and regional open space.
- Policy TR-P8.4: Require that new development applications include bike paths or bike lanes, when appropriate.
- Policy TR-P8.5: Enhance and improve bicycle connections between neighborhoods and between neighborhoods and significant destinations, such as parks, schools, transit stops and transit centers, shopping centers, and employment centers.

- Policy TR-P8.6: Use available rights-of-way and creek banks for public use as trails, bikeways, or walkways.
- Policy TR-P8.7: Encourage major employers to provide support facilities to encourage use of bikes for commute purposes.
- Policy TR-P8.8: Incorporate bike storage and other support facilities into transportation system management plans at employment sites and public facilities.
- Policy TR-P8.9: Require that new multi-family and non-residential developments provide adequate public and private bicycle parking and storage facilities.
- Policy TR-P8.10: Develop signage for bikeway connections between transit stops and significant destinations. Provide this signage as funding allows.

Pedestrian:

- Goal TR-9: Ensure safe, pleasant, and convenient pedestrian paths, sidewalks, and trails to accommodate all segments of the population.
- Policy TR-P9.1: Develop a series of continuous pedestrian walkways within the Downtown and residential neighborhoods.
- Policy TR-P9.2: Design separated pedestrian paths and trails to be convenient, visible, and safe.
- Policy TR-P9.3: Continue to support programs to improve the mobility of the elderly and disabled, remove existing architectural barriers, and require that new development be accessible to those with physical impairments.

VACAVILLE EXISTING ACTIVE TRANSPORTATION NETWORK

The active transportation network consists of both pedestrian and bicycle infrastructure that work together to provide mobility options for all those that live, work, study, play, visit, pray, or shop in Vacaville. Whether we're aware of it or not, everyone in Vacaville uses active transportation infrastructure, such as sidewalks, at some point in their day even if just for short distances to reach their desired destinations.

EXISTING PEDESTRIAN NETWORK

The pedestrian network within Vacaville consists largely of sidewalk infrastructure supported by crossing treatments, multi-use paved trails, and unpaved recreational trails. Vacaville currently has an overall Walk Score of 36 out of 100 according to the real-estate website www.WalkScore.com, indicating that most errands require a car. As part of the Solano ATP, sidewalk presence was used as the metric for pedestrian accessibility and was inventoried within incorporated jurisdictions and adjacent pockets of unincorporated communities.

Sidewalk Inventory

An inventory of existing sidewalks was conducted to identify sidewalk gaps within Vacaville, with results summarized in **Figure 8-B**. The city currently has a total of 416 miles of existing sidewalk infrastructure, which includes measurements of sidewalks on both sides of the street independently. With approximately 832 miles of maximum sidewalk coverage (total roadway mileage multiplied by two to account for both sides of the street). Depending on land use context, there may be areas of the city with rural characteristics where typical sidewalk infrastructure may not be compatible. However, it was not possible to exclude these areas from the overall sidewalk inventory evaluation.

Sidewalk coverage in Vacaville was also evaluated in the equity focus areas evaluated in the equity focus areas (see the Countywide chapter for full descriptions) as designated by the Metropolitan Transportation Commission for Priority Development Areas and Communities of Concern, or CalEnviroScreen Disadvantaged Communities. In Priority Development Areas, there is approximately 10 miles of sidewalk coverage. For Communities of Concern, there is approximately 18 miles of sidewalk coverage. Vacaville does not have any areas that meet the criteria for Disadvantaged Communities. Overall, the need for sidewalk infrastructure is greatest in the Communities of Concern equity focus area, which needs about 19 miles of sidewalk gaps filled.

EXISTING BICYCLE NETWORK

This section discusses the bicycle facilities in Vacaville's existing bike network. It also includes an analysis of bicyclist comfort and connectivity – that is, level of traffic stress (LTS) and bicycle network connectivity analysis (BNA), respectively –for the existing network. Additional information on the LTS and BNA methodologies can be found in the Countywide chapter's existing conditions section.

Existing Facilities

Vacaville has a 416-mile roadway network, 89 lane miles of which currently have designated bicycle facilities. This includes 26 lane miles of shared-use paths, 35 lane miles of bike lanes, and 28 lane miles of bike routes, as summarized in **Figure 8-B**. Most roadways in the city (79%) do not have any designated bicycle facilities. Vacaville's bicycle network consists of several shared-use paths in parks (e.g., Centennial Park, Lagoon Valley Regional Park), linear trails (e.g., the Alamo Creek Bike Trail, the Ulatis Creek Trail, the Southside Bikeway), bike lanes running throughout the city (e.g., Nut Tree Road, Ulatis Drive, Peabody Road, Alamo Drive), and bike routes (e.g., Vaca Valley Parkway, North Orchard Avenue, Monte Vista Avenue, Elmira Road). The existing network provides connections to neighborhoods, schools (e.g., Vacaville High, Will C. Wood High School, Edwin Markham Elementary), downtown businesses, and neighborhood retail centers throughout the city, as shown on **Figure 8-D**. However, the network has major gaps between facilities and does not serve destinations throughout the city equally.

Bicyclist Comfort and Connectivity

Figure 8-B also presents the percentage of lane miles of facilities in Vacaville by LTS score. LTS 1 is the most common classification, making up 68 percent of lane miles because a majority of roadways are on low-speed and low-volume streets as depicted on **Figure 8-E**. These streets are typically local neighborhood streets (e.g., Cinnabar Way, Yellowstone Drive) or quiet streets running through downtown (e.g., Parker Street, Elizabeth Street). Roads with these characteristics do not necessarily require bicycle facilities to be considered low-stress. Facilities provided on roadways with slightly higher volumes and speeds also contribute to total LTS 1 lane miles (e.g., the bike lanes on Peabody Road).

Higher stress LTS 3 and 4 facilities are the second and third most common comfort classifications for roadways in Vacaville, accounting for 14 percent and 11 percent of lane miles, respectively. These include high-speed and/or high-volume major roadways such as Elmira Road, Alamo Drive, Browns Valley Road, and Leisure Town Road. Many of these roadways are designated bike routes or have bike lanes but do not provide facilities for people of all ages and abilities given existing roadway traffic characteristics and geometries. While these high-stress roadways are less common, they are some of the most direct north-south and east-west routes in the city and function as barriers to a connected, low-stress citywide bike network. Lastly, LTS 2 facilities account for a much smaller six percent of lane miles in the city.

Vacaville's BNA analysis indicates that a majority of the city has low or medium connectivity, as shown on **Figure 8-F**. The city's northern and western neighborhoods have the highest connectivity, with multiple bike facilities connecting them to adjacent areas. The remainder of the city has low-to-medium connectivity. While there are many LTS 1 streets in the city, they are typically isolated low-stress "islands" that require crossing a higher LTS street (e.g., Elmira Road, Nut Tree Road) or barrier (e.g., I-80) to connect to destinations in adjacent census blocks.

Figure 8-B. Vacaville Active Transportation Network Infographic

	Existing Sidewalk Lane Miles	Full Sidewalk Buildout Lane Miles
Citywide	416	832
Priority Development Areas	10	20
Communities of Concern	18	37
Disadvantaged Communities	-	0

BICYCLE NETWORK INVENTORY

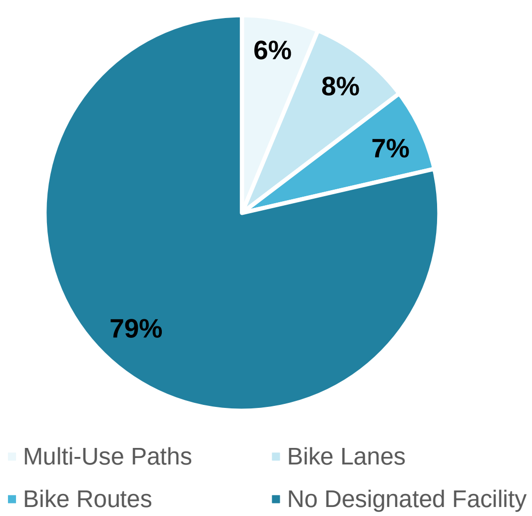
Bike Facilities	**Lane Miles**
Multi-Use Paths (Class I)	26
Bike Lanes (Class II)	35
Bike Routes (Class III)	28
No Designated Facility	327
All Roadways	416

Citywide Bicycle Connectivity (BNA) Score

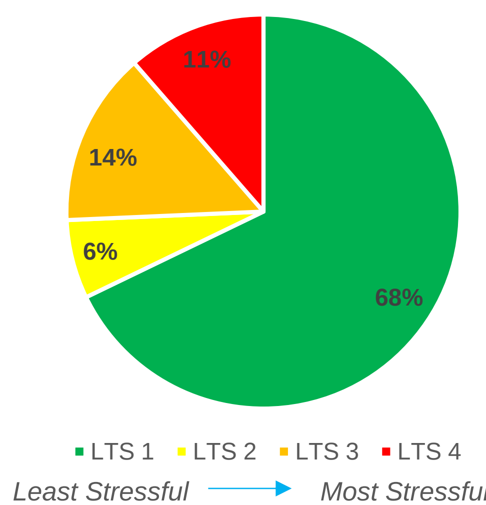
26

Low Connectivity **0 → 100** **High Connectivity**

BICYCLE INVENTORY PERCENT OF ROADWAY MILEAGE



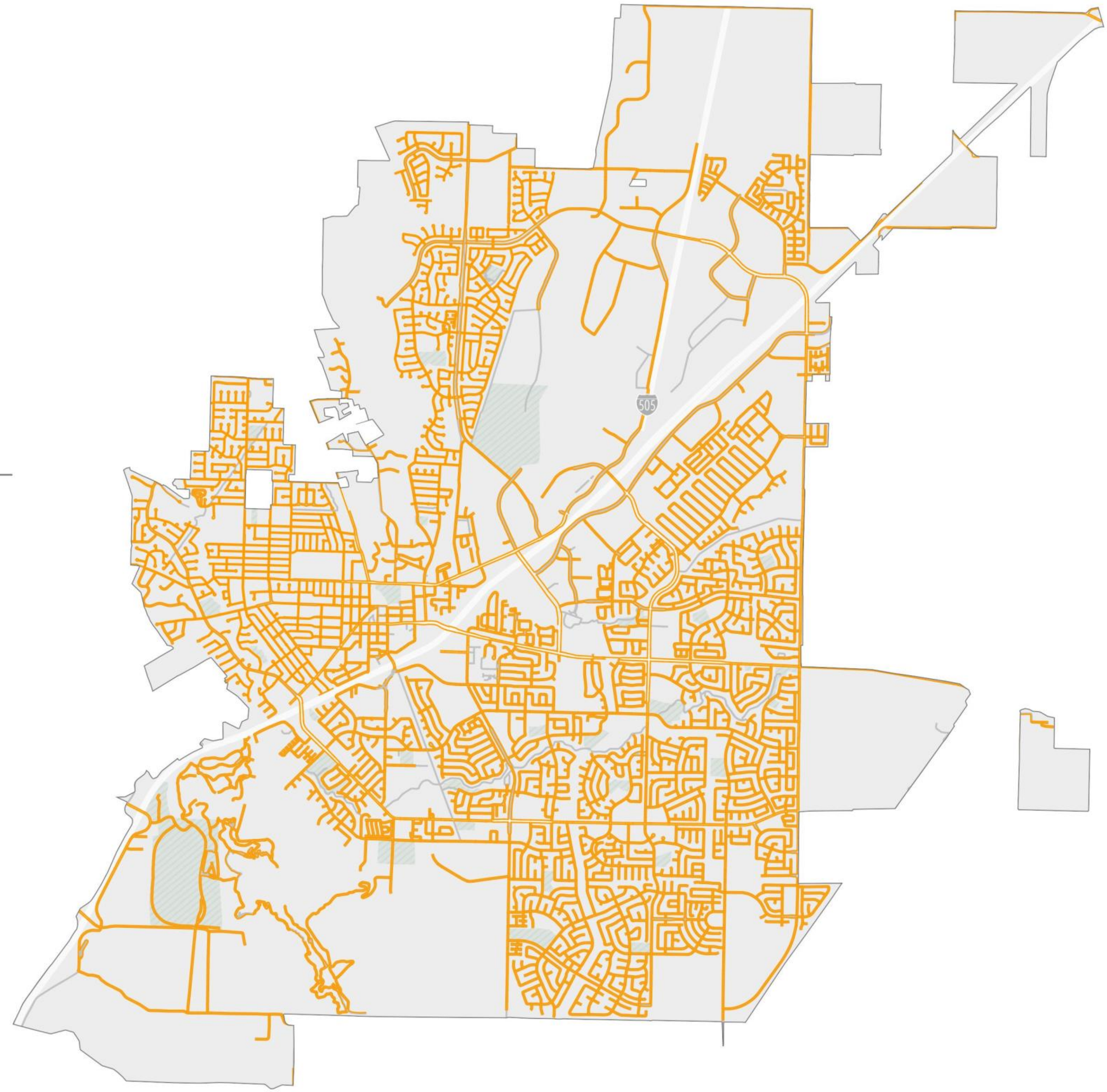
BICYCLIST COMFORT LEVEL OF TRAFFIC STRESS (LTS)



STA

Countywide Active Transportation Plan

Sidewalk Coverage



*Sidewalks determined manually using aerial imagery

Figure 8-D. Vacaville Existing Bicycle Facilities

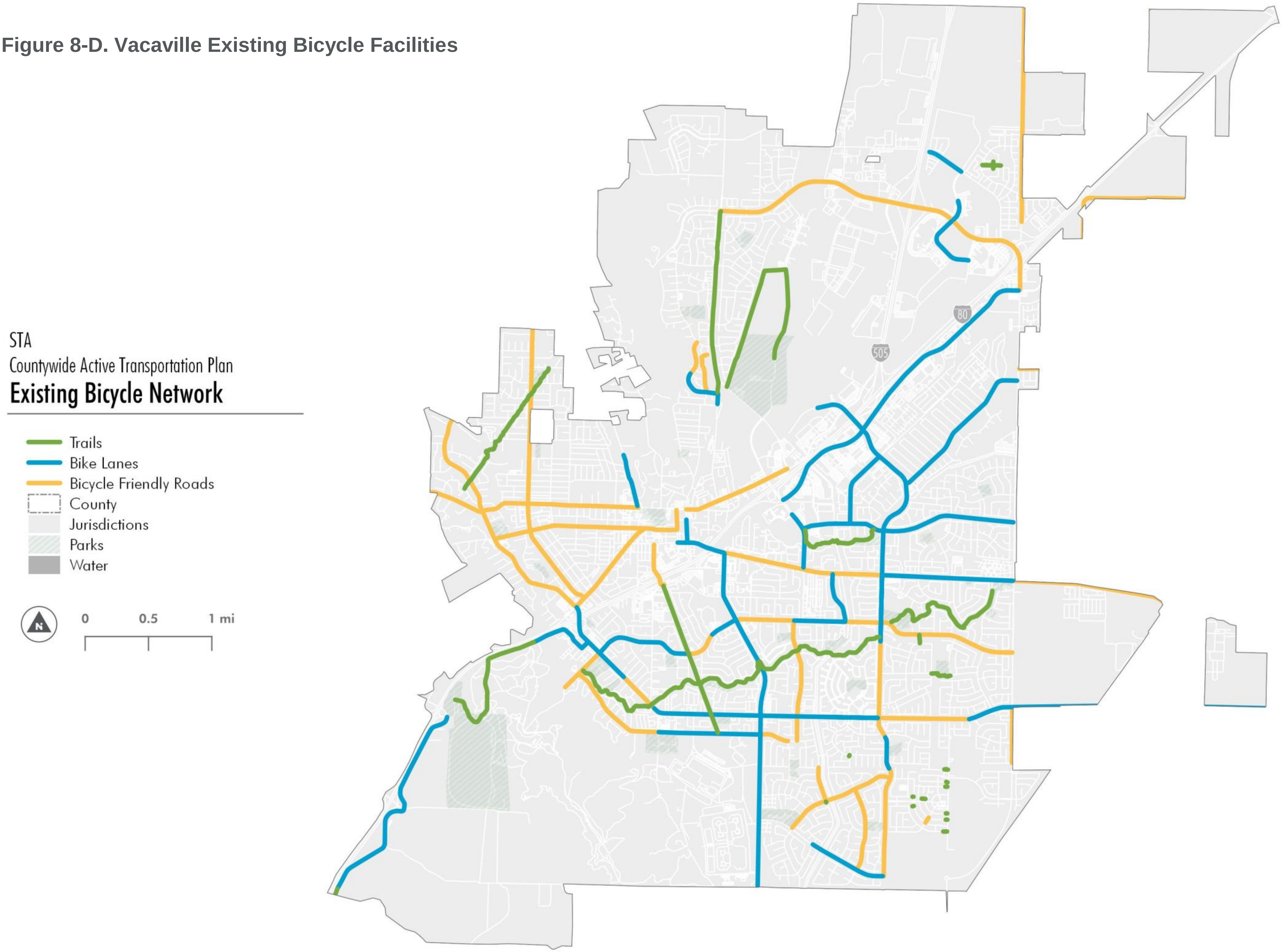


Figure 8-E. Vacaville Bicycle Level of Traffic Stress

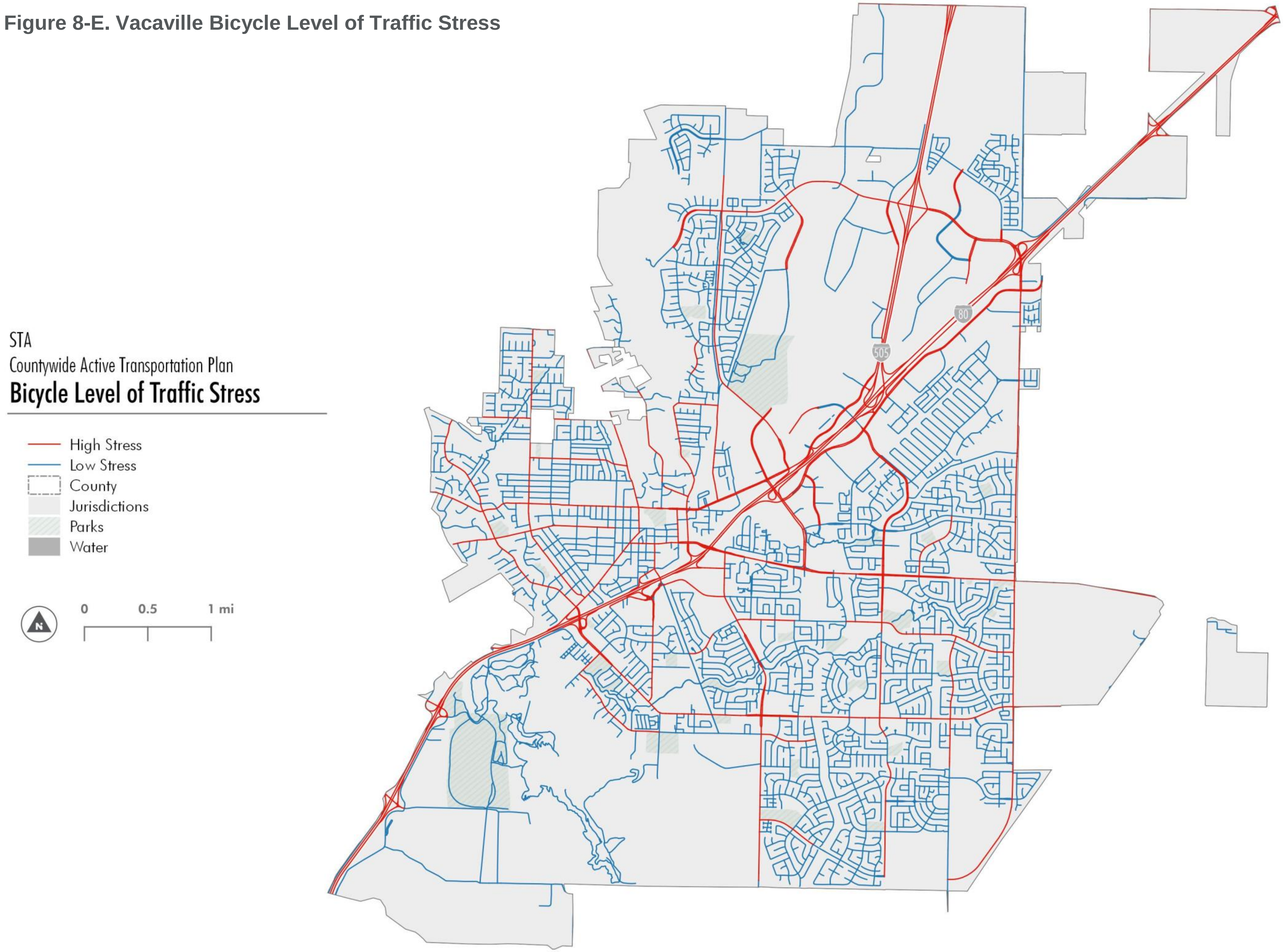
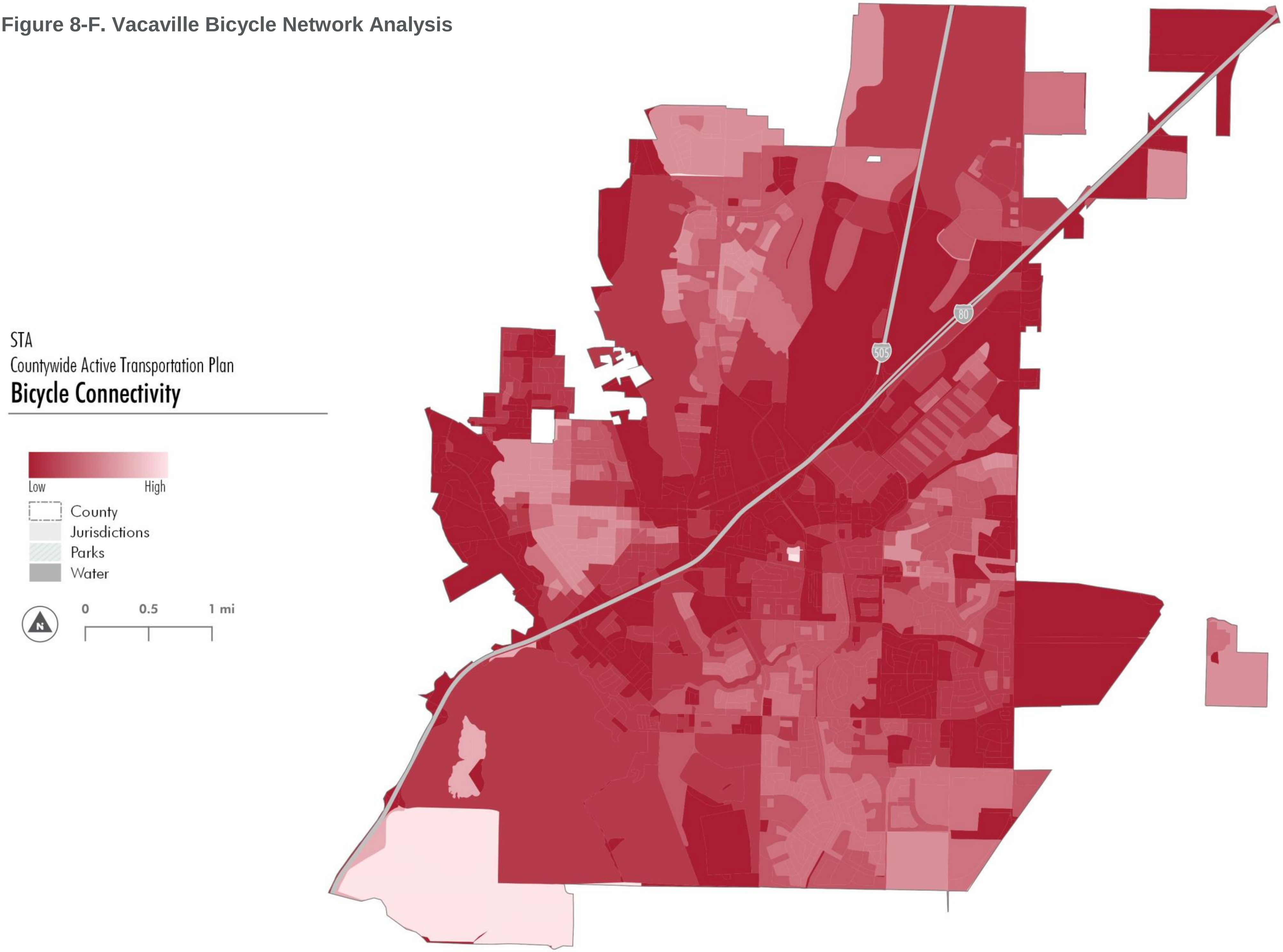


Figure 8-F. Vacaville Bicycle Network Analysis



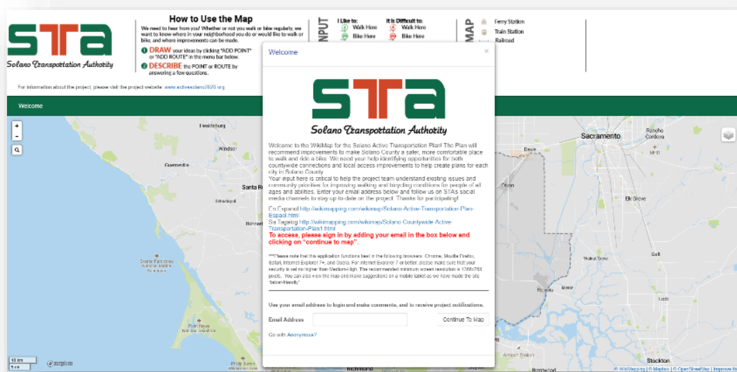
VACAVILLE PUBLIC OUTREACH PHASE I SUMMARY

As part of the first phase of public outreach for the Solano ATP both online and in-person events were held to try to reach people across all parts of the county. The online and in-person feedback was combined to highlight where all participants had positive or negative input about existing infrastructure throughout the County. Positive comments generally encapsulate where people currently like to walk or bicycle and identify experiences to be highlighted. Negative comments mostly highlight areas where people feel it is dangerous or uncomfortable to walk or bike. Areas that received more comments show as darker than areas with only one or two comments as can be on the heatmaps on **Figure 8-G** to **Figure 8-J**. In total, 1,080 individual line and point comments were collected across Solano County, with 483 comments from in-person events and 597 comments from the project website.

ONLINE PARTICIPATION

An online interactive WikiMap was available on the project website, www.activesolano2020.org, which was hosted by STA. The WikiMap allowed participants to draw lines or drop pins where they like walking or biking and where they want to see improvements to walking or biking. This process helped identify the positive attributes that should be celebrated and the negative attributes that may need new projects to help encourage more people to walk and bicycle in Solano. Additionally, Spanish and Tagalog versions of the WikiMap were accessible on the project website to garner input from all Solano residents.

STA's online interactive WikiMap



IN-PERSON POP-UP EVENT – MERRIMENT ON MAIN

The Solano ATP Team attended this festive family event on Thursday, November 27nd, 2018. Merriment on Main is an annual Vacaville tradition that has been occurring since 1983. This event took place in Downtown Vacaville and started at 4:30, with a tree lighting occurring between 6:20 PM and 6:40 PM. It rained on and off throughout the course of the event, and as a result many of the scheduled vendors did not attend. Despite the rain, however, a significant number of people attended the event. Though restrictions from the event organizers precluded actively calling people to provide feedback, there was a steady stream of people willing to provide input.

SUMMARY OF PUBLIC INPUT FOR WALKING AND BIKING

Vacaville received a few positive comments, most of which were focused in the southeast on Leisure Town Road between Vanden Road and Sparrowhawk Drive. Outside city limits, positive comments were directed toward bicycling along Hawkins Road and Elmira Road on the eastside of Vacaville. Positive comments toward walking were found at Lagoon Valley Regional Park and Centennial Park.

Unfavorable comments for bicycling were directed toward Gibson Canyon Road (outside the city limits), Mason Street, Foothill Drive, and East Monte Vista Avenue. There were no negative comments for walking in Vacaville.

Pedestrian-focused Input

Good Places to Walk

- Rivera Road and Glen Road area in Lagoon Valley Park
- Langoon Valley Road near the south side of the Lagoon
- Intersection of Alamo Drive and Whitehall Way
- Alamo Creek Park
- Andrews Park
- Centennial Park
- Magnolia Park

Poor Places to Walk

- No comments

Bicycle-focused Input

Good Places to Bicycle

- On Leisure Town Road between Vanden Road and Sparrowhawk Drive
- On Hawkins Road from Leisure Town Road and outside city limits
- On Elmira Road between Leisure Town Road and South A Street (Elmira – small town)
- On Pleasants Valley Road between Cherry Glen Road and outside city limits

Poor Places to Bicycle

- On Mason Street between Merchant Street and Elizabeth Street

Photos from the Phase I Pop-up Event

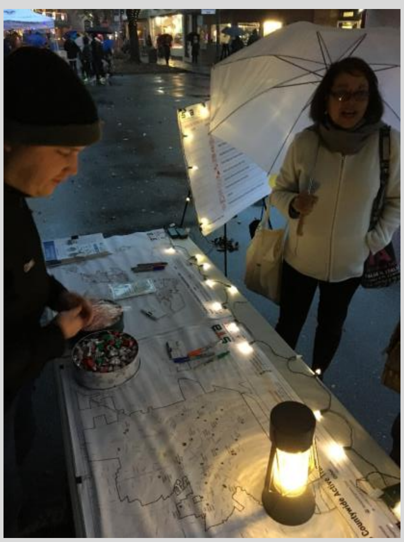


Figure 8-G. Vacaville Public Outreach – Positive WikiMap Walking Comments

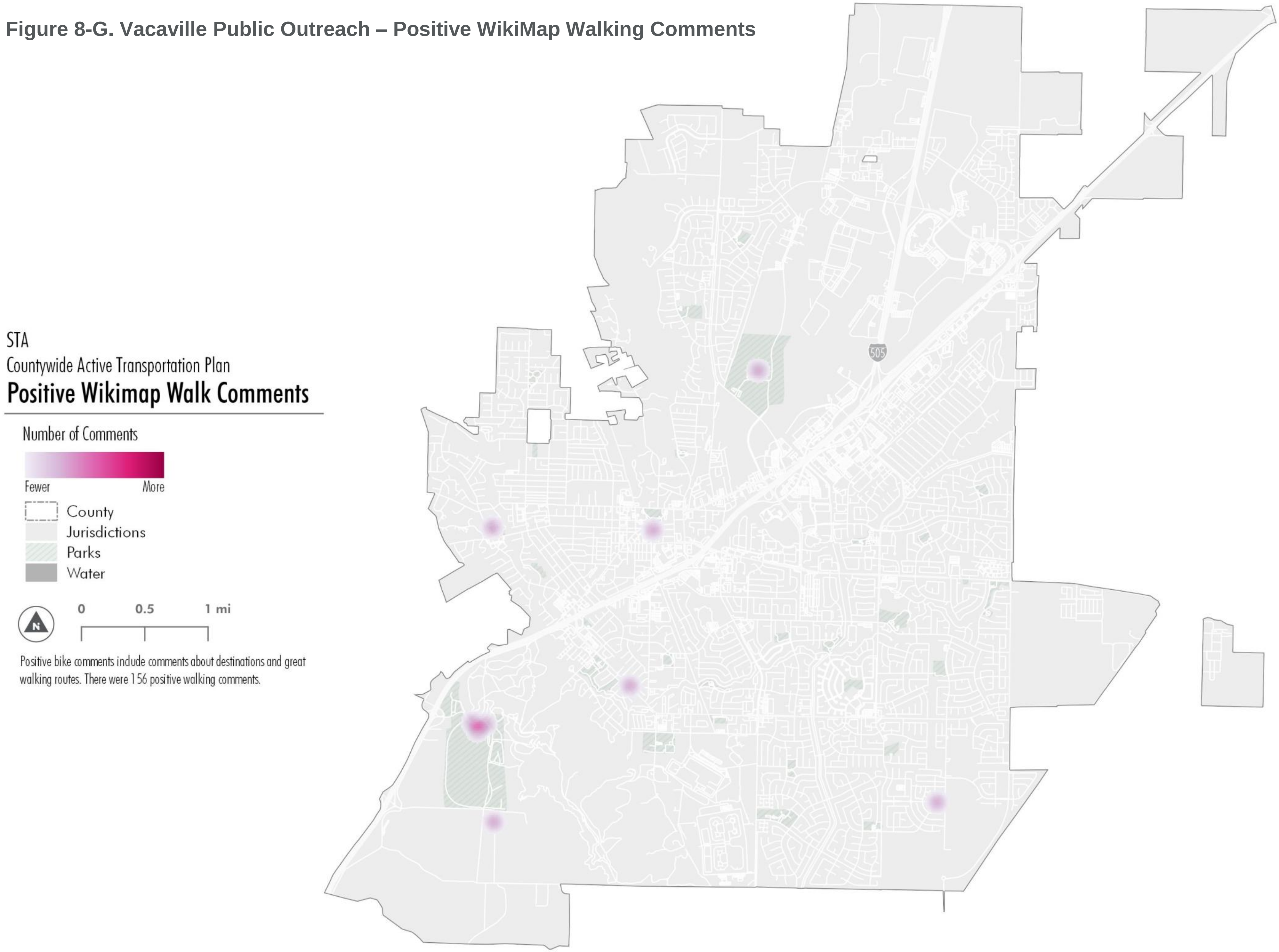


Figure 8-H. Vacaville Public Outreach – Negative WikiMap Walking Comments

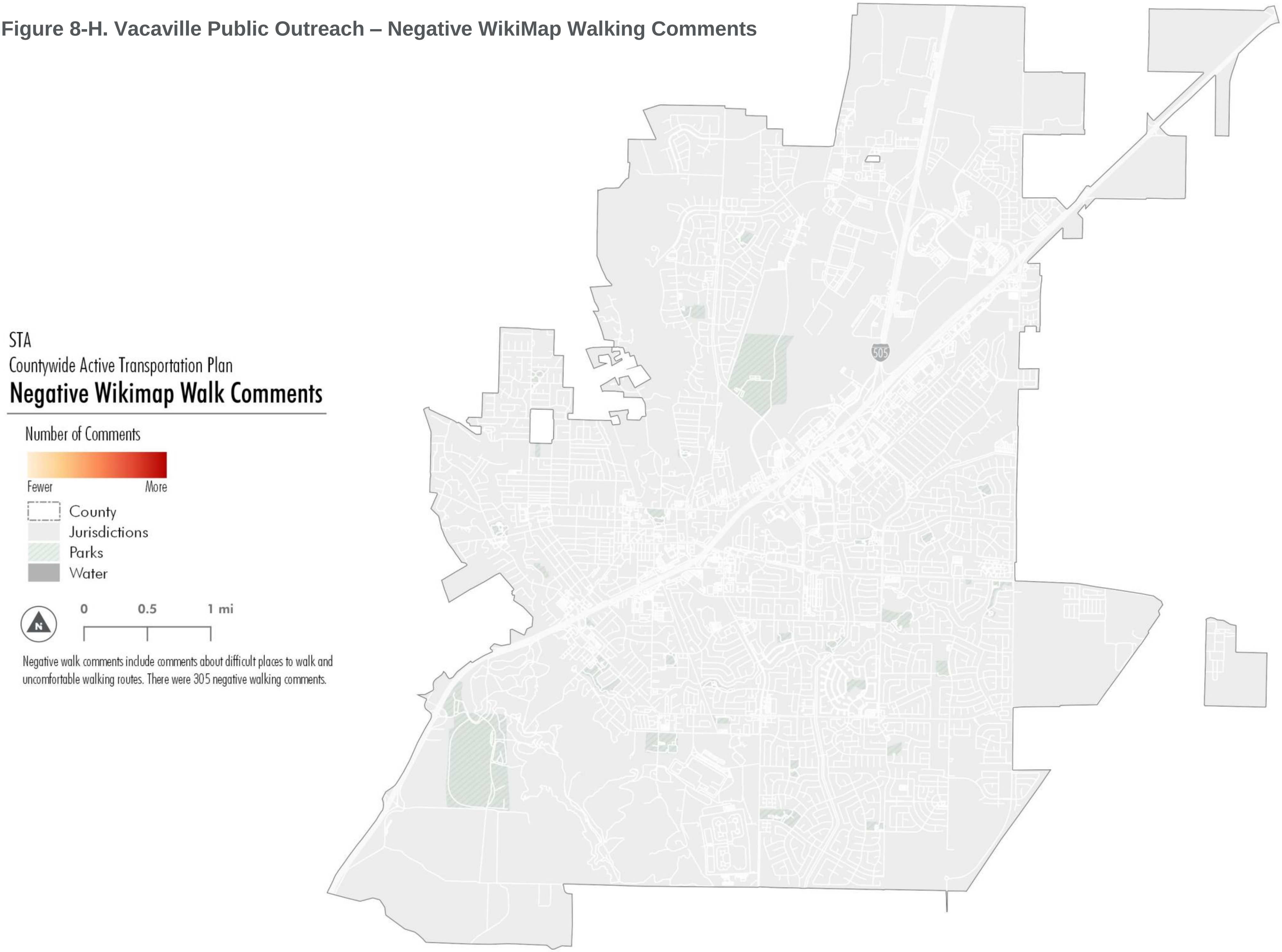


Figure 8-I. Vacaville Public Outreach – Positive WikiMap Bicycle Comments

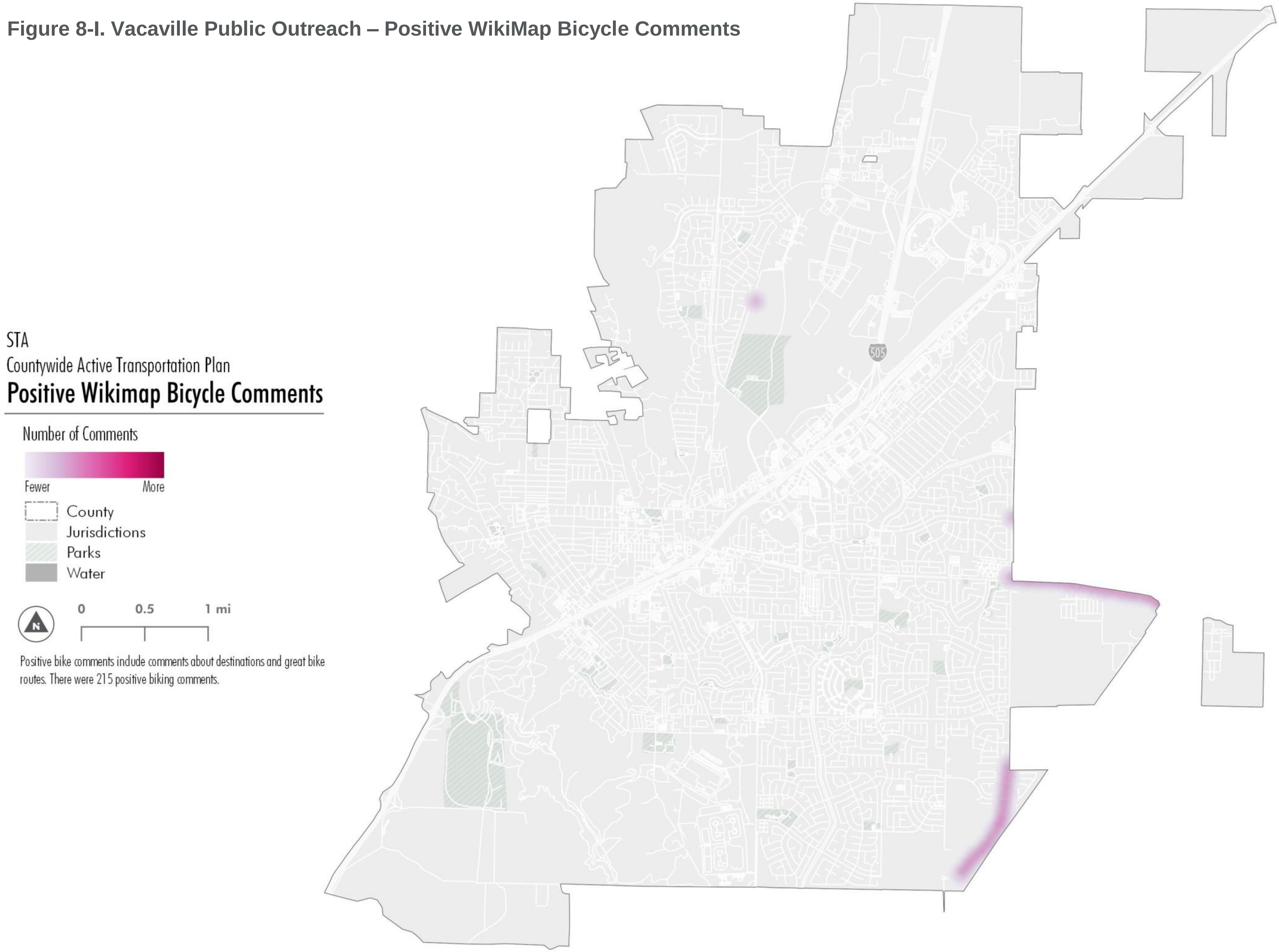
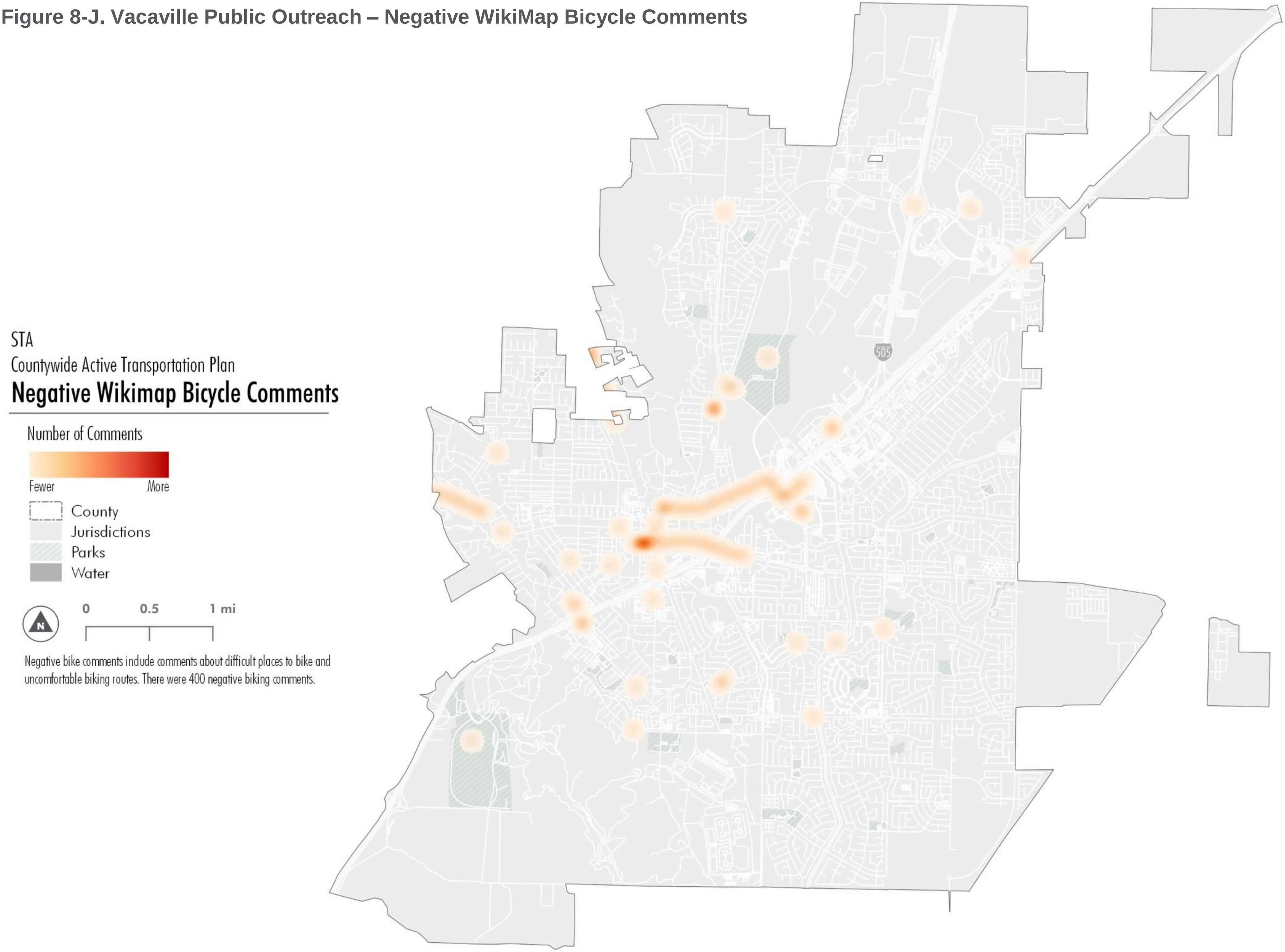


Figure 8-J. Vacaville Public Outreach – Negative WikiMap Bicycle Comments



CHAPTER 9
CITY OF VALLEJO
ACTIVE TRANSPORTATION
EXISTING CONDITIONS

9. VALLEJO ACTIVE TRANSPORTATION EXISTING CONDITIONS

VALLEJO OVERVIEW

The City of Vallejo is along the southern coast of Solano County. Vallejo is located at the junction of many of the major roadways in Solano County with the I-80 corridor providing connections south to the East Bay and north to Fairfield, CA-37 and CA-29 providing connections west to Napa, and I-780 connecting east to I-680 and Benicia. Interstates I-80 and I-780 along with CA-37 divide the city into several portions. Vallejo has a variety of environments with waterfront portions, historic maritime industry, and Mare Island. There is a dense grid of residential land use on the central and north portion of the City. Further to the south, the residential land use is lower density with cul-de-sacs. Commercial land use is located along Lincoln Highway/Broadway Street and east of the I-80/CA-37 interchange at the Gateway Plaza. Six Flags Discovery Kingdom is located south of CA-37. Across the Napa River lies Mare island where the majority of industrial land use is located along with the Mare Island Golf Club and Shoreline Heritage Preserve. Additional industrial use is located on the mainland coast of the Napa River and at the interchange of I-80 and I-780 to the southwest. Vallejo is the largest city in Solano County, with a population of 122,105 people as of 2017.

SUPPORT FACILITIES AND PROGRAMS

Based on the Solano Countywide Bicycle Plan (2012) there are multiple locations for park and ride facilities to foster multi-modal travel. For instance, there are currently three location that provide bike parking at Davis Street at I-80 and Lemon Street at Curtola near I-80 (southwest and northwest locations). Only the Lemon Street location offers transit connections to Benicia (NW only) and Vallejo Transit (NW and SW). Plans are in the works to build another park and ride area at Intermodal Center at Mare Island Way and Georgia Street with up to 650 existing spots and 1,400 planned spots. The location will include bike parking and transit connections to Vallejo and Benicia Transit. Vallejo Transit is equipped will bike racks and bikes are allowed to be stored inside if there is space available.

VALLEJO DEMOGRAPHICS OF ACTIVE TRANSPORTATION

Demographics and travel patterns for the City of Vallejo are depicted in **Figure 9-A**. Multiple factors influence people's ability to walk and bicycle within Vallejo, and key trends in these factors are summarized in **Table 9-1**. This section evaluates demographic characteristics of the population who currently walk or ride a bicycle in Vallejo using data from the United States Census American Community Survey (2016, 5-year estimates) and the California Household Travel Survey (2012). While this information is useful, this data should not be taken at face value given the small sample sizes associated with this data in smaller communities, such as Vallejo. It is presented here because it is the only source of standardized data across all geographies in Solano County and can help provide a clearer picture of walking and bicycling trips in Vallejo.

RACE & ETHNICITY

Vallejo is one of the more diverse cities in Solano County, with a population that is 36 percent White, 24 percent Asian, 23 percent Hispanic, and 15 percent Black. White residents make up a disproportionately high amount of people who bike (47%) and walk (42%) to work relative to their share of the population. While Asian residents make up the second largest population group, they make up a disproportionately low amount of people who walk to work (14%). Hispanic residents have near equal proportions of both people who walk to work (23%) and bike to work (22%) as compared with their share of the population.

AGE

Residents age 25 to 44 years old (42%) and those age 45 to 64 years old (40%) make up near equal shares of Vallejo's population. Those two groups also make up the highest numbers of people who bike and walk to work, but both make up disproportionately low shares of people who walk as compared to their population. While commuters age 16 to 24 account for only 13 percent of the population, they make up a disproportionately high number of people who walk to work (24%) compared to their share of the population.

GENDER

Vallejo residents have a near equal gender split of 51 percent men and 49 percent women. Men make up a disproportionately higher number of bicycle commuters (65%) than women (35%). The proportion of women (56%) who walk to work as compared to men (44%) is closer to equal.

INCOME STATUS

Within Vallejo, the largest income range for commuters is those that earn less than $25,000 per year (36%) followed closely by those who make between $25,000 and $50,000 a year (29%). Over half of all bike commuters are people in the lowest income range (57%), and this group also makes up the largest majority of walk commuters (44%). The second lowest income range represents a disproportionately high number of people who walk (37%) and bike (28%) to work. The highest income range, those who earn over $75,000, has disproportionately low amounts of people who walk (5%) and bike (12%) to work relative to their share of the population.

GENERAL TRAVEL CHARACTERISTICS FOR ALL MODES

Trip Purposes

Almost one-quarter of trips (24%) in Vallejo across all modes are for dining, with only about 16 percent of all trips being for work. Additionally, trips for errands (20%) and recreation (15%) combine to make up over a third of all trips taken in Vallejo.

Trip Distances

A majority of all trips taken in Vallejo by any mode of transportation are less than three miles in length (58%), which is considered a reasonable biking distance. Almost a quarter of all trips (23%) are actually even less than one mile, which is considered a reasonable walking distance for normal trips. This indicates that almost two-thirds of all trips made within Vallejo could be converted to walking or biking trips. Trips distances from three to five miles (12% in Vallejo) and over five miles (30%) are often deemed too far for the “interested but concerned” user to consider walking or bicycling for their trip.

Mode Share

While a majority of trips in Vallejo are short distance and non-work-related, the preferred mode of choice for all trip types is by far the car (89%). Telecommuting and transit each represent 4 percent of trips, while walking (2%) and biking (<1%) make up a minimal share of all preferred modes of travel. The total number of people who reported walking or bicycling to work in Vallejo in the United States Census’ American Community Survey is 1,003.

Table 9-1 presents information about which population groups are walking and bicycling more (or less) than others in Vallejo better understand which population groups may be more dependent on active transportation facilities and which population groups may lack access to these types of facilities. This can help Vallejo plan for the equitable distribution of active transportation facilities and ensure that outreach efforts are targeting new audiences and considerate of the needs of specific populations. This information can also help Vallejo determine which population groups should be engaged to better understand barriers to walking and bicycling.

Table 9-1 Vallejo Active Transportation Demographics Findings

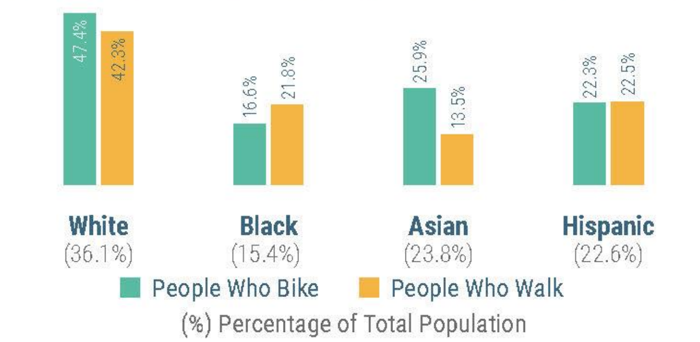
Who is Walking More	Who is Biking More
• White, Black, and Hispanic residents • Young adults and middle-aged workers • Women • Low-income and medium-low income earners	• White and Asian residents • Young adults and middle-aged workers • Men • Low and medium-low income earners
Who is Walking Less	**Who is Bicycling Less**
• Asian residents • High school and college students and working seniors • Men • Medium-high and high-income earners	• Black and Hispanic residents • High school and college students and working seniors • Women • Medium-high and high-income earners

Vallejo Active Transportation Profile

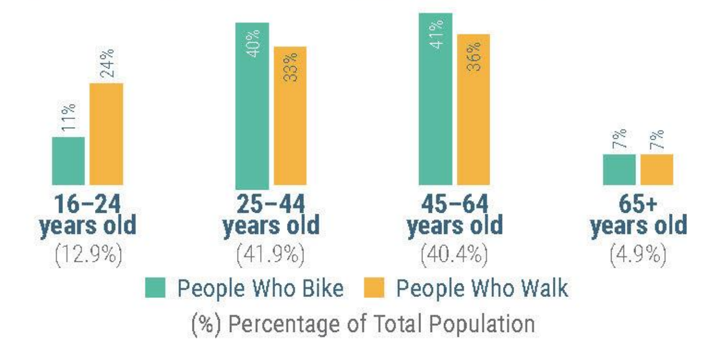
Characteristics of residents who walk or bike to work:

Source: US Census, ACS 5-Year Estimates 2016.

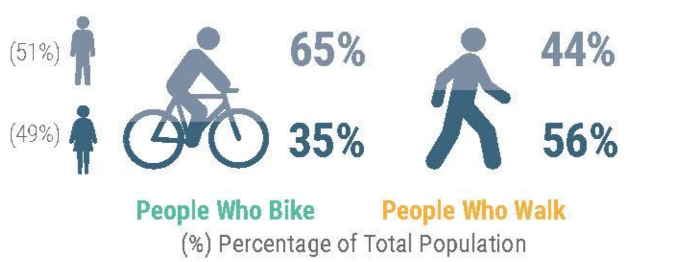
Race



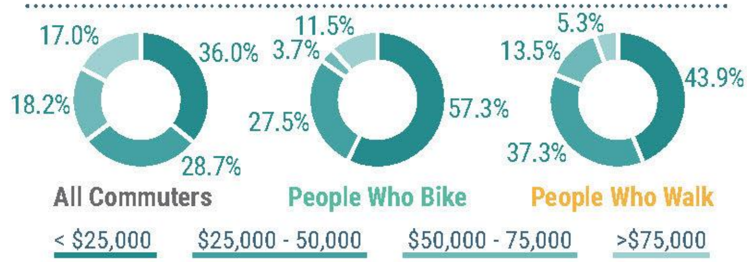
Age



Gender



Income

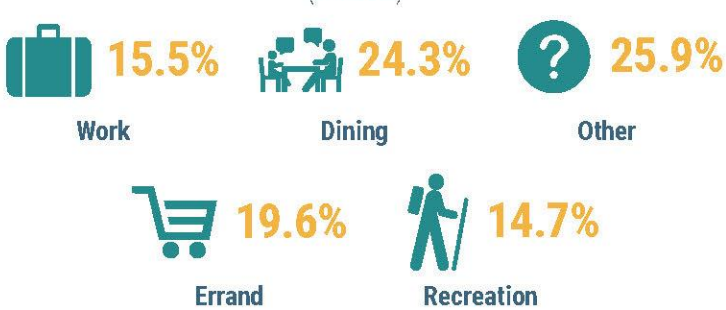


General travel characteristics (all modes):

Source: California Household Travel Survey, 2012.

Trip Purposes

(all modes)

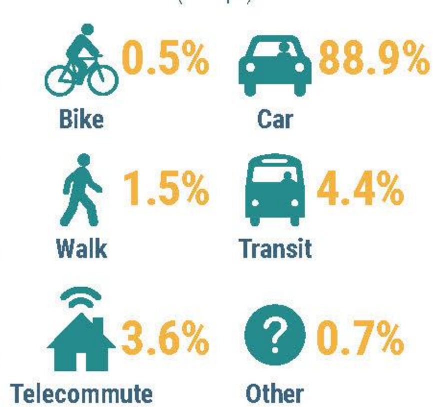


Trip Distances

(all modes)

Mode Share

(all trips)



Solano Transportation Authority Solano Active Transportation Plan

Figure 9-A. Vallejo Active Transportation Demographics Infographic

VALLEJO ACTIVE TRANSPORTATION GOALS AND POLICIES

Various documents guide how active transportation projects and programs are implemented throughout the County. While Vallejo does not have an adopted bicycle, pedestrian, or active transportation plan, the City uses guiding and supportive policies in its adopted General Plans as summarized below. The City may have other planning documents such as specific plans or community plans that were not evaluated individually as part of this effort.

VALLEJO GENERAL PLAN MOBILITY, TRANSPORTATION, & CONNECTIVITY ELEMENT (2017)

The Vallejo General Plan's Mobility, Transportation, & Connectivity Element covers the State-mandated topic area of circulation, including circulation of people and goods by road, rail, and water for all users, such as pedestrians, bicyclists, motor vehicles, and trucks. Additionally, it addresses the locally important issues of regional and local connectivity within and between Vallejo's neighborhoods, including recreational trails. Goals and policies related to active transportation include the following.

- Policy MTC-1.5: Continue to participate in efforts to complete the regional trail network through Vallejo.
- Policy MTC-1.6: Promote public access to open space and trails.
- Policy MTC-2.1: Prioritize pedestrian, bicycle, and automobile safety over traffic flow.
- Policy MTC-2.4: Maintain a transportation network that provides mobility for all ages and abilities and for all areas of the community.
- Policy MTC-2.5: Maintain a street classification system that establishes user mode priorities and associated performance standards for each type of street.
- Policy MTC-2.7: Increase accessibility for and use of streets by pedestrians, bicyclists, and transit riders.
- Policy MTC-2.8: Decrease dependence on single-occupant vehicles by increasing the attractiveness of other modes of transportation.
- Policy MTC-3.4: Expand the local bicycle and trail network to provide safe, healthy, attractive options for non-motorized travel among destinations in Vallejo, including for wheelchair users.
- Policy MTC-3.5: Promote a well-designed, interconnected, pedestrian-friendly environment in the Downtown/ Waterfront District.
- Policy MTC-3.6: Emphasize pedestrian access in the Downtown/Waterfront circulation system.
- Policy MTC-3.7: Facilitate access to and through the District by alternatives to the automobile.

VALLEJO EXISTING ACTIVE TRANSPORTATION NETWORK

The active transportation network consists of both pedestrian and bicycle infrastructure that work together to provide mobility options for all those that live, work, study, play, visit, pray, or shop in Vallejo. Whether we're aware of it or not, everyone in Vallejo uses active transportation infrastructure, such as sidewalks, at some point in their day even if just for short distances to reach their desired destinations.

EXISTING PEDESTRIAN NETWORK

The pedestrian network within Vallejo consists largely of sidewalk infrastructure supported by crossing treatments, multi-use paved trails, and unpaved recreational trails. Vallejo currently has an overall Walk Score of 42 out of 100 according to the real-estate website www.WalkScore.com, indicating that most errands require a car. As part of the Solano ATP, sidewalk presence was used as the metric for pedestrian accessibility and was inventoried within incorporated jurisdictions and adjacent pockets of unincorporated communities.

Sidewalk Inventory

An inventory of existing sidewalks was conducted to identify sidewalk gaps within Vallejo, with the results summarized in **Figure 9-B**. The city currently has a total of 515 miles of existing sidewalk infrastructure, which includes measurements of sidewalks on both sides of the street independently. With approximately 1,024 miles of maximum sidewalk coverage (total roadway mileage multiplied by two to account for both sides of the street). Depending on land use context, there may be areas of the city with rural characteristics where typical sidewalk infrastructure may not be compatible. However, it was not possible to exclude these areas from the overall sidewalk inventory evaluation.

Sidewalk coverage in Vallejo was also evaluated in the equity focus areas (see the Countywide chapter for full descriptions) as designated by the Metropolitan Transportation Commission for Priority Development Areas and Communities of Concern, or CalEnviroScreen Disadvantaged Communities. In Priority Development Areas, there is approximately 9 miles of sidewalk coverage. For Communities of Concern, there is approximately 236 miles of sidewalk coverage. Finally, within Disadvantaged Communities there is approximately 65 miles of sidewalk coverage. Overall, the need for sidewalk infrastructure is greatest in the Disadvantaged Communities equity focus area, which needs about 130 miles of sidewalk gaps filled.

EXISTING BICYCLE NETWORK

This section discusses the bicycle facilities in Vallejo's existing bike network. It also includes an analysis of bicyclist comfort and connectivity – that is, level of traffic stress (LTS) and bicycle network connectivity analysis (BNA), respectively –for the existing network. Additional information on the LTS and BNA methodologies can be found in the Countywide chapter's existing conditions section.

Existing Facilities

Vallejo has a 512-mile roadway network, 98 lane miles of which currently have bicycle facilities. This includes 37 lane miles of shared-use paths, 35 lane miles of bike lanes, and 25 lane miles of bike routes, as summarized on **Figure 9-B**. Most roadways in the city (81%) do not have any bicycle facilities. Vallejo's bicycle network consists of several shared-use paths (e.g., portions of the San Francisco Bay Trail on the waterfront, Bay Area Ridge Trail on the north shore of the Carquinez Strait, and Carquinez Bridge Trail), bike lanes running primarily on roads in the hilly eastern portion of the city (e.g., Columbus Parkway, Redwood Parkway, Ascot Parkway), and bike routes (e.g., Tennessee Street, Louisiana Street, 5th Street, Solano Avenue). The existing network provides connections to several neighborhoods, schools (e.g., Jesse Bethel High School, Joseph H. Wardlaw Elementary), and downtown businesses, as shown on **Figure 9-D**. However, the network has major gaps between facilities and does not serve destinations throughout the city equally.

Bicyclist Comfort and Connectivity

Figure 9-B also presents the percentage of facilities in Vallejo by LTS score. LTS 1 is the most common classification, making up 74 percent of lane miles because a majority of roadway lane miles in the city are on low-speed and low-volume streets as shown on **Figure 9-E**. These streets are typically local neighborhood streets (e.g., Clydesdale Drive, Magazine Street) or quiet streets running through downtown (e.g., Florida Street, Napa Street). Roads with these characteristics do not necessarily require bicycle facilities to be considered low-stress. Facilities provided on roadways with slightly higher volumes and speeds also contribute to total LTS 1 lane miles (e.g., the bike lanes on Louisiana Street).

However, LTS 4 is the second most common comfort classification for facilities in Vallejo, accounting for 17 percent of lane miles. These include high-speed and/or high-volume major roadways such as Sonoma Boulevard, Columbus Parkway, and Tennessee Street. Many of these roadways are designated bike routes or have bike lanes that are inadequate people of all ages and abilities given existing roadway traffic characteristics and geometries. While these high-stress roadways are less common, they are some of the most direct north-south and east-west routes in the city and function as barriers to a connected, low-stress citywide bike network. Lastly, LTS 2 and 3 account for a much smaller four percent and five percent of lane miles in the city, respectively.

Vallejo's BNA analysis indicates that a majority of the city has low connectivity, including downtown, neighborhoods in the Vallejo Hills, and southern neighborhoods along the Carquinez Strait as shown on **Figure 9-F**. The Mare Island waterfront area and Glen Cove neighborhood have the best connectivity in the city, with multiple bike facilities connecting them to adjacent areas. While there are many LTS 1 streets in the city, they are typically isolated low-stress "islands" that require crossing a higher LTS street (e.g., Redwood Parkway, Solano Avenue, Broadway) or barrier (e.g., I-80, I-780) to connect to destinations in adjacent census blocks.

Figure 9-B. Vallejo Active Transportation Network Infographic

	Existing Sidewalk Lane Miles	Full Sidewalk Buildout Lane Miles
Citywide	515	1,024
Priority Development Areas	9	19
Communities of Concern	236	375
Disadvantaged Communities	65	195

BICYCLE NETWORK INVENTORY

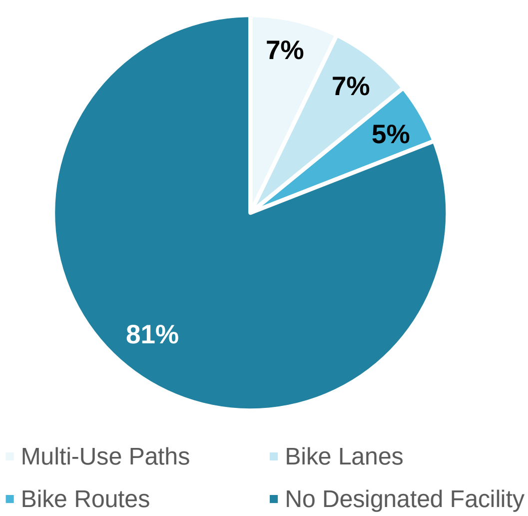
Bike Facilities	**Lane Miles**
Multi-Use Paths (Class I)	37
Bike Lanes (Class II)	35
Bike Routes (Class III)	25
No Designated Facility	414
All Roadways	512

Citywide Bicycle Connectivity (BNA) Score

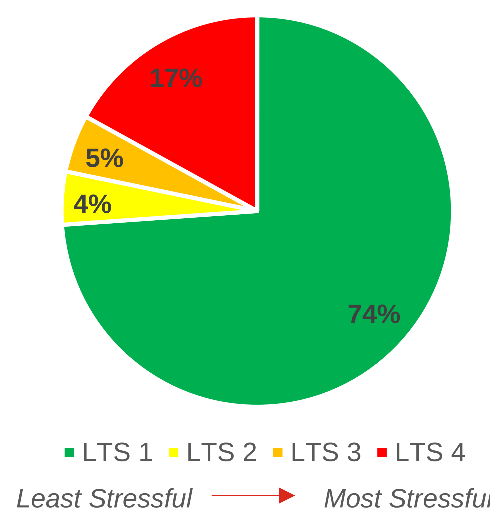
26

Low Connectivity **0 → 100** **High Connectivity**

BICYCLE INVENTORY PERCENT OF ROADWAY MILEAGE



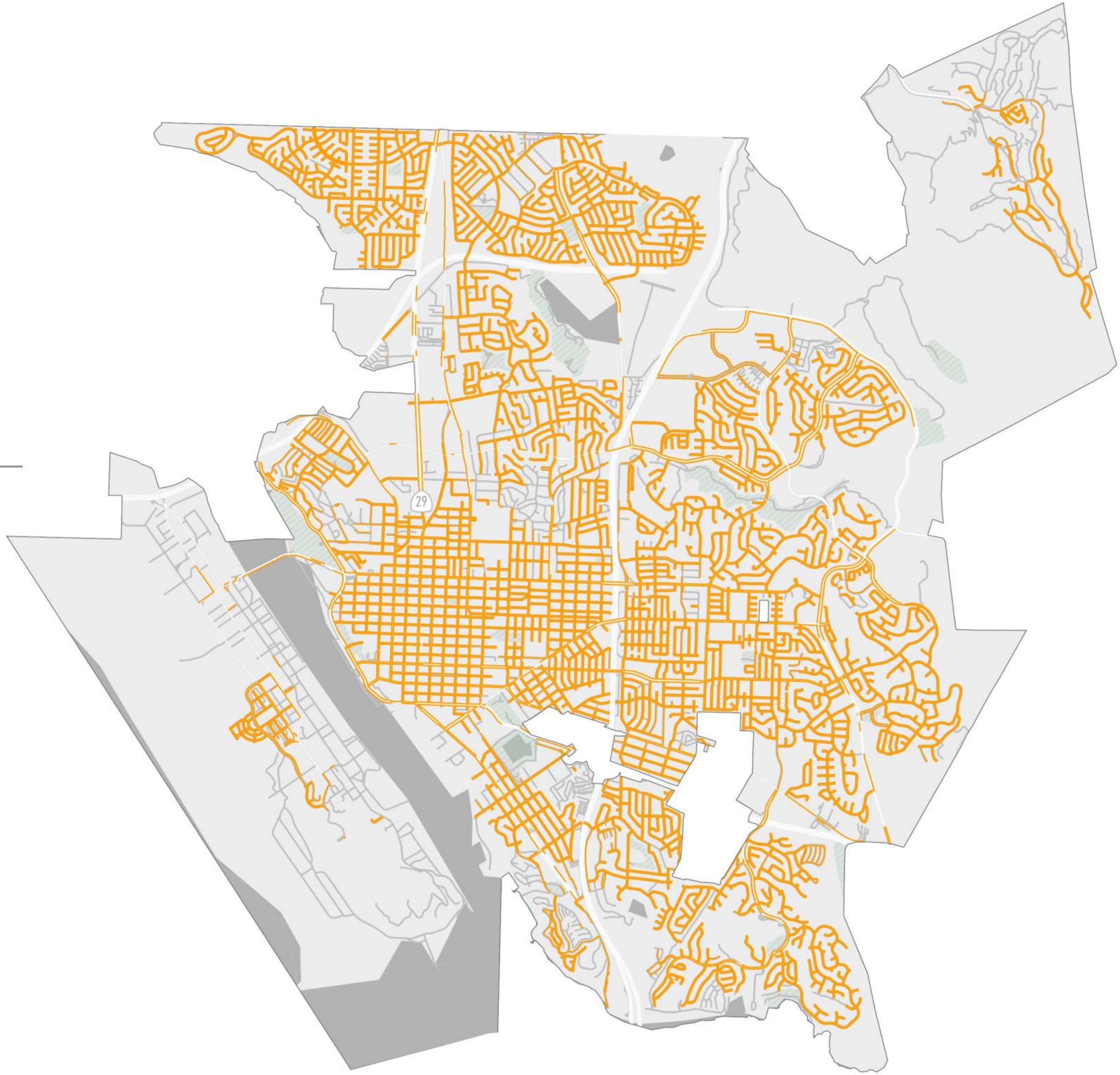
BICYCLIST COMFORT LEVEL OF TRAFFIC STRESS (LTS)



STA

Countywide Active Transportation Plan

Sidewalk Coverage



*Sidewalks determined manually using aerial imagery

Figure 9-D. Vallejo Existing Bicycle Facilities

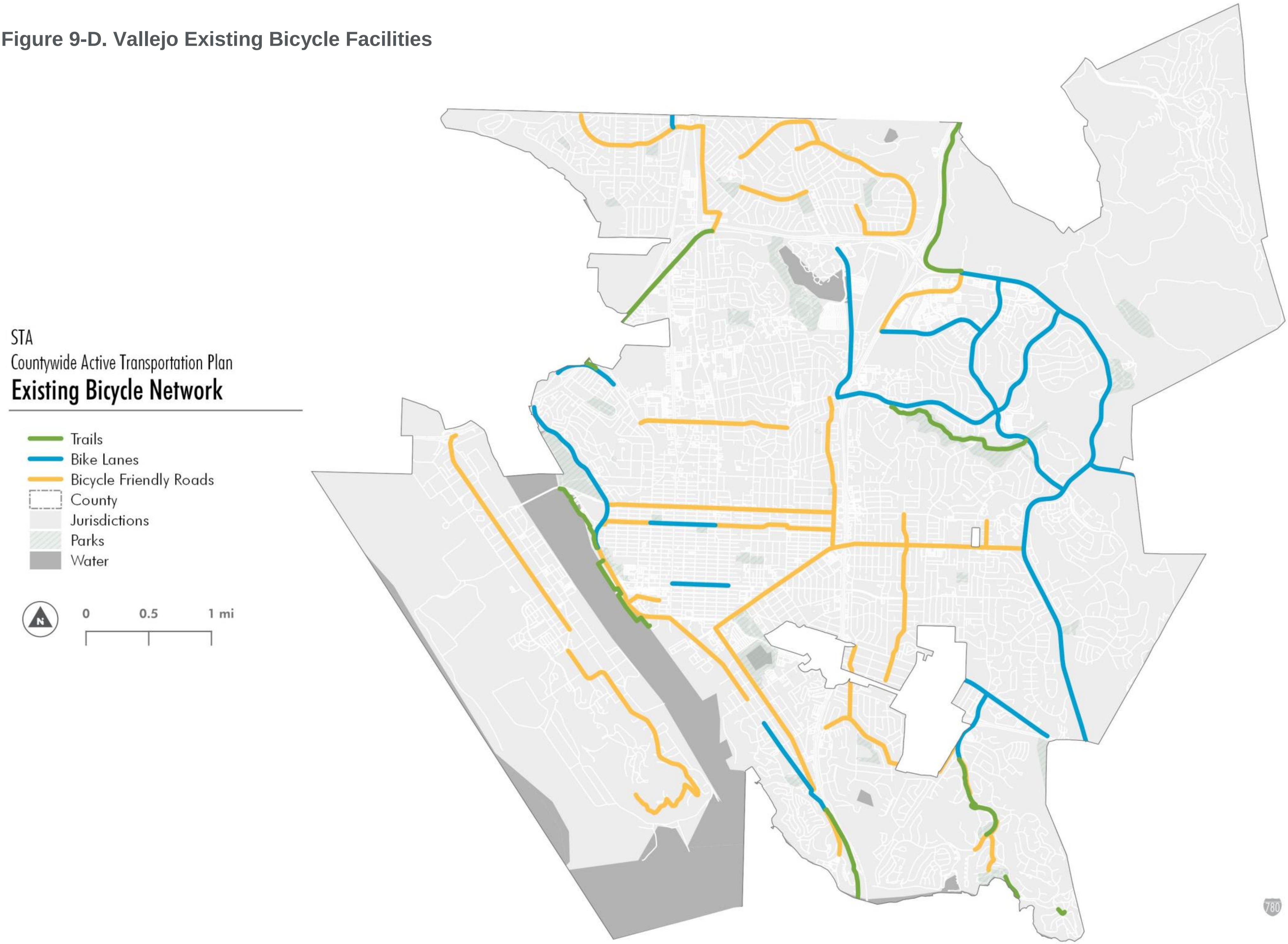


Figure 9-E. Vallejo Bicycle Level of Traffic Stress

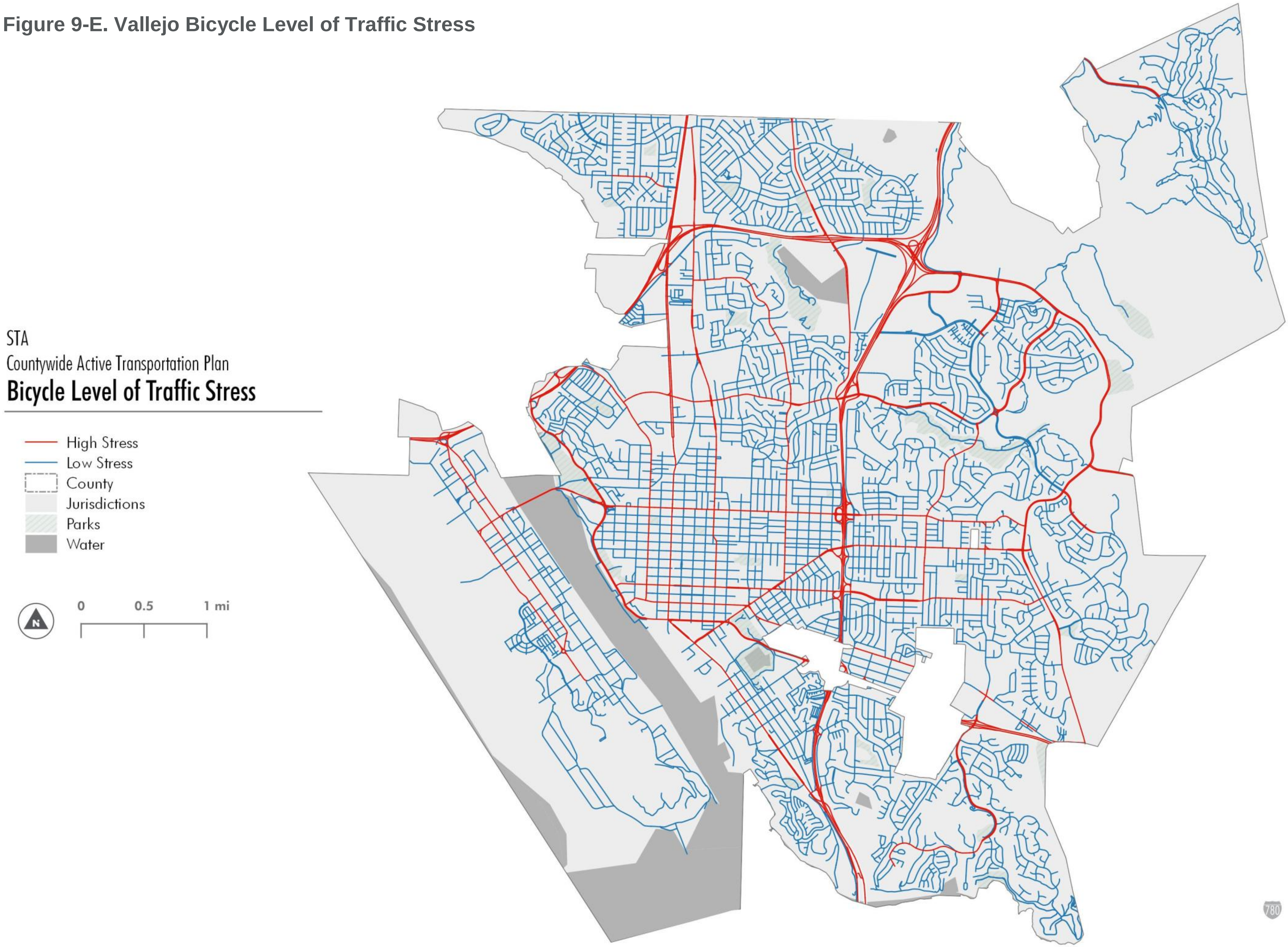


Figure 9-F. Vallejo Bicycle Network Analysis

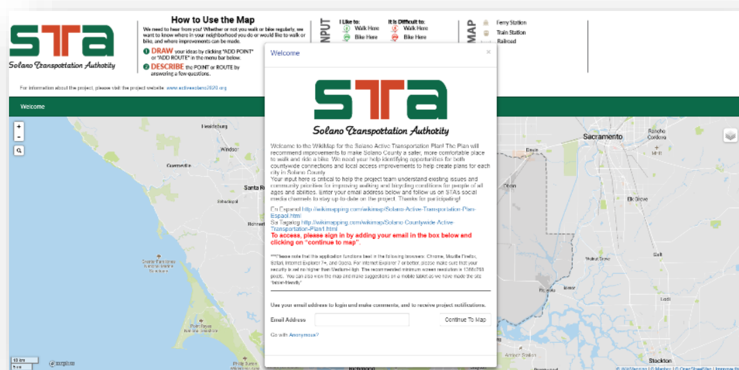
VALLEJO PUBLIC OUTREACH PHASE I SUMMARY

As part of the first phase of public outreach for the Solano ATP both online and in-person events were held to try to reach people across all parts of the county. The online and in-person feedback was combined to highlight where all participants had positive or negative input about existing infrastructure throughout the County. Positive comments generally encapsulate where people currently like to walk or bicycle and identify experiences to be highlighted. Negative comments mostly highlight areas where people feel it is dangerous or uncomfortable to walk or bike. Areas that received more comments show as darker than areas with only one or two comments as can be on the heatmaps on **Figure 9-G** to **Figure 9-J**. In total, 1,080 individual line and point comments were collected across Solano County, with 483 comments from in-person events and 597 comments from the project website.

ONLINE PARTICIPATION

An online interactive WikiMap was available on the project website, www.activesolano2020.org, which was hosted by STA. The WikiMap allowed participants to draw lines or drop pins where they like walking or biking and where they want to see improvements to walking or biking. This process helped identify the positive attributes that should be celebrated and the negative attributes that may need new projects to help encourage more people to walk and bicycle in Solano. Additionally, Spanish and Tagalog versions of the WikiMap were accessible on the project website to garner input from all Solano residents.

STA's online interactive WikiMap



IN-PERSON POP-UP EVENT – FARMERS MARKET

The Solano ATP Team attended the Vallejo Farmers Market on Saturday, November 3rd, 2018 to solicit input from residents. This year-round event occurs on Saturdays from 9:00 AM to 2:00 PM on Georgia Street and Marin

Photos from the Phase I Pop-up Event

Street. This event offers fresh produce and specialty foods, as well as many family types of events that bring Vallejo residents out to walk near the bay.

During the event, residents and visitors consistently stopped by the booth throughout the day to provide input. Most people who came up where interested in general information (hiking and biking flyers). Members of the community were excited to learn about the Solano ATP and participated as much as they could. Many were curious about where funding is coming from and how money will be distributed.

SUMMARY OF PUBLIC INPUT FOR WALKING AND BIKING

Vallejo had the largest amount of comments for all jurisdictions. Benicia Road received a very large amount of positive comments near Columbus Parkway. Lake Herman Road and Columbus also received a high number of positive comments, as did the area near Admiral Callaghan Lane. There were also a number of positive comments along Interstate 80, along Mare Island Way near along River Park, along Georgia Street between Marin Street and Columbus Parkway, and near the Napa River on Wilson Avenue between State Route 37 up to Tennessee Street and continuing up to Sacramento Street intersection. Finally, the Bay Area Ridge Trail along the Napa River and up to downtown part of Vallejo received positive comments.

Unfavorable comments within Vallejo were mostly directed toward Sonoma Boulevard and various intersections (e.g., Intersection of Georgia Street and Mare Island Way, Intersection of Sonoma Boulevard and Maine Street, Intersection of Georgia Street and Sonoma Boulevard, Intersection of Tuolumne Street and Georgia Street, Intersection of Sonoma Boulevard and Solano Avenue, and Intersection of Curtola Parkway and Solano Avenue). Street corridors like Tennessee Street, Georgia Street, Benicia Rad, Redwood Street, Tuolumne Street, and a small part of Mare Island Causeway adjacent to River Park also received negative comments. Additionally, there were a number of negative comments on the east southside of Vallejo along the Carquinez Bridge Trail via Maritime Academy Drive up to Bridge Vista Point and along the Bay Area Ridge Trail adjacent to Carquinez Bridge and to the city limits. For the northwest side of the city, there were negative comments mostly regarding Sacramento Street.

Pedestrian-focused Input

Good Places to Walk

- Wilson Avenue between State Route 37 up to Tennessee Street and continuing up to Sacramento Street intersection
- Bay Area Ridge Trail along the Napa River and up to the Downtown part of Vallejo

Poor Places to Walk

- McGary Road and American Canyon Road
- Mare Island Causeway over Napa River
- On State Highway 37 between Railroad Avenue and Wilson Avenue and between State Highway 29/37
- On Sacramento Street between Parrott Street and Farragut Avenue
- Carquinez Bridge Trail via Maritime Academy Drive up to Bridge Vista Point
- Bay Area Ridge Trail adjacent to Carquinez Bridge to the city limits

Bicycle-focused Input

Good Places to Bicycle

- Along Interstate 80 feeding into the City of Vallejo and continuing via Columbus Parkway via the Solano Bikeway. It continues thru Columbus Parkway (past Lake Herman Road and Georgia Street) up to Benicia Road.
- Benicia Road between Georgia Street and Columbus Parkway
- Oakwood Avenue between Georgia Street and Redwood Parkway

- Broadway Street between Mini Drive and Lewis Brown Drive
- Sears Point Road and then Wilson Avenue (south) and connecting on to Mare Island Causeway up to Railroad Avenue

Poor Places to Bicycle

- Mare islands Causeway between Railroad Avenue River Park
- Intersection of Georgia Street and Mare Island Way
- Intersection of Sonoma Boulevard and Maine Street
- Intersection of Georgia Street and Sonoma Boulevard
- Intersection of Tuolumne Street and Georgia Street
- Intersection of Sonoma Boulevard (State Route 29) and Solano Avenue
- Intersection of Curtola Parkway and Solano Avenue
- Solano Avenue between Georgia Street an Tuolumne Street
- Redwood Street between Fairground Drive and Admiral Callaghan Lane
- Intersection of Sonoma Boulevard and Sequoia Avenue
- Tennessee Street between Mariposa Street and Humboldt Street
- Sonoma Boulevard (State Route 29) between Tennessee Street and Sequoia Avenue
- Tennessee Street between Mare Island Way and Columbus Parkway
- Sacramento Street between State Route 37 to Georgia Street
- Georgia Street between Mare Island Way and Columbus Parkway
- Redwood Street between Sacramento Street and Foothill Drive
- American Canyon Road at McGary Road and Hiddenbrook Parkway

Figure 9-G. Vallejo Public Outreach – Positive WikiMap Walking Comments

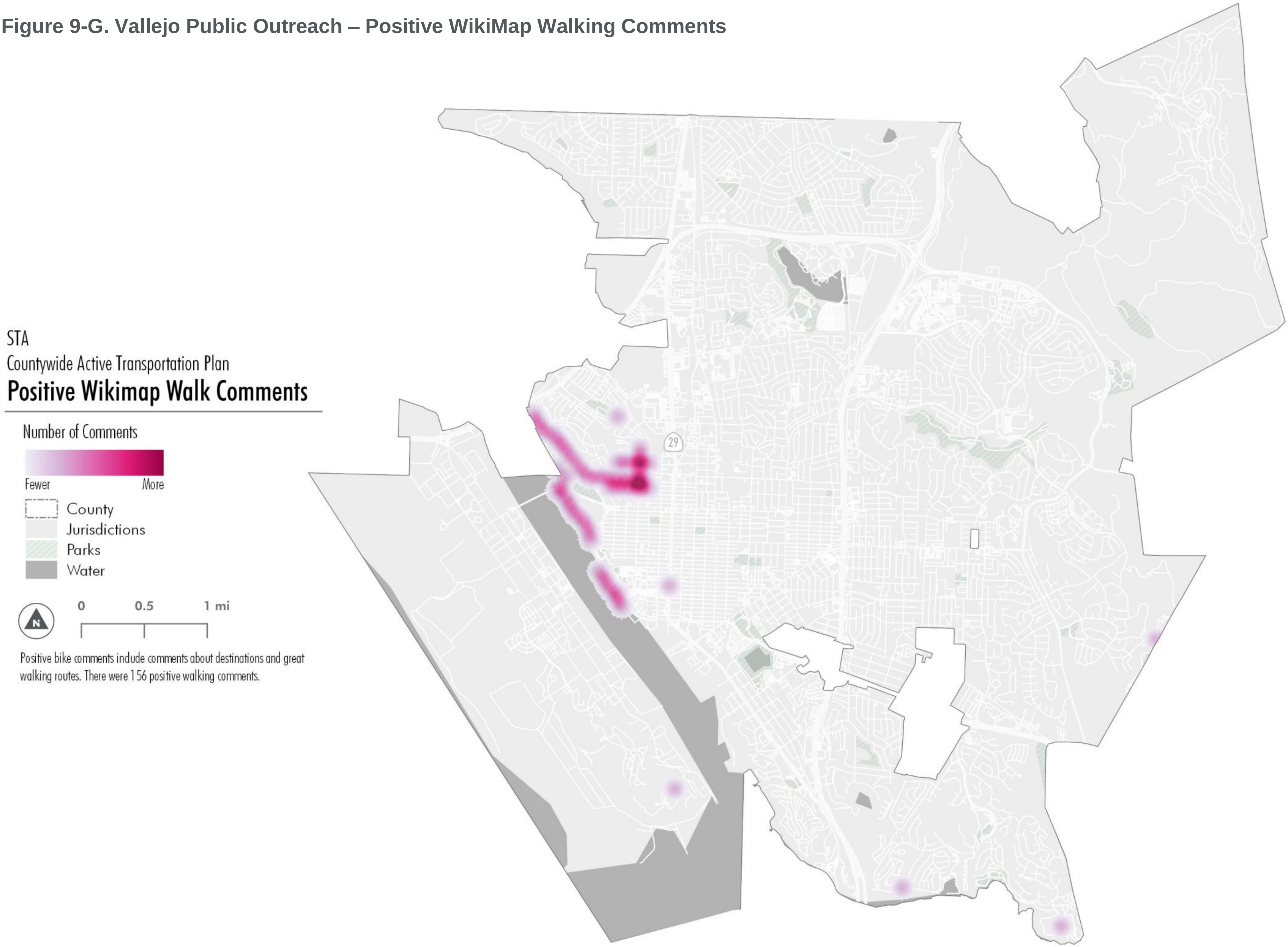


Figure 9-H. Vallejo Public Outreach – Negative WikiMap Walking Comments

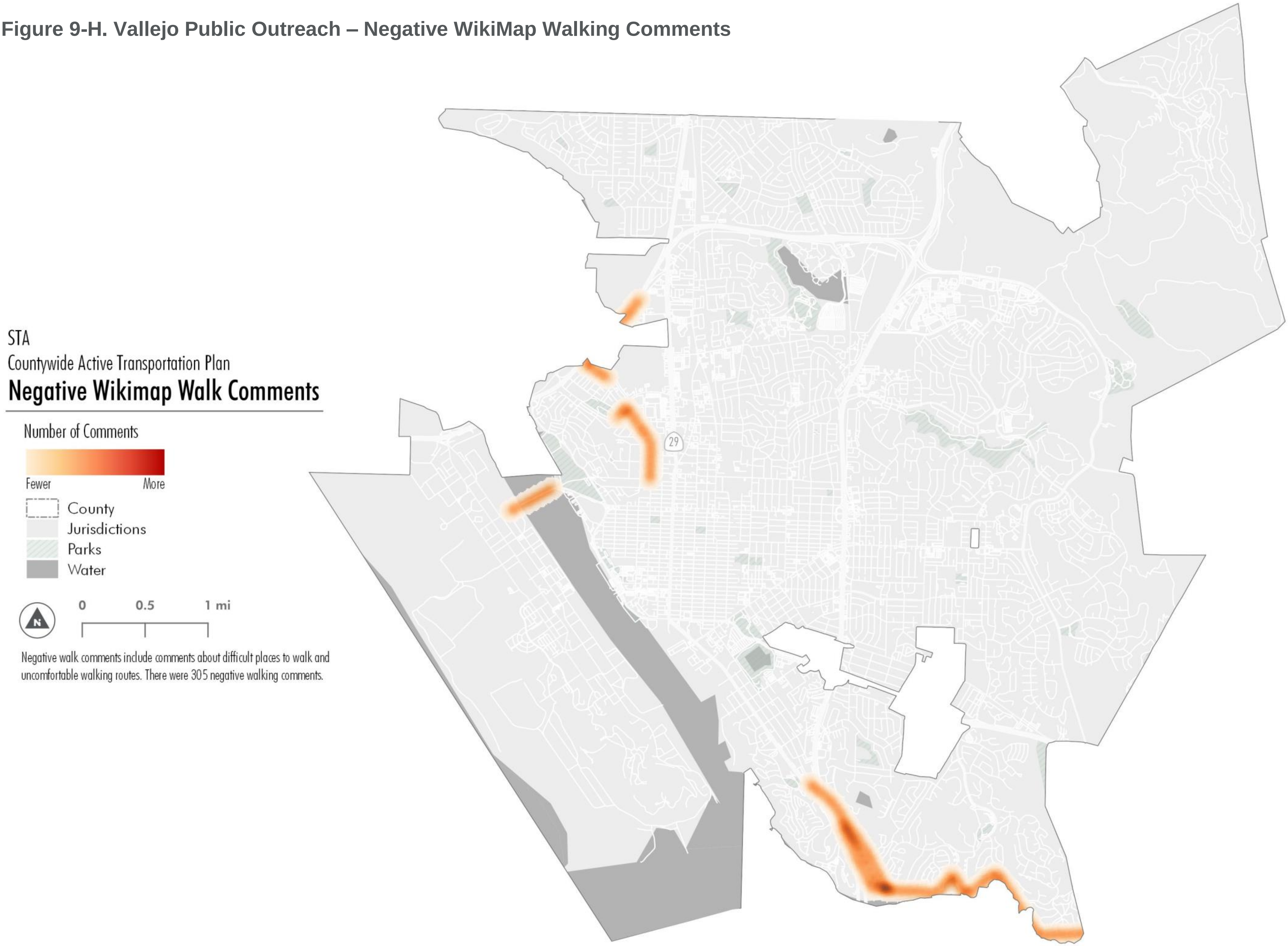


Figure 9-I. Vallejo Public Outreach – Positive WikiMap Bicycle Comments

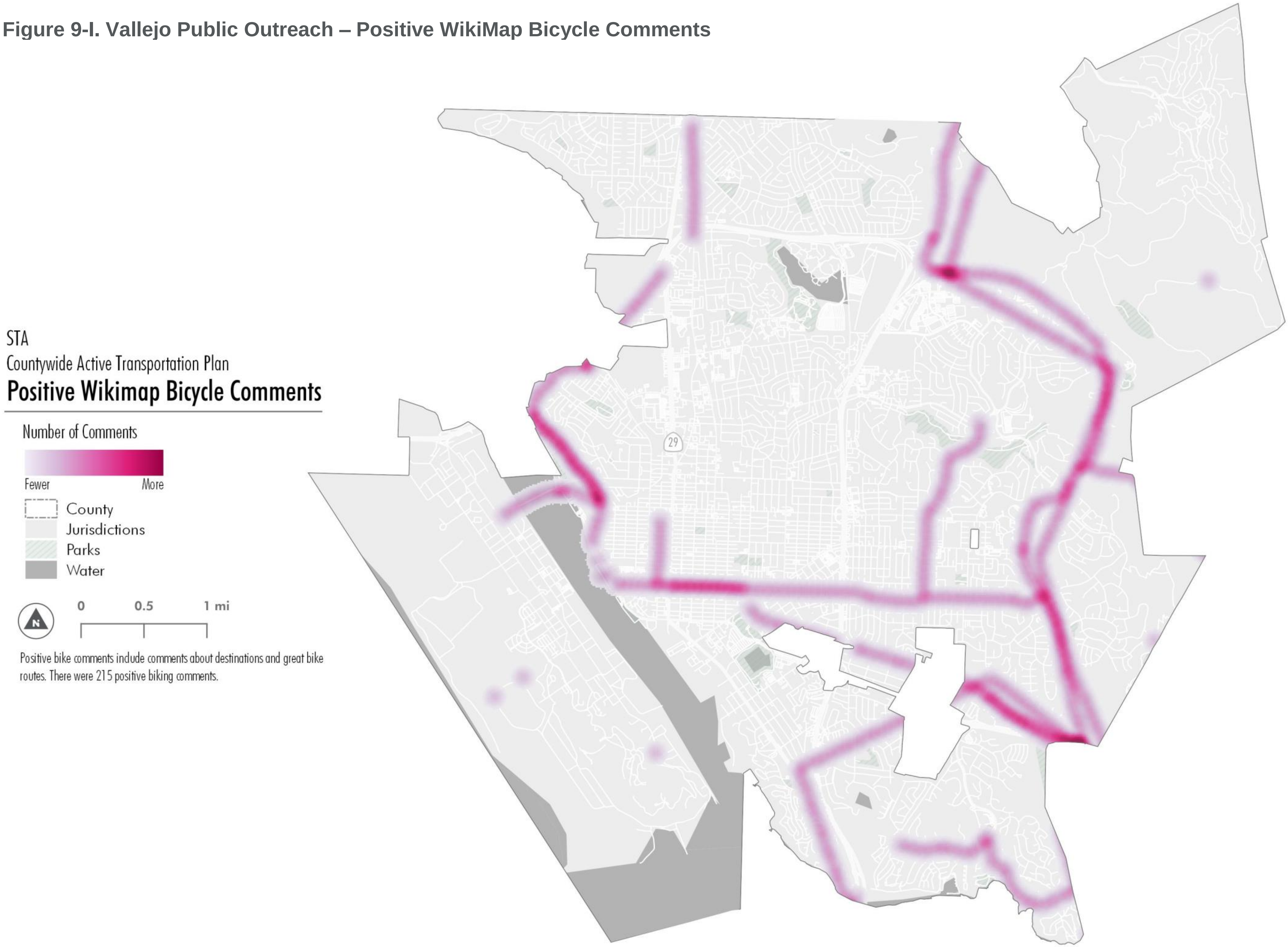
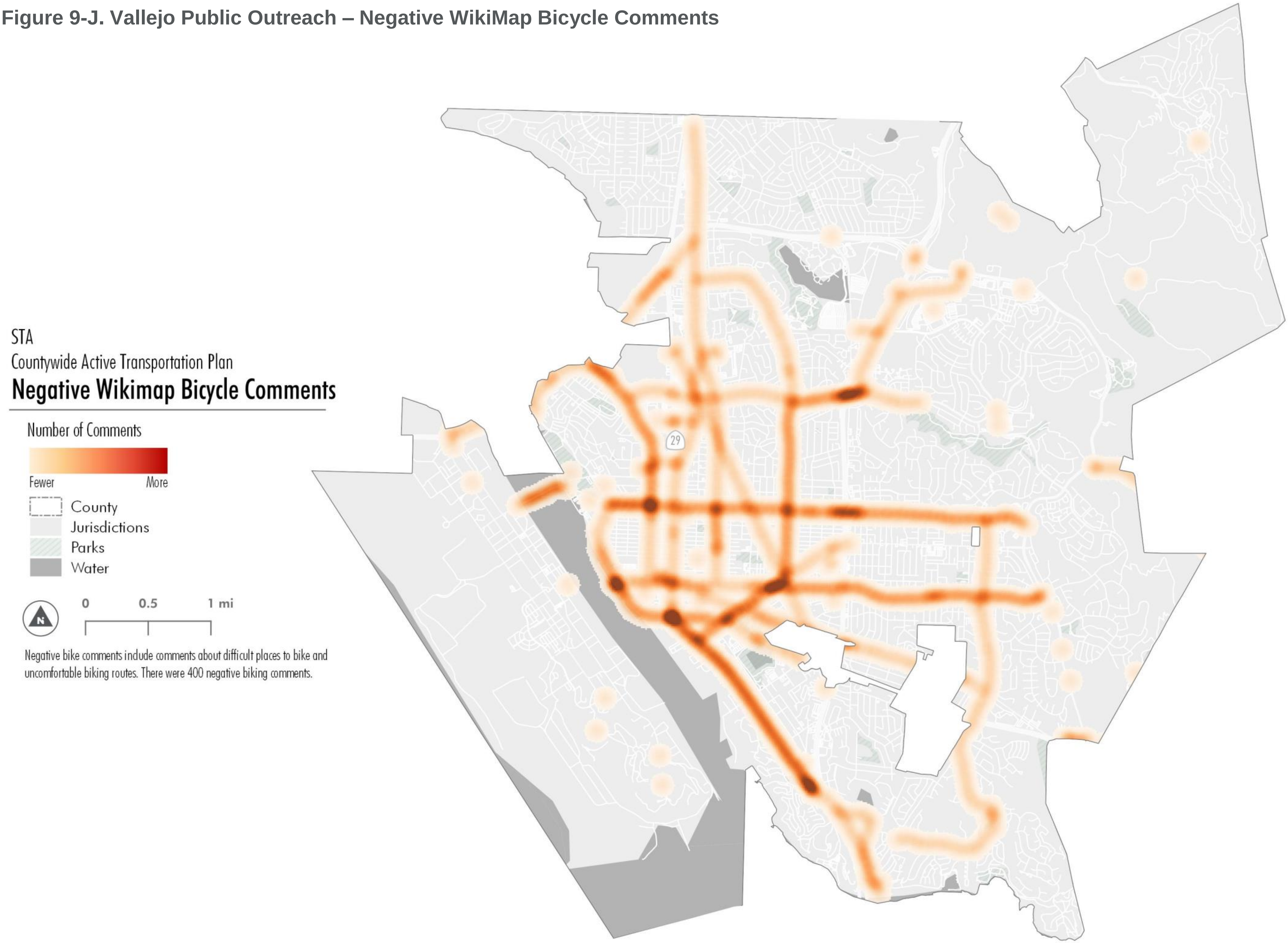


Figure 9-J. Vallejo Public Outreach – Negative WikiMap Bicycle Comments



CHAPTER 10
SOLANO ACTIVE TRANSPORTATION PLAN NEXT STEPS

10. NEXT STEPS

Prior to the finalization of the Solano ATP, a variety of tasks will be completed to inform project recommendations and revise them based on local community and jurisdiction staff input.

KEY DESTINATIONS AND DEMAND ANALYSIS

Key destinations were identified as part of the Phase I Public Outreach events and will be summarized for each jurisdiction and for the County as a whole. This input will be used in conjunction with other available data sources such as the U.S. Census to create latent demand analysis that will identify which areas throughout Solano have the greatest potential for walking and biking trips.

COLLISION ANALYSIS

Building on the recently adopted Solano Travel Safety Plan, bicycle and pedestrian collisions will be assessed across the County in greater detail to identify hot spot locations and key trends. Future projects identified to address high collision areas may be prioritized to promote safe mobility for all Solano residents.

DRAFT NETWORK RECOMMENDATIONS

Draft network recommendations will be compiled to fill gaps in local and countywide networks. The network recommendations will focus on bridging connections between the key destinations and other latent demand areas. Once compiled, the Solano ATP project team will present the draft networks back to the public in the Phase II Public Outreach pop-up events to ensure the right connections are identified and accurately reflects Phase I input.

TOOLE DESIGN

1635 BROADWAY
SUITE 200
OAKLAND, CA 94612

510.298.0740
TOOLEDESIGN.COM

MEMORANDUM

January 28, 2020

To: Cory Peterson
Organization: Solano Transportation Authority
From: Patrick Gilster, AICP; Laura Krull; and Joel Shaffer
Project: Solano Countywide Active Transportation Plan

Re: Task 5.1: Countywide Needs Analysis – Generators Demand

Potential Demand Analysis

Potential demand analysis uses demographic factors to identify areas with high *potential* bicycling and walking demand ("generators demand"). The analysis builds a composite score from several demographic characteristics, based on assumptions informed by professional judgment. Potential demand analysis does not necessarily predict actual bicycling or walking activity; areas may be characterized by development and demographic factors that support bicycling and walking but may suffer from limitations such as having roads with high levels of traffic stress or low connectivity. Key destinations and other priority attractions will be used to create a separate composite "attractors demand" in a subsequent task.

Demand analysis is an important metric because it allows Toole Design and others to understand high demand locations irrespective of current infrastructure. After bicycle and pedestrian facilities are identified in future projects phases, infrastructure may be prioritized in areas with high potential demand. Conversely, individual projects in areas with low potential demand could be prioritized based on additional criteria such as equitable distribution of resources, access to schools, access to transit, or other metrics.

Inputs

The potential demand score is calculated by analyzing the following demographic factors:

- **Population density**
  - This factor is a major determinant for both recreational and utilitarian trips. In short, the more people are in an area, the more people will be walking or biking. Population density is also highly related to transit ridership.
- **Low-Income population Density**

- Research indicates that people living in households below the poverty line are more likely to depend on transit, walking, or biking to get around.[1,2] The households-in-poverty data is only available for Census block groups, which comprise multiple Census blocks.

- **Zero-Car Population Density**
  - Zero-car households have a high probability of using active transportation modes of transportation, including the use of transit. Census block groups with a high proportion of households without access to a personal vehicle represent areas within Solano County where there is a potential high demand for active transportation facilities.
- **Density of Population over 65**
  - The elderly population was identified as an important population to include in the analysis by STA.
- **Density of Population under 18**
  - Minors were identified as an important population to include in the analysis by STA.

Table 1 provides a list of the factors and their geographies and data sources.

Table 1: Demographic Factors Used in Demand Analysis

Factor	Geography	Data Source
Total Population	Census block	2016 U.S. Census 5-year estimates
Low-Income Population*	Census block group	2016 U.S. Census 5-year estimates
Zero-Car Population density*	Census block group	2016 U.S. Census 5-year estimates
Density of population over 65	Census block group	2016 U.S. Census 5-year estimates
Density of population under 18	Census block group	2016 U.S. Census 5-year estimates

*Variables that are measured at the household level are scaled to population based on the average household size for the corresponding Census block group

Calculation

The potential demand is calculated at the census block level. Each factor is calculated separately and summed to create a composite score for each census block. This equation is intended to reflect areas entire population while providing a higher weighting to certain factors, as shown in the following equation:

[1] Fighting For Equitable Transportation: Why It Matters. Safe Routes to School National Partnership. 2015. Available at: https://www.apha.org/~/media/files/pdf/topics/environment/built_environment/srtsnp_equitytransp_factsheet2015.ashx

[2] Predicting Transit Ridership at the Stop Level: The Role of Service and Urban Form. J Dill, M Schlossberg, L Ma, C Meyer - 92nd Annual Meeting of the Transportation Research Board, 2013

$$D_{CB} = \frac{P_T + P_{LI} + P_{ZC} + P_{>65} + P_{<18}}{A_{CB}}$$

Where:
D_{CB} = *census block potential demand*
P_T = *census block total population*
P_{LI} = *census block low-income population*
P_{ZC} = *census block zero-car population*
$P_{>65}$ = *census block population over 65 years old*
$P_{<18}$ = *census block population uncder 18 years old*
A_{CB} = *census block area*

Results

Figures 1 through 8 show countywide and citywide areas with the highest levels of potential demand. In addition, we identified the 25 areas with highest potential demand countywide and the 10 areas with highest potential demand for each city. The high demand areas are not equal in size and may vary based on census block or individual destination size. Areas identified in red bold formatting under each jurisdiction are included in the top 25 countywide demand areas.

These areas, listed alphabetically by jurisdiction, are as follows:

Countywide:

(1) Dixon: Downtown apartment complexes (roughly bounded by Mayes Street, the Union Pacific Railroad tracks, Cherry Street, and Hall Park Drive)
(2) Fairfield: Downtown residential neighborhoods (roughly bounded by Pennsylvania Avenue, Missouri Street, Jefferson Street, and Ohio Street)
(3) Fairfield: Residential neighborhood bounded by North Texas Street, East Travis Boulevard, and Union Pacific Railroad tracks
(4) Fairfield: Residential neighborhood bounded by East Tabor Avenue, Sunset Avenue, East Travis Boulevard, and North Texas Street
(5) Fairfield: Apartment complexes located on Pennsylvania Avenue / Alaska Avenue from Kensington Drive to North Texas Street
(6) Fairfield: Apartment complexes and nursing home bounded by Pennsylvania Avenue, B Gale Wilson Boulevard, Richards Court, and Travis Boulevard
(7) Fairfield: Apartment complexes located on North Texas Street from Walmart to Marigold Drive
(8) Fairfield: Neighborhood and apartment complexes in vicinity of Lee Bell Park
(9) Fairfield: Fairfield Mobile Home & RV Park and apartment complexes near intersection of West Texas Street and Pennsylvania Avenue
(10) Suisun City: Downtown neighborhoods (roughly bounded by West Street, Sacramento Street, Main Street, and Morgan Street)
(11) Suisun City: Apartment complexes located in vicinity of Civic Center Boulevard and Almond Street
(12) Suisun City: Henley Apartment Homes and Village Green Apartments
(13) Vacaville: Residential neighborhood bounded by Markham Avenue, Brown Street, and East Monte Vista Avenue
(14) Vacaville: Apartment complexes and mobile home park located off of Elmira Road between Interstate 80 and Allison Drive
(15) Vacaville: Apartment complexes, senior housing, and mobile home parks located off of Alamo Drive between Alamo Court and Peabody Road
(16) Vacaville: Residential neighborhoods in vicinity of intersection of Peabody Road and Marshall Road

(17)Vallejo: Downtown residential neighborhoods (roughly bounded by Nebraska Street, Amador Street, Solano Avenue, and the Napa River)
(18)Vallejo: Residential neighborhood southeast of Downtown (roughly bounded by Solano Avenue, Curtola Parkway, Georgia Street, and Interstate 80)
(19)Vallejo: Neighborhood surrounding Federal Terrace Elementary School and Terrace Park
(20)Vallejo: Cal Maritime Academy
(21)Vallejo: South Vallejo (roughly bounded by Lemon Street and Interstate 80)
(22)Vallejo: Apartments located near intersection of Columbus Parkway and Ascot Parkway
(23)Vallejo: Neighborhood surrounding Richardson Park
(24)Vallejo: Wirben Vasquez Mobile Home Park / apartment complexes bounded by Tennessee Street, Avian Drive, Springs Road, and Rollingwood Drive
(25)Vallejo: North Vallejo (neighborhoods north of State Route 37)

Benicia:

(1) Waterstone Terrace Apartments / apartments at intersection of Military West and West 5th Street
(2) Apartments adjacent to Marina Village Way
(3) Casa de Vilarrasa (senior housing)
(4) Apartment complexes near intersection of Military East and Hospital Road
(5) Apartment complex adjacent to East T Street
(6) Apartment complexes near intersection of Chelsea Hills Drive and Southampton Road
(7) Club Pacifica Apartments
(8) Benicia Highlands Apartments
(9) Apartment complexes adjacent to Riverhill Drive
(10)Rancho Benicia Mobile Home Park

Dixon:

(1) Walnut Ranch Apartments
(2) Watson Ranch Apartments
(3) Neighborhood adjacent to Winfield Street
(4) Birchwood Place Apartments
(5) Second Street Senior Apartments
(6) Apartment complexes in Downtown Dixon (roughly bounded by Mayes Street, the Union Pacific Railroad tracks, Cherry Street, and Hall Park Drive)
(7) Two blocks bounded by B Street, C Street, 2nd Street, and 4th Street
(8) Apartments located at Porter Street and Marvin Way
(9) Neighborhoods surrounding Northwest Park
(10) Two blocks bounded by Mayfair Drive, South Almond Street, Camelia Drive, and Spruce Street

Fairfield:

(1) Downtown residential neighborhoods (roughly bounded by Pennsylvania Avenue, Missouri Street, Jefferson Street, and Ohio Street)
(2) Apartment complexes located on Pennsylvania Avenue / Alaska Avenue from Kensington Drive to North Texas Street

(3) **Apartment complexes located on North Texas Street from Walmart to Marigold Drive**
(4) **Neighborhood and apartment complexes in vicinity of Lee Bell Park**
(5) **Apartment complexes and nursing home bounded by Pennsylvania Avenue, B Gale Wilson Boulevard, Richards Court, and Travis Boulevard**
(6) **Residential neighborhood bounded by North Texas Street, East Travis Boulevard, and Union Pacific Railroad tracks**
(7) **Residential neighborhood bounded by East Tabor Avenue, Sunset Avenue, East Travis Boulevard, and North Texas Street**
(8) Apartment complexes located off of East Tabor Avenue from Blossom Avenue to Union Pacific Railroad tracks
(9) Residential neighborhood bounded by Travis Boulevard, Pennsylvania Avenue, West Texas Street, and Interstate 80
(10) **Fairfield Mobile Home & RV Park and apartment complexes near intersection of West Texas Street and Pennsylvania Avenue**

Rio Vista:

(1) Neighborhood in vicinity of Homecoming Park
(2) Trilogy at Rio Vista
(3) Neighborhood north of Saint Francis Way and Flores Way
(4) Neighborhood southwest of Saint Joseph Cemetery
(5) Downtown neighborhoods (roughly bounded by State Route 12, South 7th Street, Hamilton Avenue, and the Sacramento River)

Note: Due to Rio Vista's smaller geographical size, only five distinct high demand areas were identified.

Suisun City:

(1) **Downtown neighborhoods (roughly bounded by West Street, Sacramento Street, Main Street, and Morgan Street)**
(2) Centennial Arms Apartments
(3) Apartment complexes located at intersection of Cordelia Street and West Street
(4) **Apartment complexes located in vicinity of Civic Center Boulevard and Almond Street**
(5) Sea Breeze Mobile Home Park
(6) Neighborhood bounded by Driftwood Drive, Josiah Way, Lotz Way, and Marina Boulevard
(7) **Henley Apartment Homes and Village Green Apartments**
(8) Neighborhood to the east of Cloverleaf Estates Dog Park
(9) Autumn Oaks Apartments
(10) Cottonwood Creek Apartments

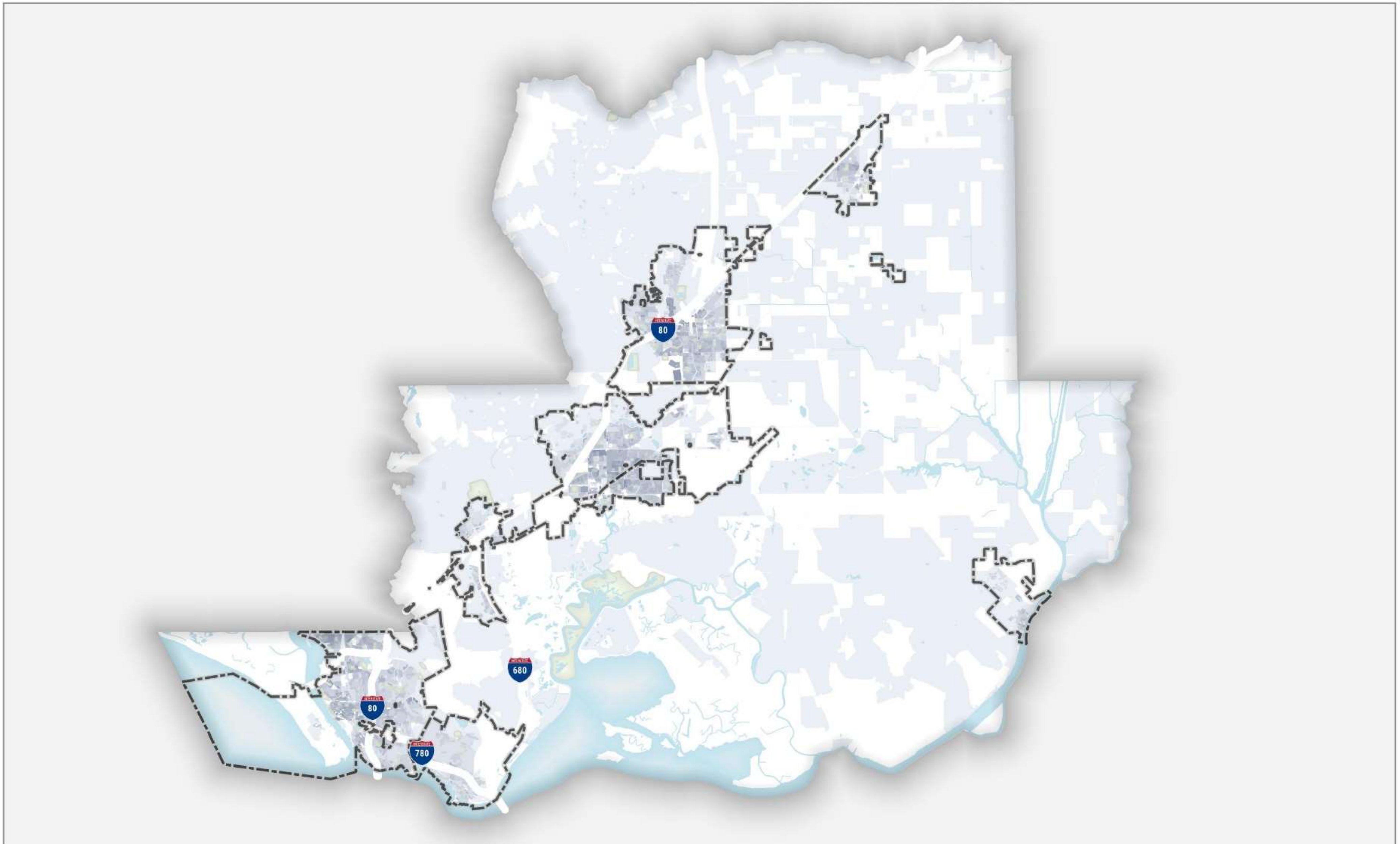
Vacaville:

(1) **Residential neighborhood bounded by Markham Avenue, Brown Street, and East Monte Vista Avenue**
(2) **Apartment complexes and mobile home park located off of Elmira Road between Interstate 80 and Allison Drive**
(3) The Parc Apartments

(4) Apartment complexes bounded by Harbison Drive, Ulatis Drive, Arcadia Drive, and Nut Tree Parkway
(5) Apartment complexes, senior housing, and mobile home parks located off of Alamo Drive between Alamo Court and Peabody Road
(6) Walnut Grove Senior Apartments
(7) Apartment complexes in vicinity of intersection of North Orchard Avenue and West Monte Vista Avenue
(8) Apartment complexes located in vicinity of intersection of Alamo Drive and Farmington Drive
(9) Hidden Creek Apartments and Lynwood Knolls Apartments
(10) Residential neighborhoods in vicinity of intersection of Peabody Road and Marshall Road

Vallejo:

(1) Downtown residential neighborhoods (roughly bounded by Nebraska Street, Amador Street, Solano Avenue, and the Napa River)
(2) Residential neighborhood southeast of Downtown (roughly bounded by Solano Avenue, Curtola Parkway, Georgia Street, and Interstate 80)
(3) South Vallejo (roughly bounded by Lemon Street and Interstate 80)
(4) Neighborhood surrounding Federal Terrace Elementary School and Terrace Park
(5) Wirben Vasquez Mobile Home Park / apartment complexes bounded by Tennessee Street, Avian Drive, Springs Road, and Rollingwood Drive
(6) Apartments located near intersection of Columbus Parkway and Ascot Parkway
(7) Apartments located in vicinity of Cadloni Lane
(8) Neighborhood surrounding Richardson Park
(9) North Vallejo (neighborhoods north of State Route 37)
(10) Cal Maritime Academy



Solano Countywide Active Transportation Plan: Overall Potential Demand

Demand

Low High

Jurisdiction

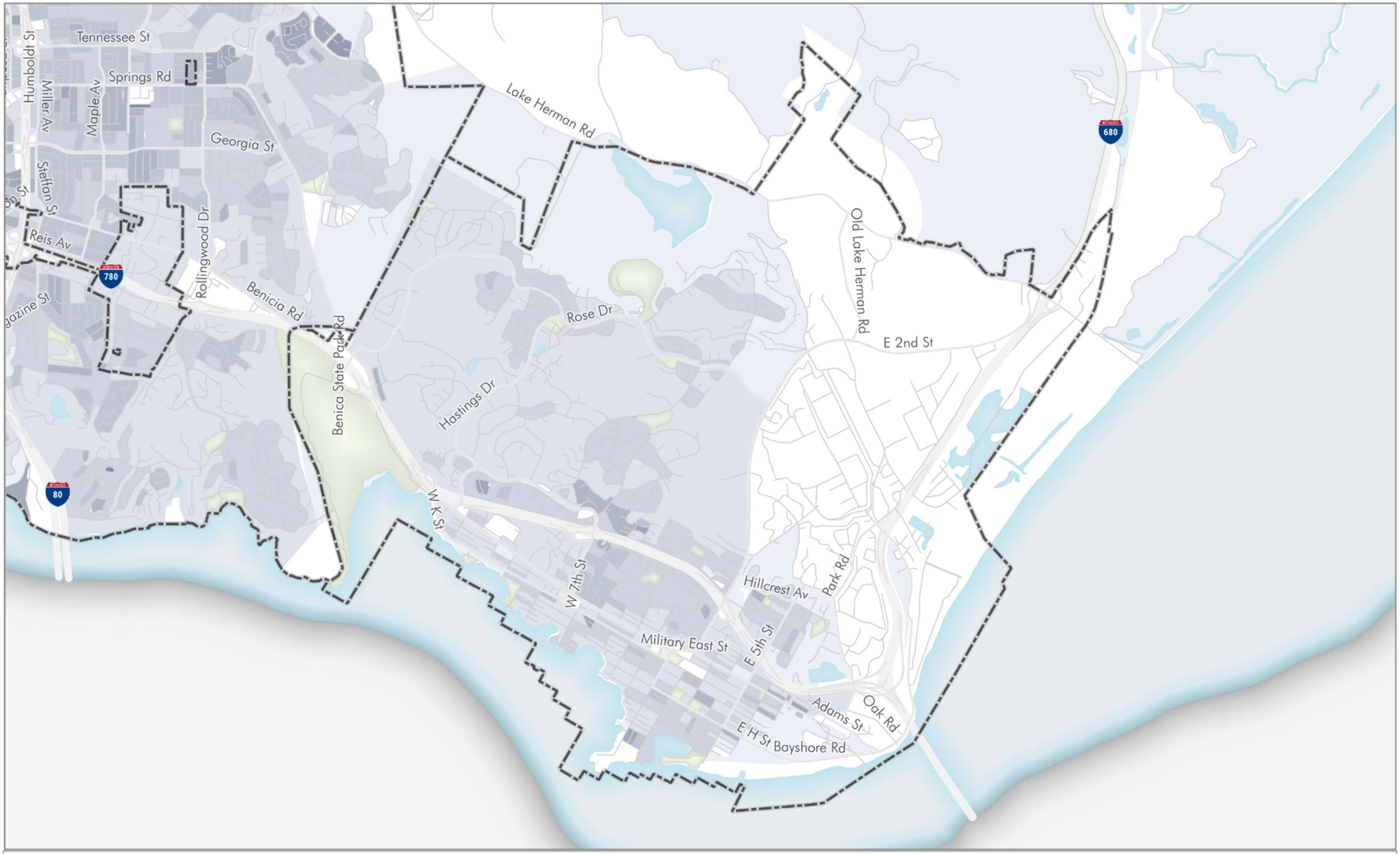
Parks

Water

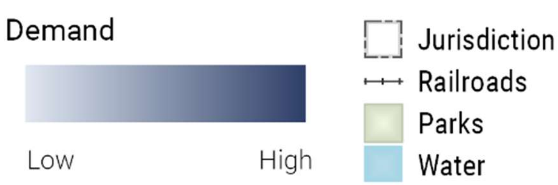
Railroads

Solano Transportation Authority

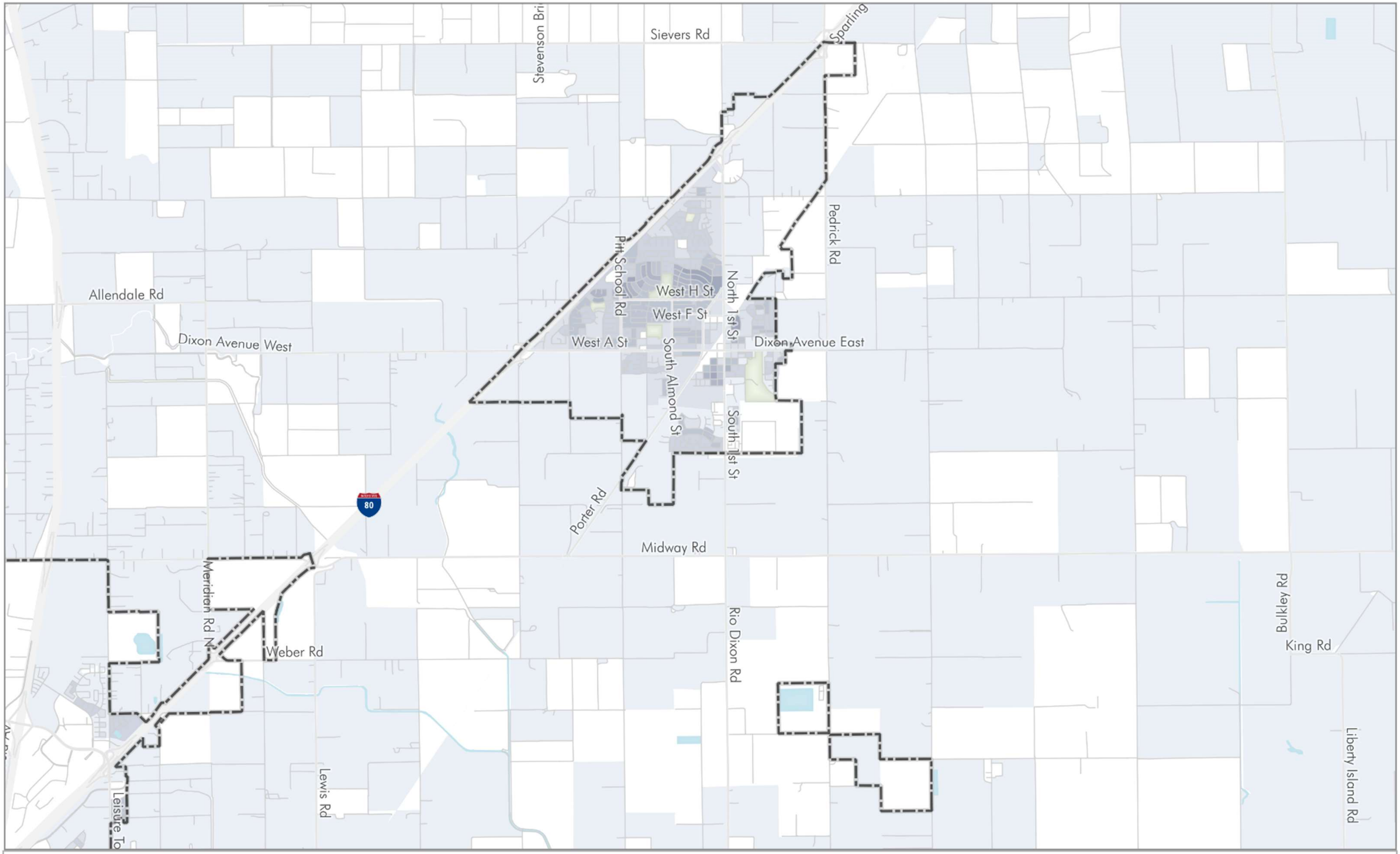
0 2 4 mi



Solano Countywide Active Transportation Plan: Benicia Overall Potential Demand



Solano Transportation Authority



Solano Countywide Active Transportation Plan: Dixon Overall Potential Demand

Demand

Low High

Jurisdiction

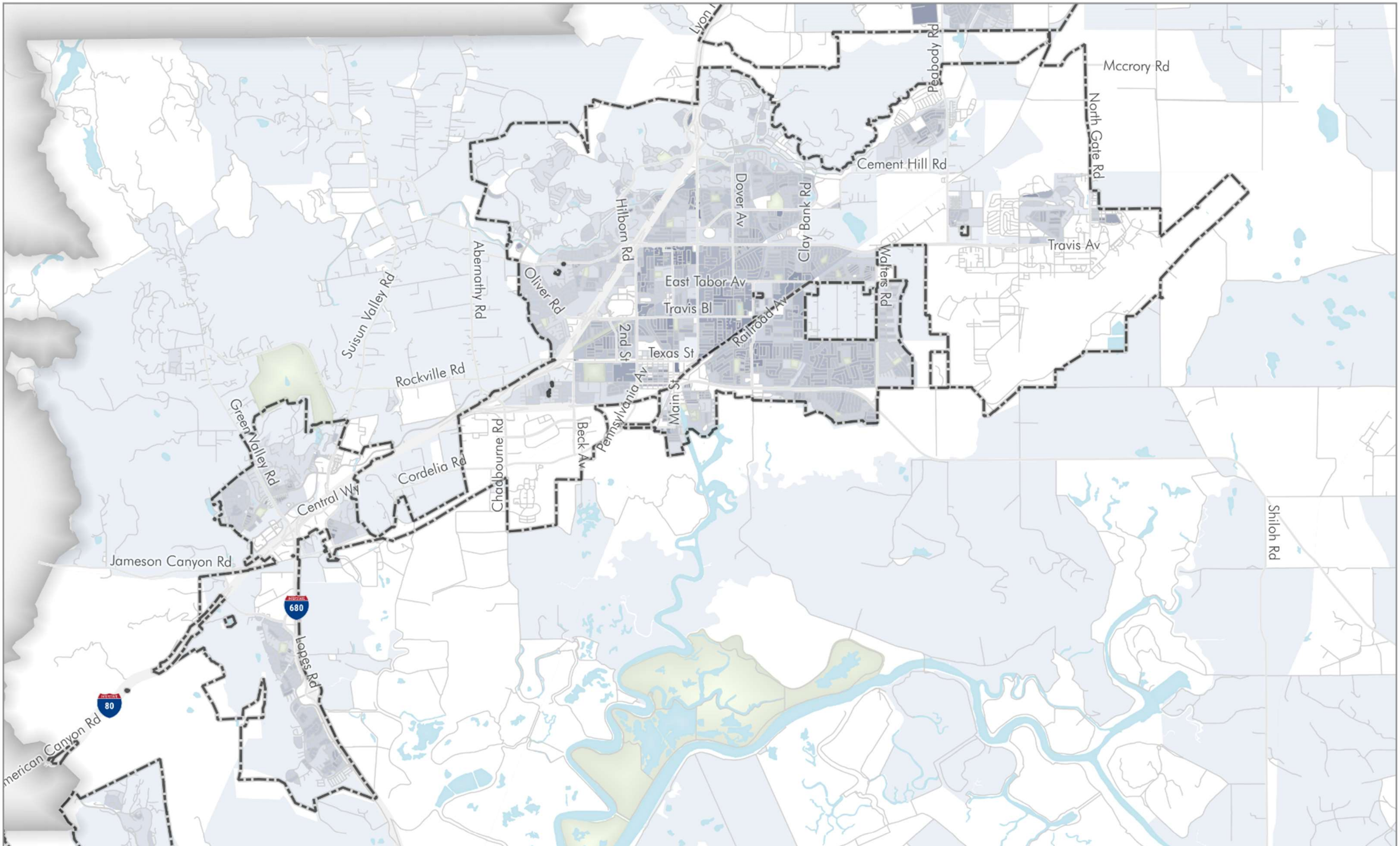
Railroads

Parks

Water

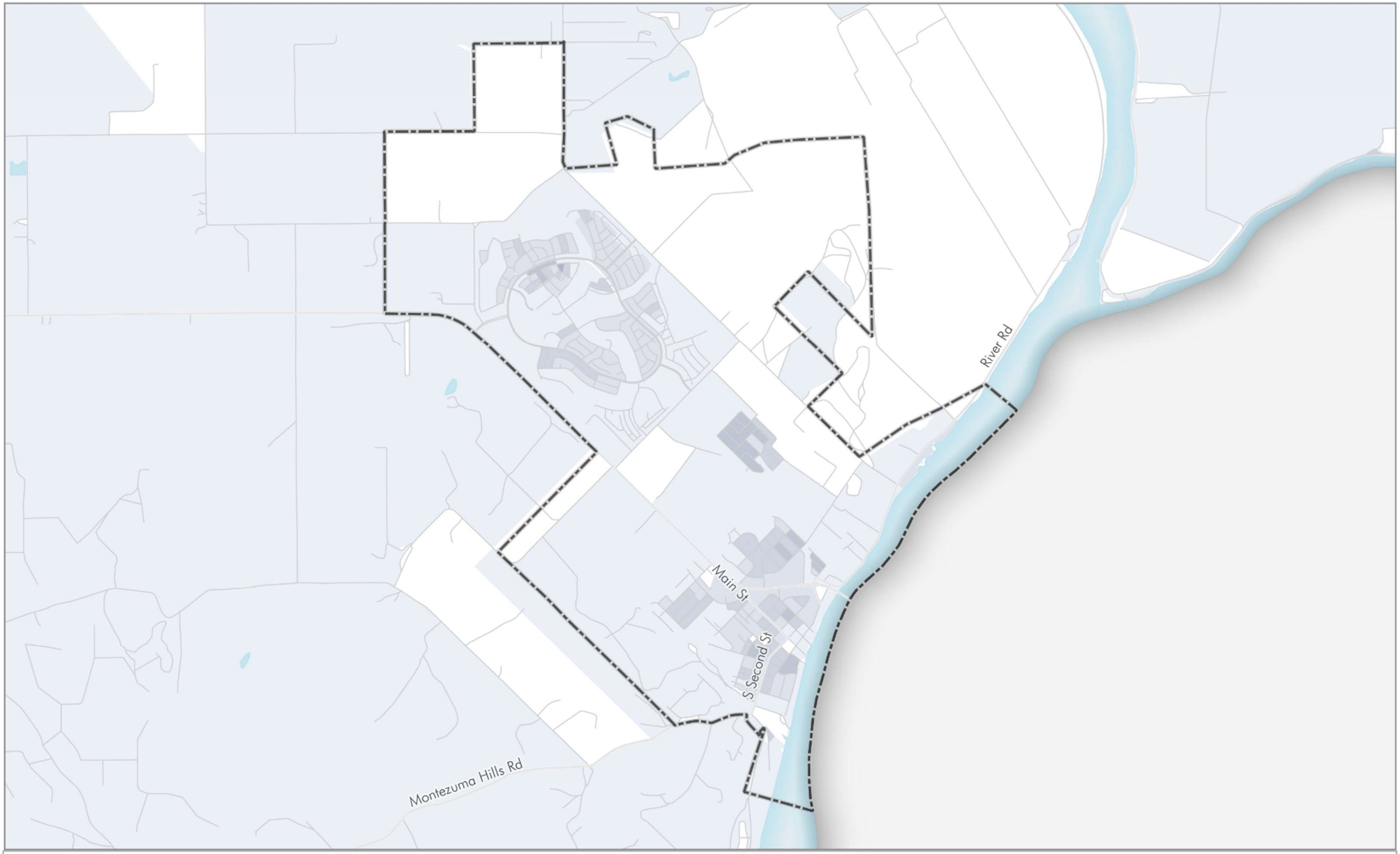
Solano Transportation Authority

0 0.3 0.6 mi



Solano Countywide Active Transportation Plan: Fairfield Overall Potential Demand

STA
Solano Transportation Authority



Solano Countywide Active Transportation Plan: Rio Vista Overall Potential Demand

Demand

Low High

Jurisdiction

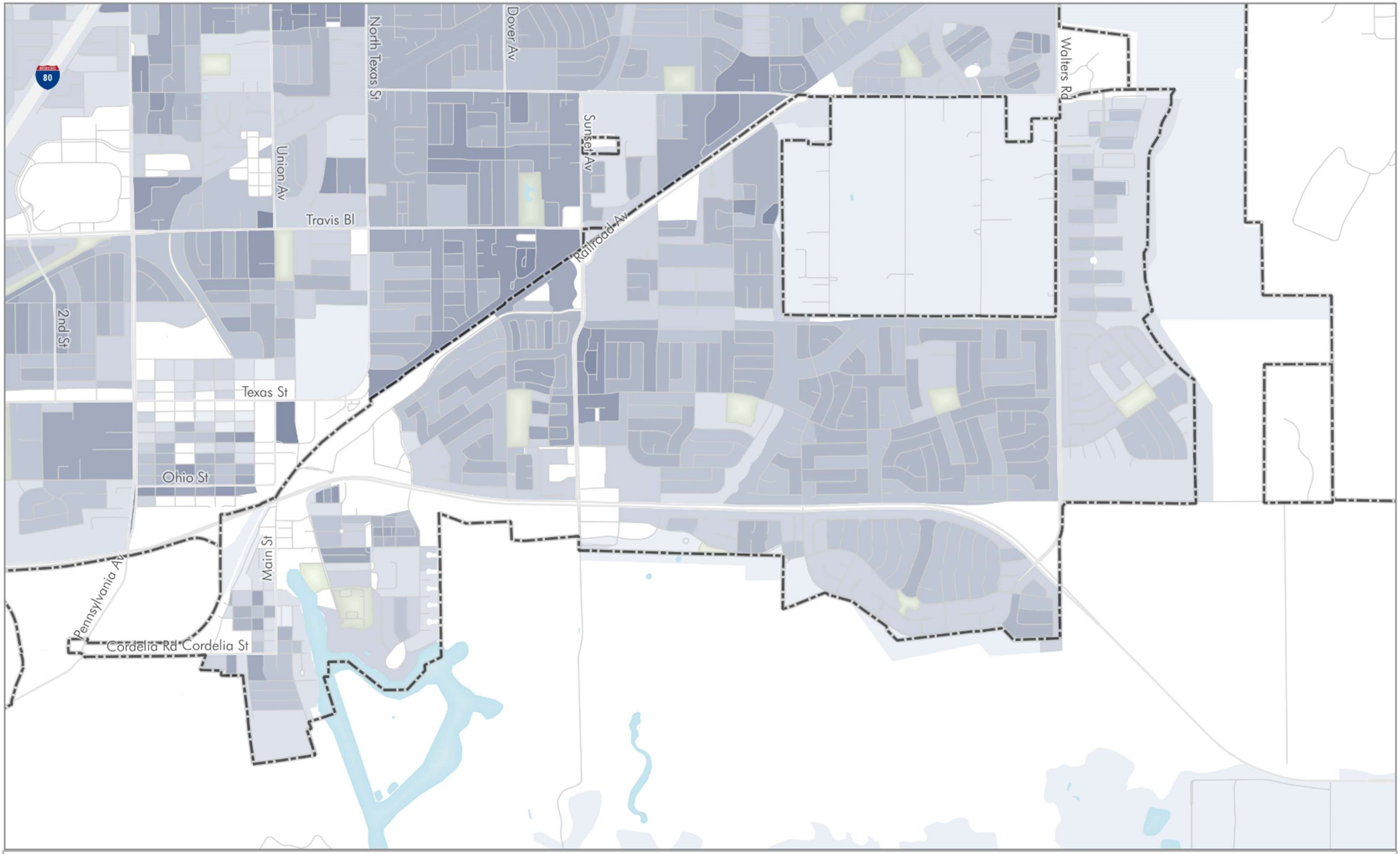
Railroads

Parks

Water

Solano Transportation Authority

0 0.19 0.38 mi



Solano Countywide Active Transportation Plan: Suisun City Overall Potential Demand

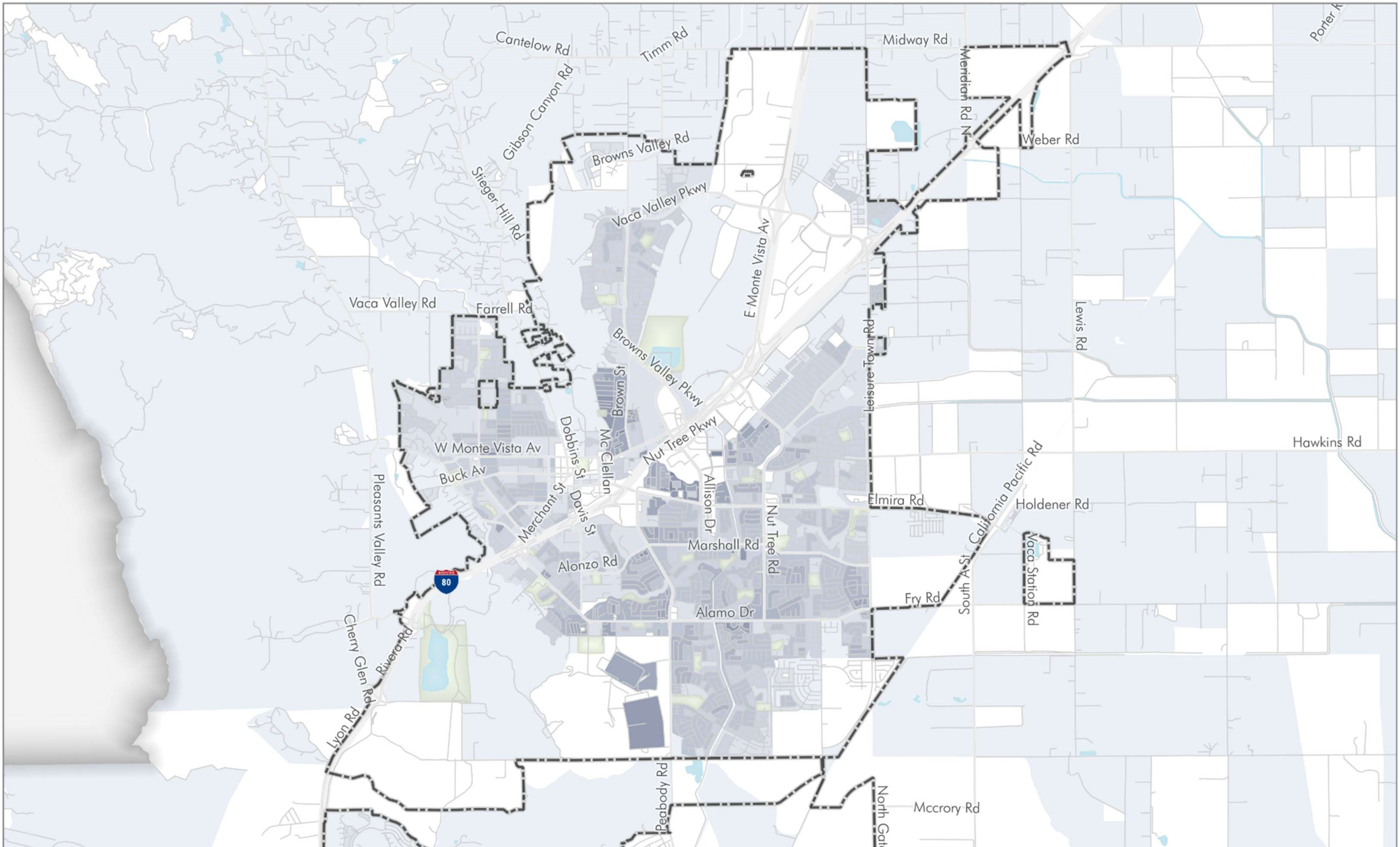
Demand

Low High

Jurisdiction
Railroads
Parks
Water

Solano Transportation Authority

0 0.12 0.24 mi



Solano Countywide Active Transportation Plan: Vacaville Overall Potential Demand

Demand

Low High

Jurisdiction

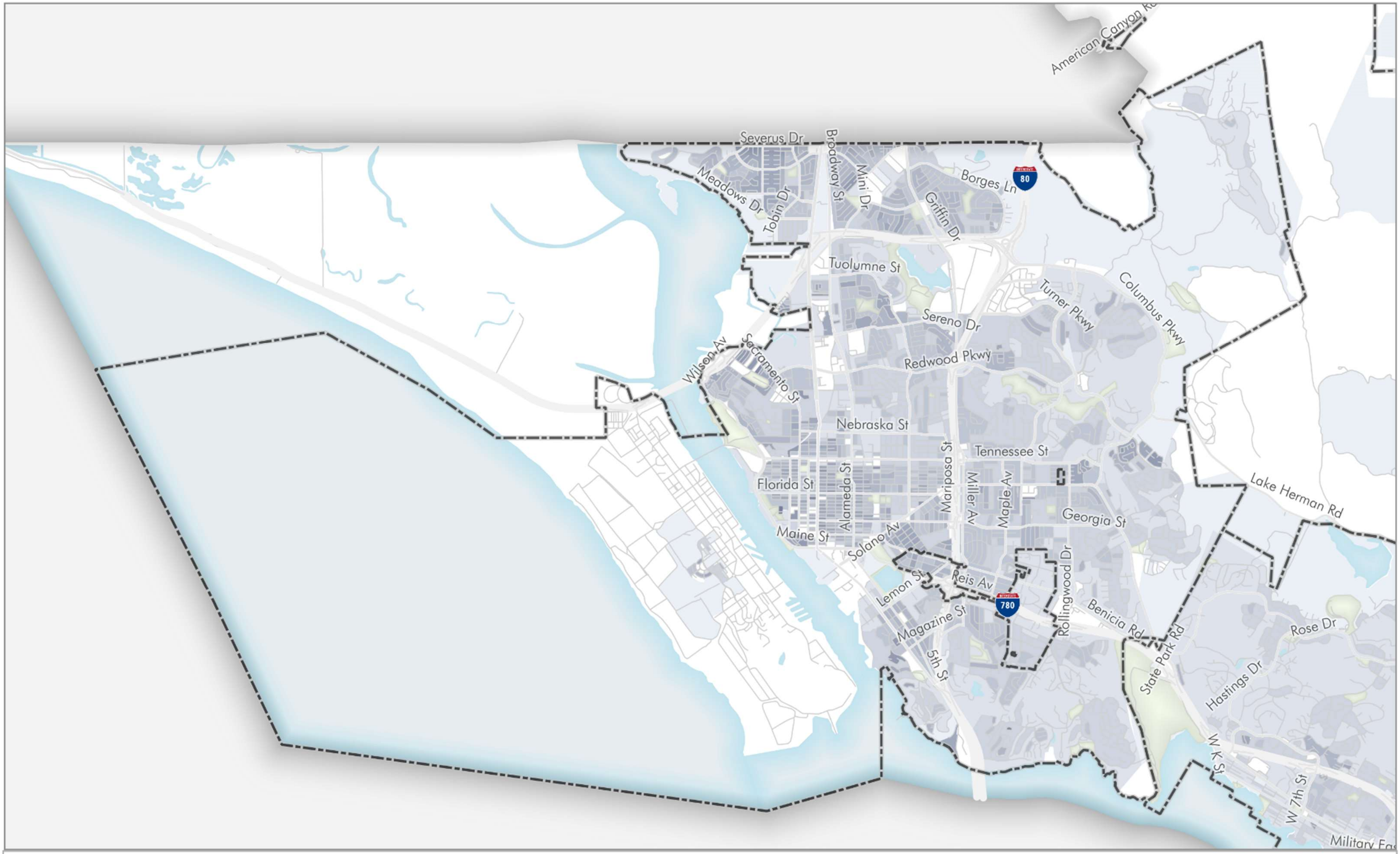
Railroads

Parks

Water

0 0.35 0.7 mi

Solano Transportation Authority



Solano Countywide Active Transportation Plan: Vallejo Overall Potential Demand

TOOLE DESIGN

1635 BROADWAY
SUITE 200
OAKLAND, CA 94612

510.298.0740
TOOLEDESIGN.COM

MEMORANDUM

January 28, 2020

To: Cory Peterson
Organization: Solano Transportation Authority
From: Patrick Gilster, AICP; Laura Krull; and Sara Rauwolf
Project: Solano Countywide Active Transportation Plan

Re: Task 5.4: Countywide Needs Analysis – Attractors Generators Analysis

Overview

Toole Design Group (TDG) completed two interrelated analyses: a latent demand (Task 5.1) and attractor/generator analysis (Task 5.4). The goal of an attractors/generators analysis was to develop an understanding of what trips are most in demand and likely to occur by bicycle or walking. The result is a conceptual network linking regional activity centers. Toole Design Group then ran the analysis at two scales; once countywide and then again for within each of the seven (7) jurisdictions. The analysis consisted of four steps, outlined below:

1. Measuring demand, including attractors and generators
2. Identifying activity centers
3. Calculating trip-making potential between activity centers
4. Determining Origin-Destination (O-D) pairs

An attractors/generators analysis was conducted for Solano County to inform active transportation corridors between key destinations. This analysis is also referred to as a gravity model in travel demand models. The goal of the analysis is to develop an understanding of what trips are most in demand and likely to occur by bicycling or walking. The score is an estimate of the total number of trips that could occur between two destinations, while factoring in the distance between destinations. As the size of objects increases – in this case the amount of demand at a location – the gravitational pull increases. Conversely, as the distance between locations increases the gravitational pull decreases. The result is a conceptual network linking key destinations.

Measuring Demand

For the demand analysis, Toole Design Group selected demand factors that are related to areas that are likely to generate and attract active transportation trips in order to develop a composite demand score. Therefore, the composite demand is broken up into two types distinct demand: generator factors and attractor factors. Each factor is aggregated to a quarter-mile area for each jurisdiction and a two-mile area for the countywide analysis.

Generator factors are trip origins and consist of factors that create demand, with a focus on home-based trips. Attractor demand factors are trip destinations and consist of factors that attract demand, such as schools, parks or other locations that people are likely to bike or walk to. This represents the potential number of trips that a destination attracts. The composite score takes into account that many areas of these sizes (1/4-mile or 2-mile) contain uses that likely both generate and attract trips.

Generator Factors

Generators represents the potential number of trips that originate from a location. These variables are measured as density (people per square mile) as summarized in **Error! Reference source not found.**, and detailed in **Countywide Needs Analysis – Generators Demand Memo.**

Table 1. Recommended Demand Factors (Generators)

Factor	Geography	Data Source
Total Population	Census block	2016 U.S. Census 5-year estimates
Low-Income Population*	Census block group	2016 U.S. Census 5-year estimates
Zero-Car Population density*	Census block group	2016 U.S. Census 5-year estimates
Density of population over 65	Census block group	2016 U.S. Census 5-year estimates
Density of population under 18	Census block group	2016 U.S. Census 5-year estimates

Attractors

Key trip attractions were determined based on research for what destinations individuals are most likely, or willing, to bike and walk to. These destination categories are outlined in Table 2. A smaller subset of these destination categories, identified by STA as key regional destination categories, were used for the countywide analysis, as shown in Table 3.

Prioritization

After the base trip rate for each factor was calculated, the rate was adjusted based on each jurisdiction's destination prioritization preferences from the first phase of community engagement for the project as shown below.

Priority	Adjustment Factor
High Priority	1.2
Medium Priority	1
Low Priority	0.8

Table 2. Attractor Demand Factors, Jurisdictions

Factor	Variable	Distance	Rate
Transit Stops	Proximity to Transit Centers	1.0 miles	Ridership
	High ridership/frequency bus stops	0.5 miles	Ridership estimate
Employment	Employment density	N/A	Jobs per SF
Higher Education	Proximity to universities, colleges, community colleges	1 mile	Enrollment estimate
Schools	Proximity to elementary, middle and high schools	0.5 miles	Enrollment estimate
Parks*	Proximity to parks	0.25 miles	ITE trip generation rate
Neighborhood Commercial	Proximity to commercial	0.25 miles	ITE trip generation rate
Downtown/High Pedestrian Activity Areas	Proximity to Downtown		ITE trip generation rate
Major Retail Areas	Proximity to retail	0.5 miles	ITE trip generation rate
Government Services/Hospitals	Proximity to services	0.25 miles	ITE trip generation rate
Libraries	Proximity to libraries	0.25 miles	ITE trip generation rate
Entertainment Options	Proximity to entertainment	0.50 miles	ITE trip generation rate
Public Input Points	Density of public input destinations	N/A	Density of points

*For factors that do not have a direct means to determine potential trips, the average ITE trip generation rate (9th edition) is used for that category. This rate is shown as trips per 1,000 square feet. Neighborhood commercial uses category 820 Shopping Center. Major retail areas uses category 857 Discount Club. Government Services/Hospitals uses the average of code 730 Government Office Building, and code 610 Hospital. Library uses code 590 Library. Parks is the average of the recreational categories city park, regional park, and county park. Entertainment Options uses code 445 Multiplex Movie Theater but should be adjusted based on the types of entertainment options identified.

Table 3. Attractor Demand Factors, Countywide

Factor	Variable	Distance	Rate
Transit	Transit Centers	1.0 miles	Ridership
Employment	Employment density	N/A	Jobs per SF
Higher Education	Proximity to universities, colleges, community colleges	1 mile	Enrollment estimate
Regional Parks*	Proximity to parks	0.25 miles	ITE trip generation rate
Regional Commercial	Proximity to commercial	0.25 miles	ITE trip generation rate
Downtown/High Pedestrian Activity Areas	High pedestrian potential	N/A	ITE trip generation rate
Public Input Points	Density of public input destinations	N/A	Density of points

Identifying Activity Centers

Activity centers represent locations where there are a high number of trips being attracted and generated. These types of locations consist of downtown areas, densely populated centers of jurisdictions, major employment centers, major shopping centers, and other areas. These activity centers were used as the origins and destinations in the attractors and generators analysis, and were identified as the areas with the highest potential trips (the sum of attractor and generator trips).

Calculating Trip-making Rate Between Activity Centers

The attractiveness of travel between two activity centers was determined using the amount of demand in each activity center and the distance between the zones. Following the common modeling technique of a gravity model, the trip demand between the activity centers is determined by multiplying the demand of each activity center by the impedance.

$$T_{1,2} = (T_1 * T_2) * P_{trips}$$

where:

$T_{1,2}$= Trip making rate between activity center 1 and activity center 2
T_1= Total trips attracted and generated at activity center 1
T_2= total trips attracted and generated at activity center 2
P_{trips}= Percent of trips estimated to occur by bicycle between the two activity centers based on distance

Distance and the Impedance Factor

This analysis uses the Euclidean distance (as the crow flies) between two destinations to measure distance. As distance increases, the percent of trips occurring decreases or decays, at an exponential rate. Each distance is therefore converted to a percent of trips, using the following exponential function[1][2]:

$$P_{trips} = 0.4018 * e^{-0.2x}$$

For this equation, the percentage of bicycle trips that occur decreases exponentially as distance increases. For example, according to the bicycle distance decay function, approximately 40% of trips occur within less than 1 mile, and 86% occur at less than six miles.

Determine O-D Pairs

After the trip making rate between two activity centers is calculated, the top 25 pairs were selected countywide and the top 10 pairs within each jurisdiction were selected, based on the trip making rate. These pairings are documented in the following sections for each jurisdiction individually and separately for countywide pairs.

Next Steps

Connectivity between the highest demand pairings will be evaluated in the Task 5.3 Network Gap Assessment. The "on-the-ground" bicycle and pedestrian routes will be developed that correspond with each "as the crow flies" straight line between pairs during Task 5.3 and be presented as part of the Task 6 Countywide Recommendations. The network to be established will be known as the Countywide Backbone Network.

The Task 5.3 Network Gap Assessment will identify the following along the Countywide Backbone Network:

1. Bike Network: Gaps in existing facilities
2. Bike Network: High-stress locations that function as barriers for all ages and abilities to travel
3. Pedestrian Network: Sidewalk gaps

[1] Distance decay functions vary by mode and purpose. For this analysis, the function used for bicycle trips is the function for bike and walk work trips.

[2] Iacono, Michael, et al. *Access to Destinations: How Close is Close Enough? Estimating Accurate Distance Decay Functions for Multiple Modes and Different Purposes (2008).*

Benicia

All the pairs start or end in downtown, linking downtown to residential, commercial and industrial/employment areas around the city. See Table 4 for descriptions on the pairs, and Figure 1 and Figure 2 for the composite demand and the illustrated calculated composite trip demand between activity centers.

Table 4 Top Activity Center Pairs, Benicia

Jurisdiction	Activity Center 1	Activity Center 2	Calculated Composite Trips Demand	Reference Number	Description[3]
Benicia	Downtown	Downtown	4,374,219	1	Downtown near 1st and East Street to Military East and East 3rd Street
	Downtown	Downtown	3,468,774	2	Downtown near 1st and East Street to Military East and East 5th Street
	Commercial	Downtown	3,380,387	3	Downtown near 1st and East Street to Safeway on Military East
	Residential/ commercial	Downtown	3,121,861	4	Downtown near 1st and East Street to Riverhill Drive and Benicia City Cemetery
	Downtown	Residential/ commercial	3,043,009	5	Downtown near 1st and East Street to Southhampton Shopping Center
	Downtown	Residential/School	2,780,564	6	Downtown near 1st and East Street to Benicia High School
	Industrial	Downtown	1,770,253	7	Downtown near 1st and East Street Industrial Way and Lake Herman Road
	Commercial	Downtown	1,712,542	8	Downtown near 1st and East Street to Parkway Plaza
	Industrial/ Employment	Downtown	1,600,070	9	Downtown near 1st and East Street to East 3nd street and Lake Herman Road
	Downtown	Downtown	1,030,869	10	Downtown near East 3rd Street to downtown near East 5th Street

[3] Note that while a point may be described, the demand is summed at the scale of a quarter mile hexagon.

Figure 1 Composite Demand, Benicia

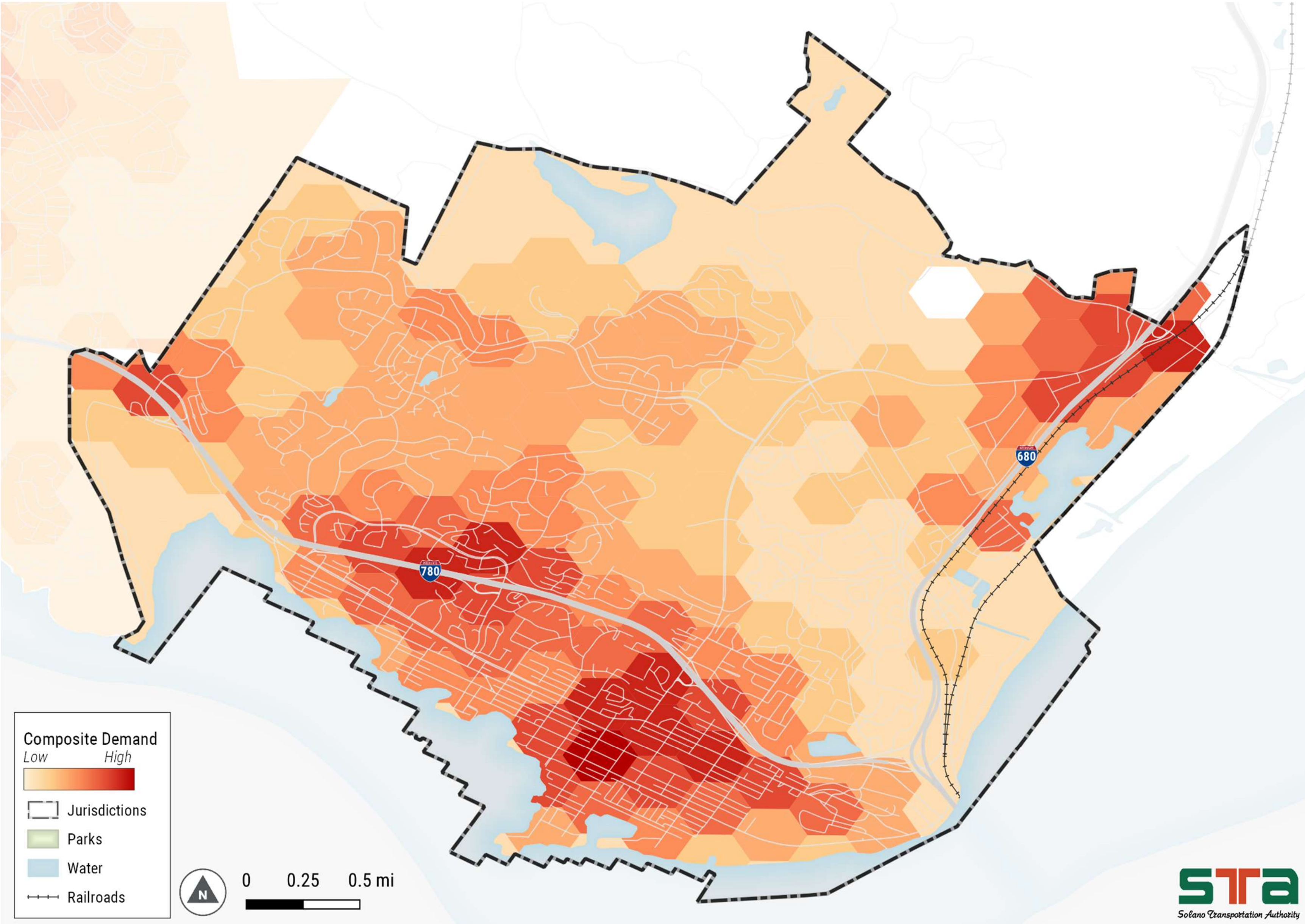
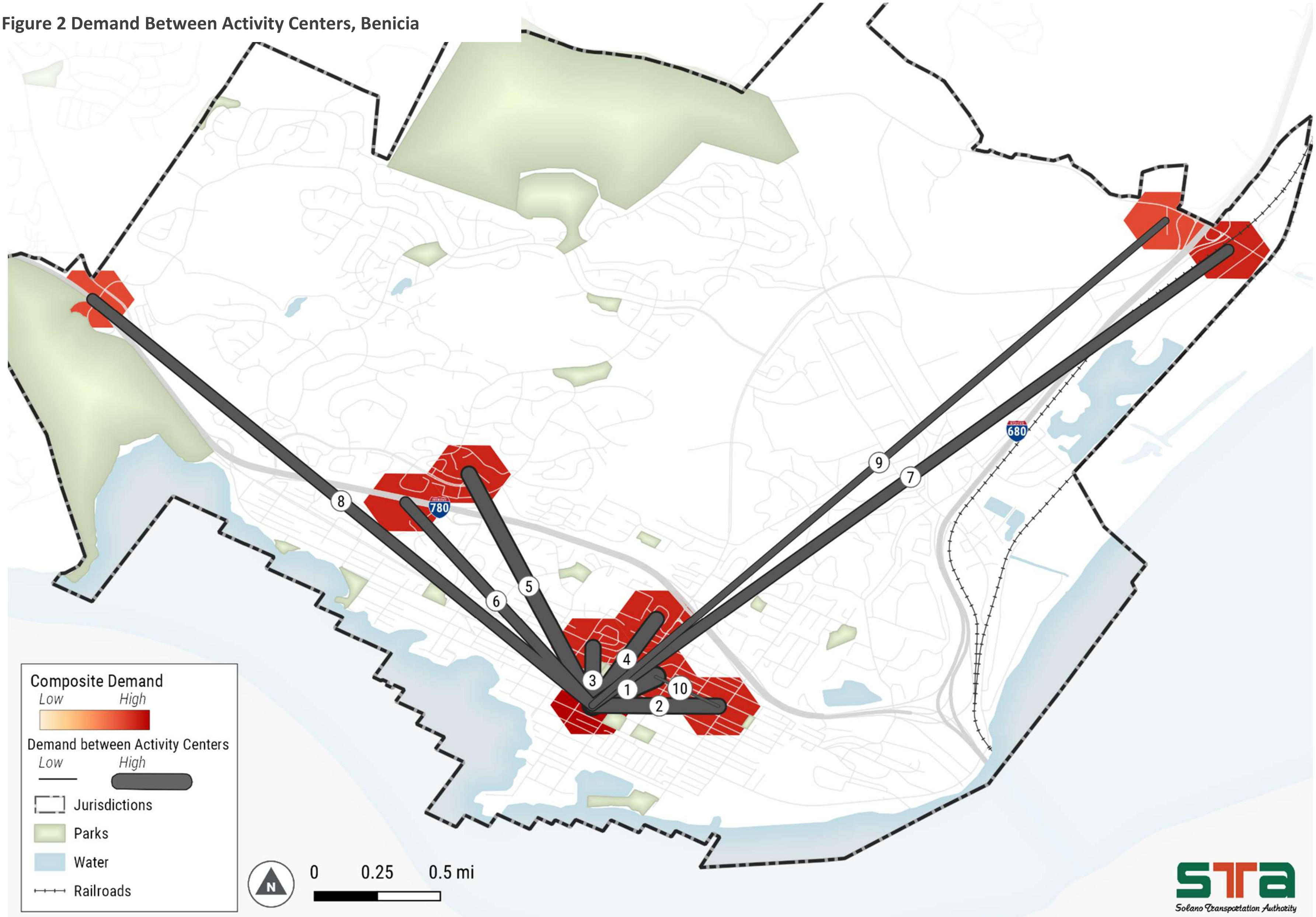


Figure 2 Demand Between Activity Centers, Benicia



Dixon

Most of the pairs start or end in downtown, with other activity centers including residential areas, schools, and commercial areas. See Table 4 for descriptions on the pairs, and Figure 1 and Figure 2 for the composite demand and the illustrated calculated composite trip demand between activity centers.

Table 5 Top Activity Center Pairs, Benicia

Jurisdiction	Activity Center 1	Activity Center 2	Calculated Composite Trips Demand	Reference Number	Description
Dixon	Residential/park	Downtown	4,347,777	1	Downtown near West A Street and North Jackson Street to East Broadway Street and South 3rd Street
	School	Downtown	3,619,734	2	Downtown near West A Street and North Jackson Street to Linford L. Anderson Elementary School
	Residential	Downtown	3,227,431	3	Downtown near West A Street and North Jackson Street to CA 113 and West H Street
	School	Residential/ park	2,122,609	4	East Broadway Street and South 3rd Street to Linford L. Anderson Elementary School
	Downtown	Residential/ commercial	2,091,553	5	Downtown near West A Street and North Jackson Street Safeway at North Lincoln and Watson Ranch Way
	Downtown	Residential	2,035,845	6	Downtown near West A Street and North Jackson Street to Stratford Avenue and Almond Street
	Residential	Downtown	1,983,671	7	Downtown near West A Street and North Jackson Street to CA 113 and Industrial Way
	Downtown	Residential	1,946,214	8	Downtown near West A Street and North Jackson Street to West F Street and Peterson Lane
	Downtown	Residential	1,942,844	9	Downtown near West A Street and North Jackson Street to West H Street and North Almond Street
	Residential/park	Residential	1,823,303	10	East Broadway Street and South 3rd Street to CA 113 and West H Street

Figure 3 Composite Demand, Dixon

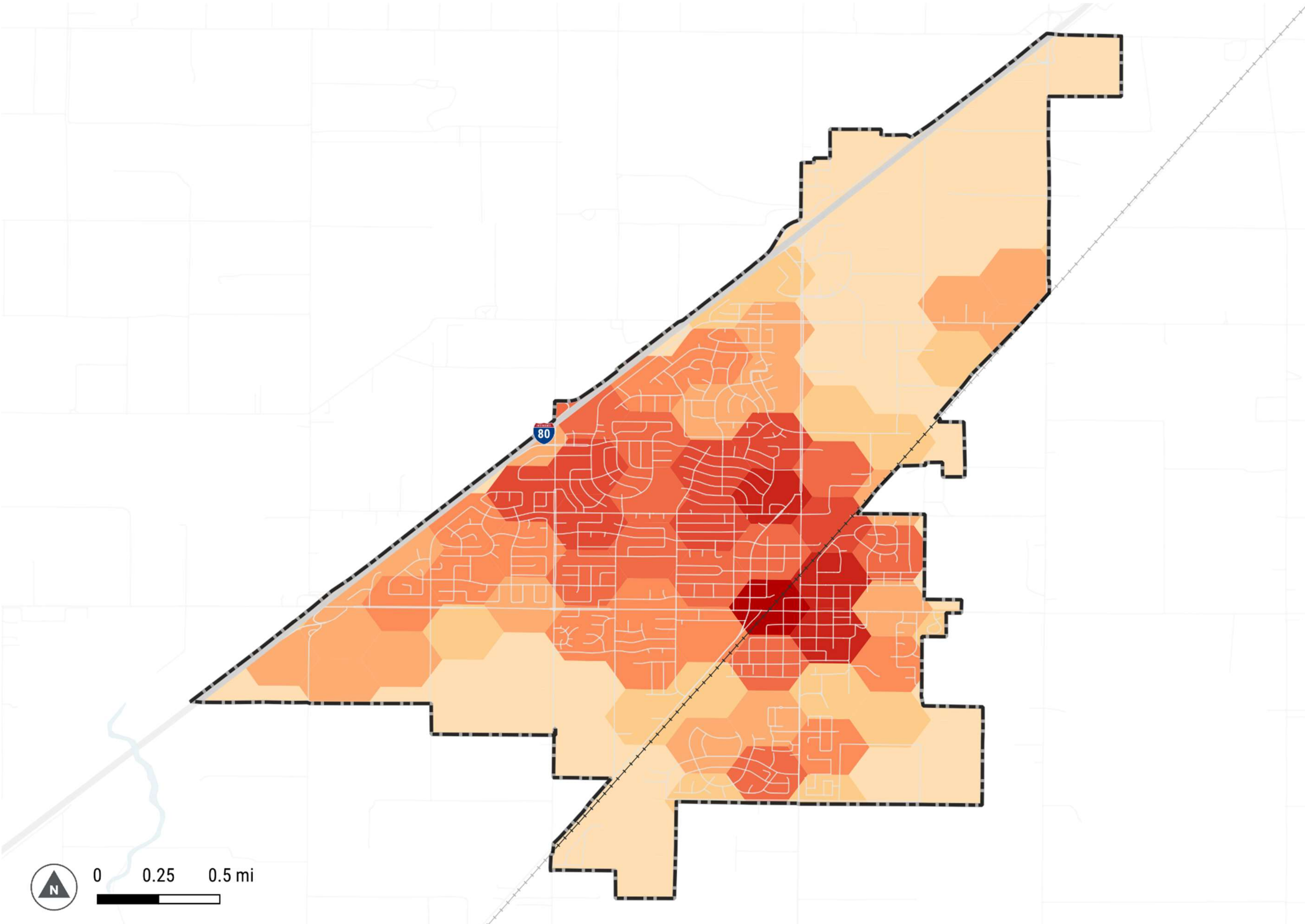
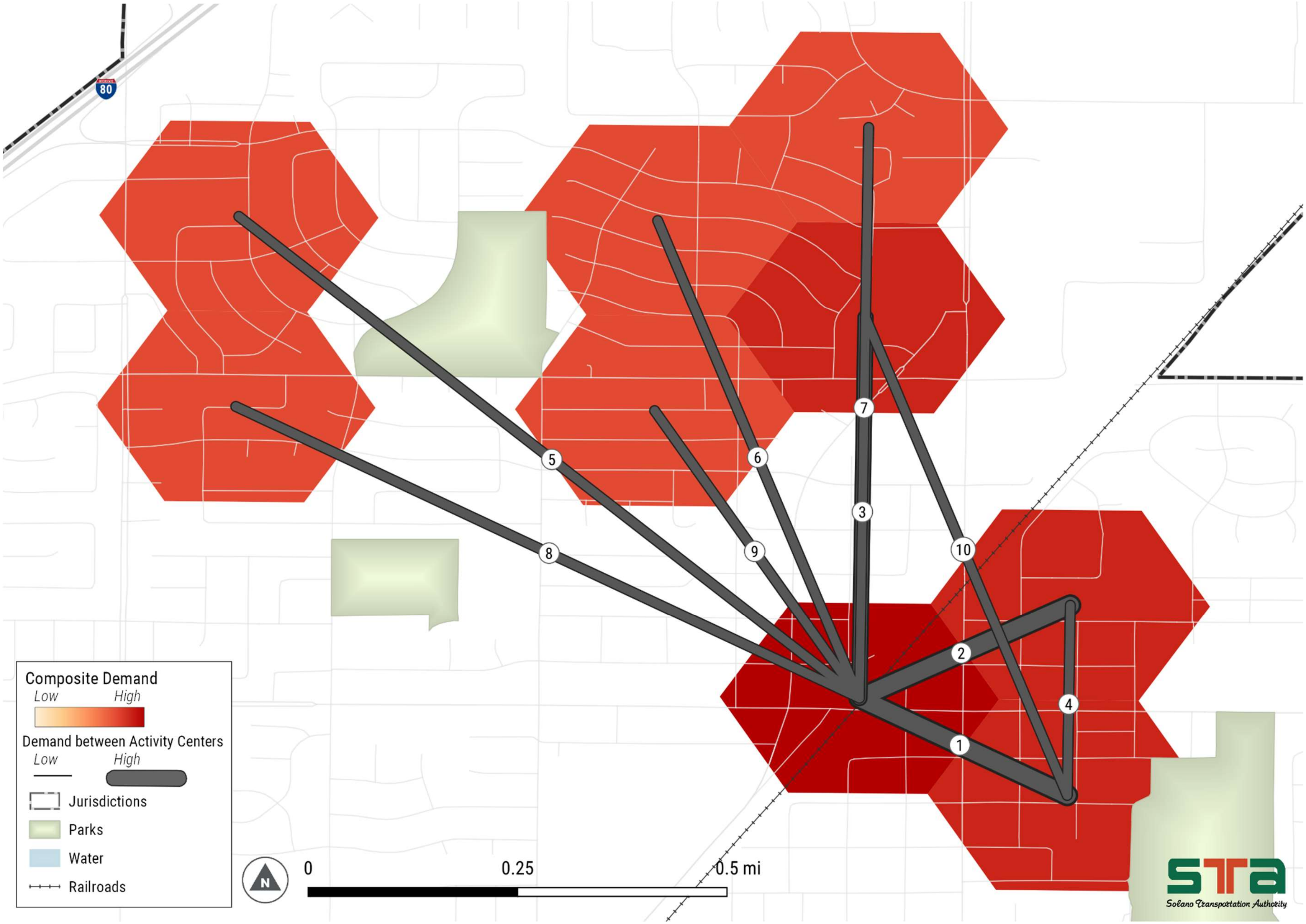


Figure 4 Demand Between Activity Centers, Dixon



Fairfield

Most of the activity centers are congregated around downtown. The activity centers link government services (for both Fairfield and the county), as well as other residential areas in the city. See Table 6 for descriptions on the pairs, and Figure 5 and Figure 6 for the composite demand and the illustrated calculated composite trip demand between activity centers.

Table 6 Top Activity Center Pairs, Benicia

Jurisdiction	Activity Center 1	Activity Center 2	Calculated Composite Trips Demand	Reference Number	Description
Fairfield	Government	Downtown	24,854,686	1	Downtown near Texas Street and Jackson Street to Solano County government services at Texas Street and Union Avenue
	Residential	Downtown	19,647,475	2	Downtown near Texas Street and Jackson Street to Webster Street and Utah Street
	School	Downtown	18,180,440	3	Downtown near Texas Street and Jackson Street to Armijo High School
	Downtown	Government	15,489,003	4	Downtown near Texas Street and Jackson Street to Fairfield government services at Kentucky Street and Pennsylvania Ave
	Residential	Downtown	10,158,802	5	Downtown near Texas Street and Jackson Street to Union Avenue and Peach Tree Drive
	Government	Residential	10,129,896	6	Solano County government services at Texas Street and Union Avenue to Webster Street and Utah Street
	School	Government	9,778,175	7	Solano County government services at Texas Street and Union Avenue to Armijo High School
	Downtown	Commercial/ hospital/ residential	9,591,640	8	Downtown near Texas Street and Jackson Street to NorthBay Medical Center
	Government	Government	7,863,271	9	Fairfield government services at Kentucky Street and Pennsylvania Ave to Solano County government services at Texas Street and Union Avenue
	School	Residential	7,729,587	10	Armijo High School to Webster Street and Utah Street

Figure 5 Composite Demand, Fairfield

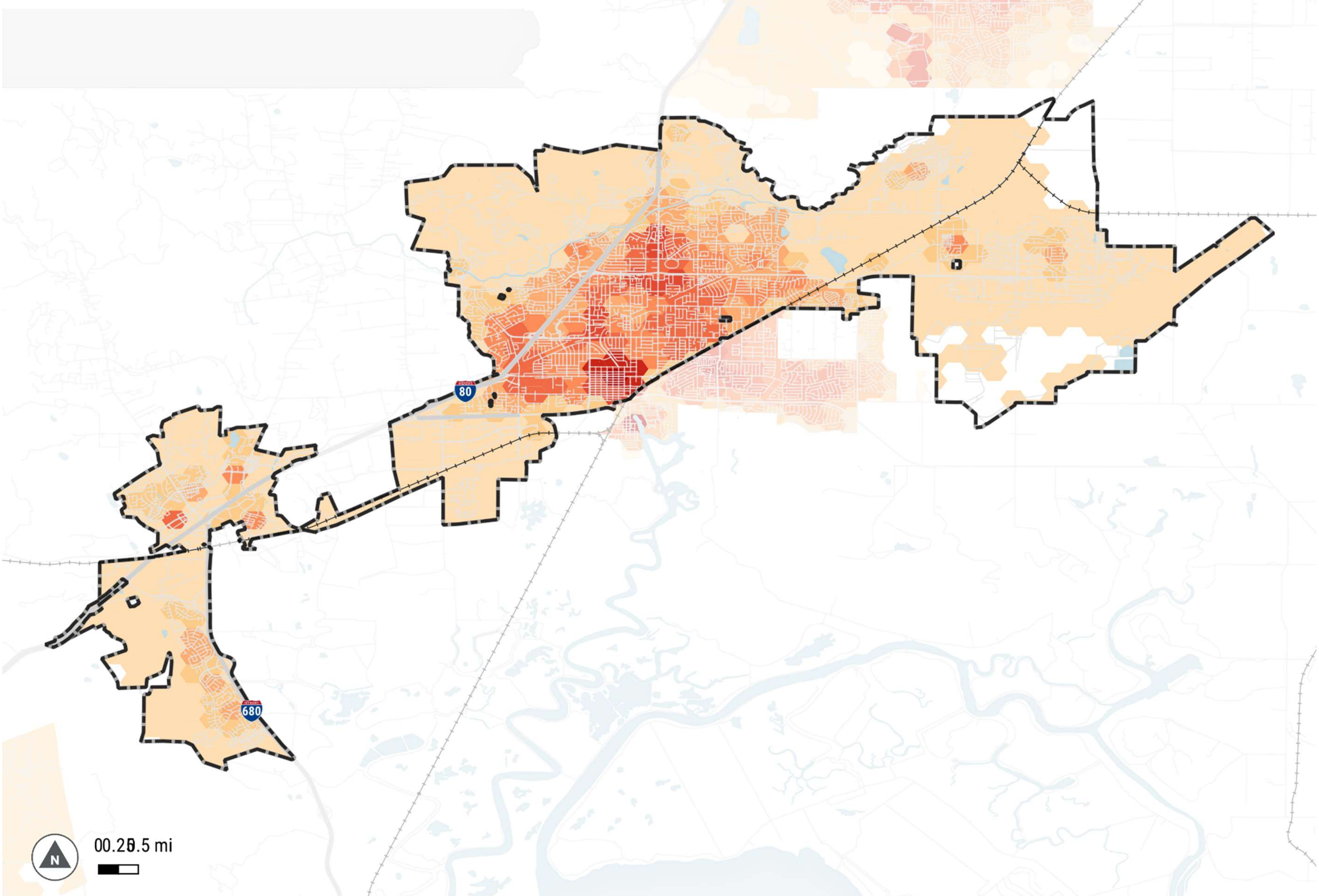
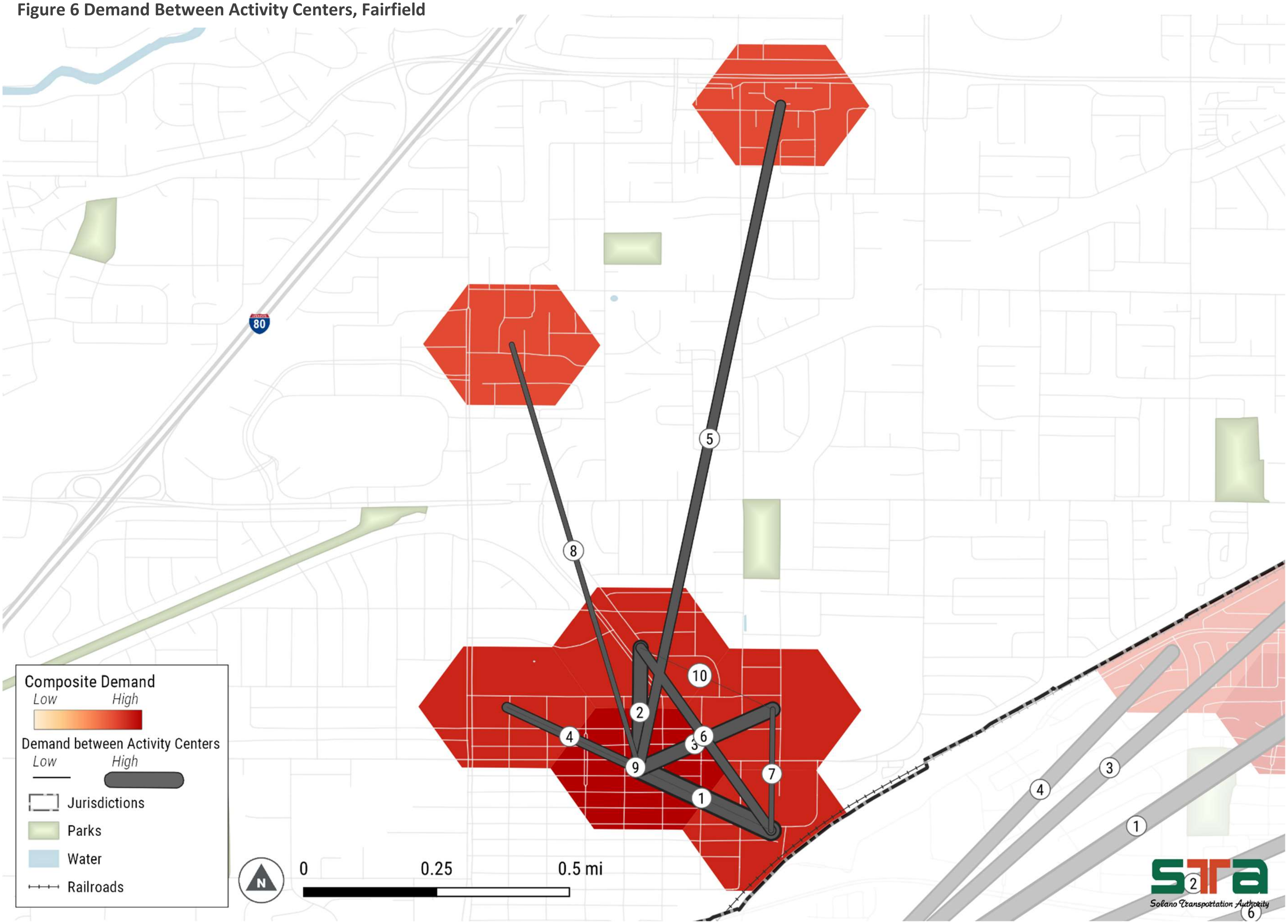


Figure 6 Demand Between Activity Centers, Fairfield



Rio Vista

Most of the pairs connect to downtown Rio Vista, connecting various residential areas to downtown. See Table 7 for descriptions on the pairs, and Figure 7 and Figure 8 for the composite demand and the illustrated calculated composite trip demand between activity centers.

Table 7 Top Activity Center Pairs, Rio Vista

Jurisdiction	Activity Center 1	Activity Center 2	Calculated Composite Trips Demand	Reference Number	Description
Rio Vista	Residential	Downtown	2,320,045	1	Downtown near MainStreet and South Front Street to Logan Street and North 5th Street
	Downtown	Residential, school	1,779,130	2	Downtown near Main Street and South Front Street to California Street and South 7th Street
	Downtown	Residential/ commercial	1,284,243	3	Downtown near MainStreet and South Front Street to Main Street and Hillside Terrace
	Residential	Downtown	1,281,515	4	Downtown near MainStreet and South Front Street to South Francis Way and Rolling Green Drive
	Downtown	Residential	1,223,870	5	Downtown near MainStreet and South Front Street to South 2nd Street and Santa Clara Street
	Downtown	Residential	824,115	6	Downtown near MainStreet and South Front Street to Madere Street and Fisher Street
	Downtown	Residential	772,944	7	Downtown near MainStreet and South Front Street to Rubler Way and Vieira Road
	Residential	Downtown	551,553	8	Downtown near MainStreet and South Front Street to Airport Road and Palisades Drive
	Residential	Downtown	484,892	9	Downtown near MainStreet and South Front Street to Church Road and Marks Road
	Residential	Residential, school	265,260	10	Logan Street and North 5th Street to California Street and South 7th Street

Figure 7 Composite Demand, Rio Vista

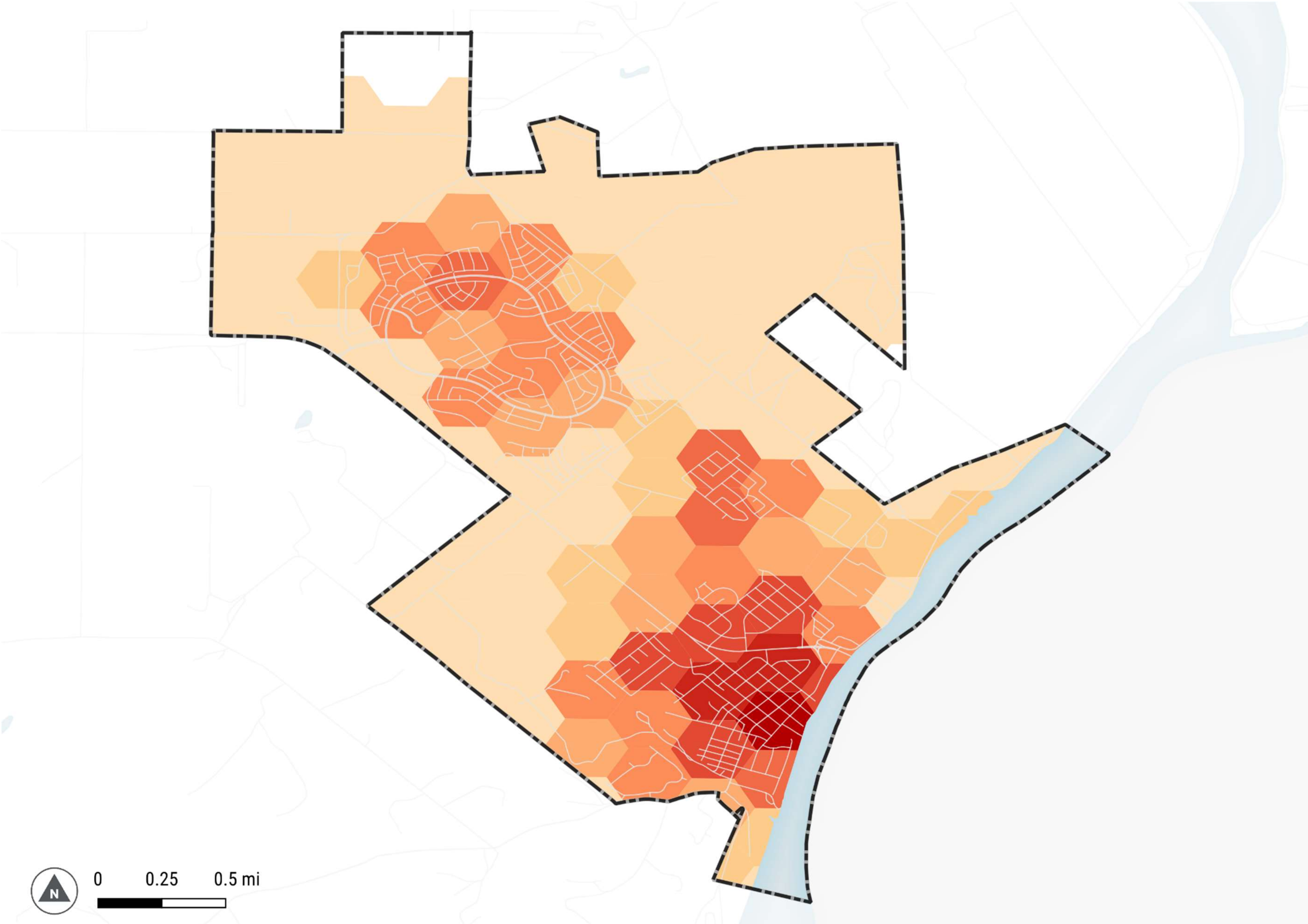


Figure 8 Demand Between Activity Centers, Rio Vista

Suisun City

Most of the pairs of activity centers originate or terminate in downtown and connect to various residential areas throughout the city. See Table 8 for descriptions on the pairs, and Figure 9 and Figure 10 for the composite demand and the illustrated calculated composite trip demand between activity centers.

Table 8 Top Activity Center Pairs, Suisun City

Jurisdiction	Activity Center 1	Activity Center 2	Calculated Composite Trips Demand	Reference Number	Description
Suisun City	Residential	Downtown	3,397,364	1	Downtown at Main Street and Solano Street to Sunset Avenue and Pintail Drive
	Residential	Downtown	2,888,117	2	Downtown at Main Street and Solano Street to Pintail Drive and Wigeon Way
	Residential	Downtown	2,853,623	3	Downtown at Main Street and Solano Street to Railroad Avenue and Sunset Avenue
	Residential	Downtown	2,542,585	4	Downtown at Main Street and Solano Street to Railroad Avenue and Village Drive
	Downtown	Residential	1,945,442	5	Downtown at Main Street and Solano Street to Pintail Drive and Crested Drive
	Downtown	Residential	1,922,063	6	Downtown at Main Street and Solano Street to Longspur Drive and Emperor Drive
	Downtown	Residential	1,751,033	7	Downtown at Main Street and Solano Street to Fulmar Drive and Pelican Way
	Downtown	Residential	1,650,383	8	Downtown at Main Street and Solano Street to Pintail Drive and Seagull Drive
	Downtown	Residential	1,581,581	9	Downtown at Main Street and Solano Street to Bella Vista Drive and Yosemite Way
	Residential	Residential	1,117,020	10	Sunset Avenue and Pintail Drive to Railroad Avenue and Sunset Avenue

Figure 9 Composite Demand, Suisun City

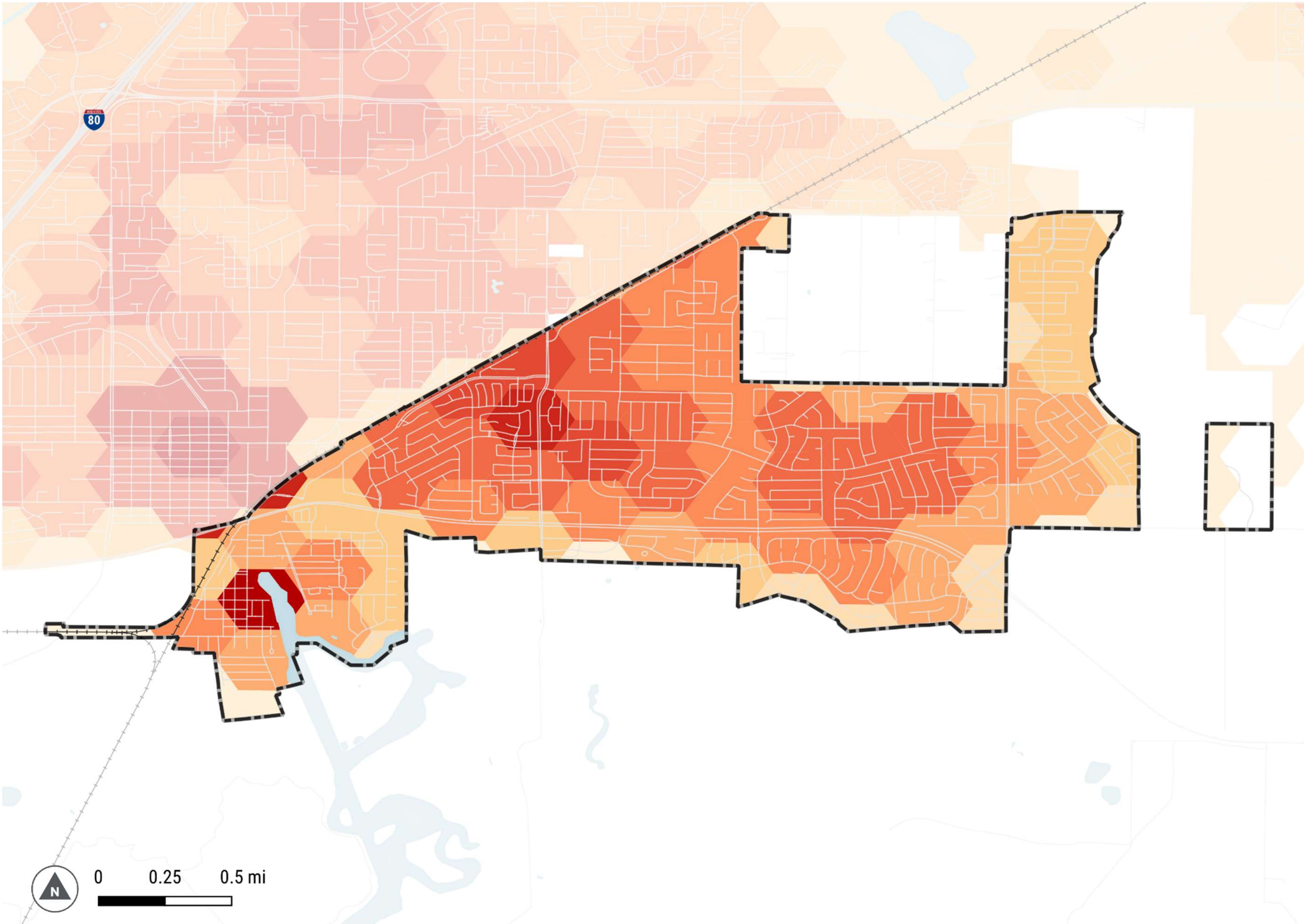
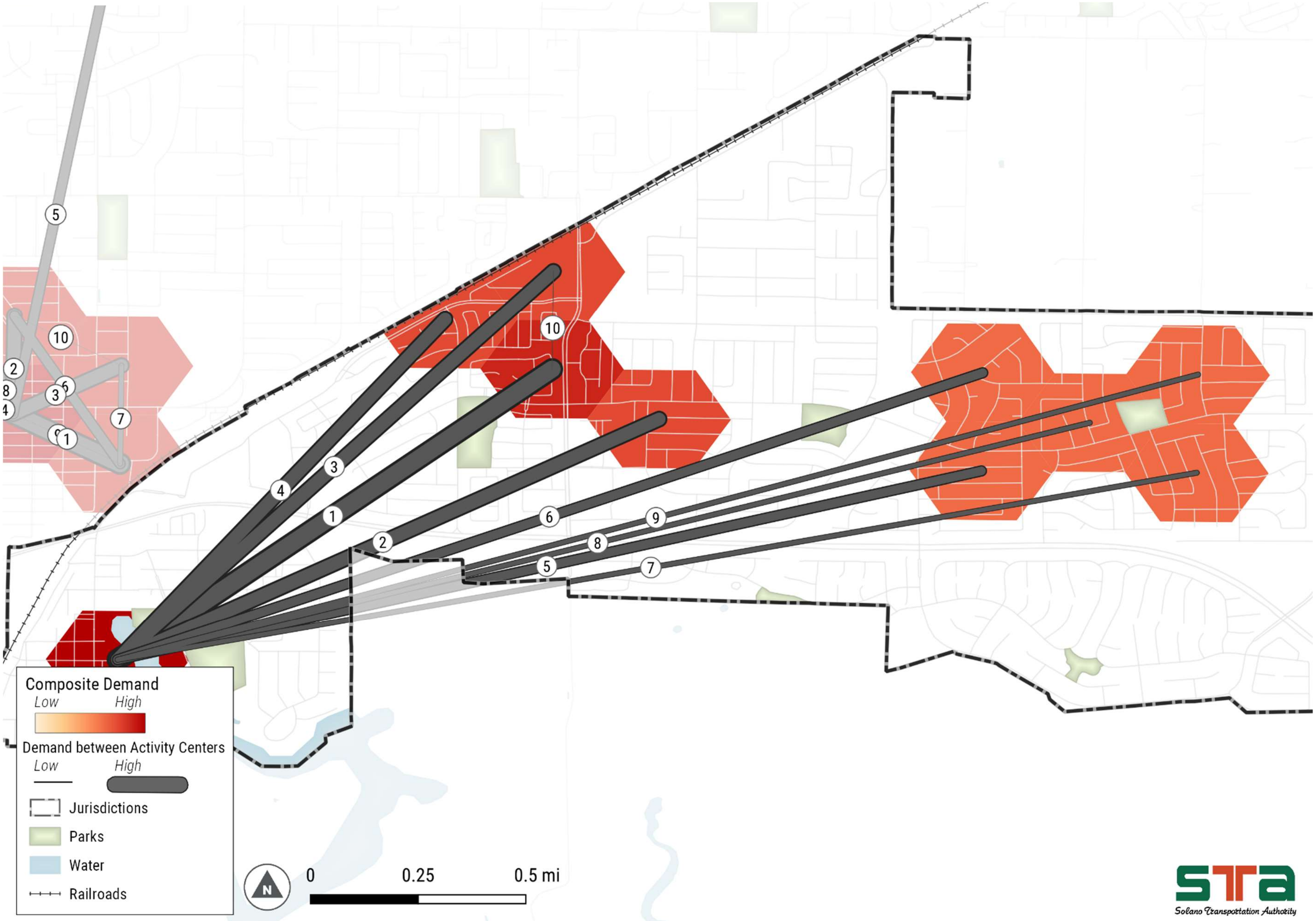


Figure 10 Demand Between Activity Centers, Suisun City



Vacaville

Most of the activity center pairs are congregated around downtown, with some connections to residential areas and medical services further away from downtown. See Table 9 for descriptions on the pairs, and Figure 11 and Figure 12 for the composite demand and the illustrated calculated composite trip demand between activity centers.

Table 9 Top Activity Center Pairs, Vacaville

Jurisdiction	Activity Center 1	Activity Center 2	Calculated Composite Trips Demand	Reference Number	Description
Vacaville	Downtown	Downtown/ residential	27,335,919	1	Downtown near Main Street and Dobbins Street to Cernon Street and Mason Street
	Downtown	Downtown	22,679,326	2	Downtown near Main Street and Dobbins Street to Mason Street and Davis Street
	Downtown	Downtown/ residential	17,834,958	3	Downtown near Mason Street and Davis Street to Cernon Street and Mason Street
	Downtown	School	12,257,845	4	Downtown near Main Street and Dobbins Street to Vacaville High School
	School	Downtown/ residential	9,639,535	5	Cernon Street and Mason Street to Vacaville High School
	Downtown	School	7,666,499	6	Vacaville High School to Mason Street and Davis Street
	School/ downtown	Downtown	7,555,749	7	Downtown near Main Street and Dobbins Street to Depot Street and Elmire Road
	Residential	Downtown	6,425,332	8	Downtown near Main Street and Dobbins Street to Brown Street and Hazel Street
	Medical	Downtown	6,330,863	9	Downtown near Main Street and Dobbins to California Medical Facility
	Residential/ school	Downtown	6,063,105	10	Downtown near Main Street and Dobbins Street to Markham Avenue and Brown Street

Figure 11 Composite Demand, Vacaville

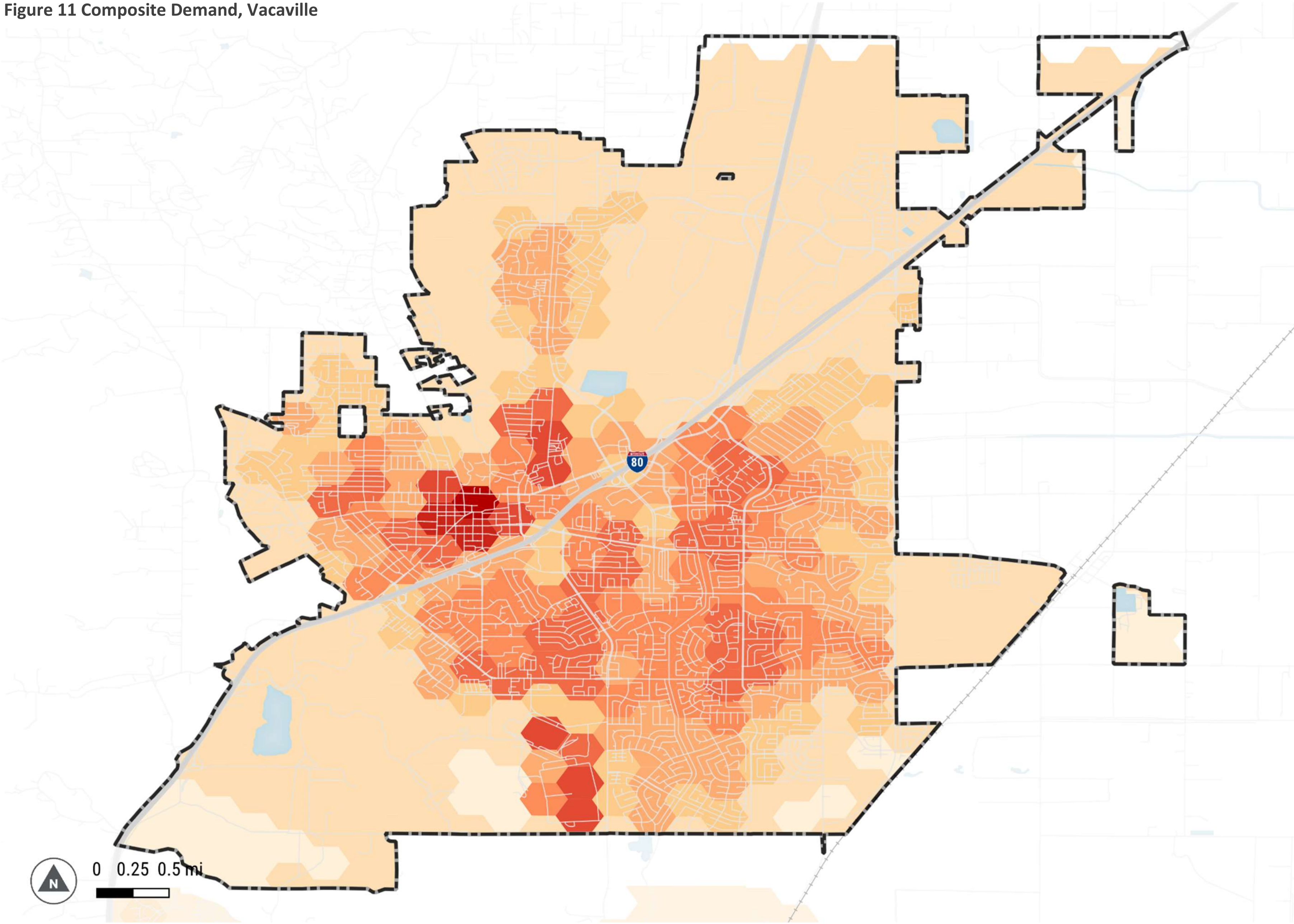
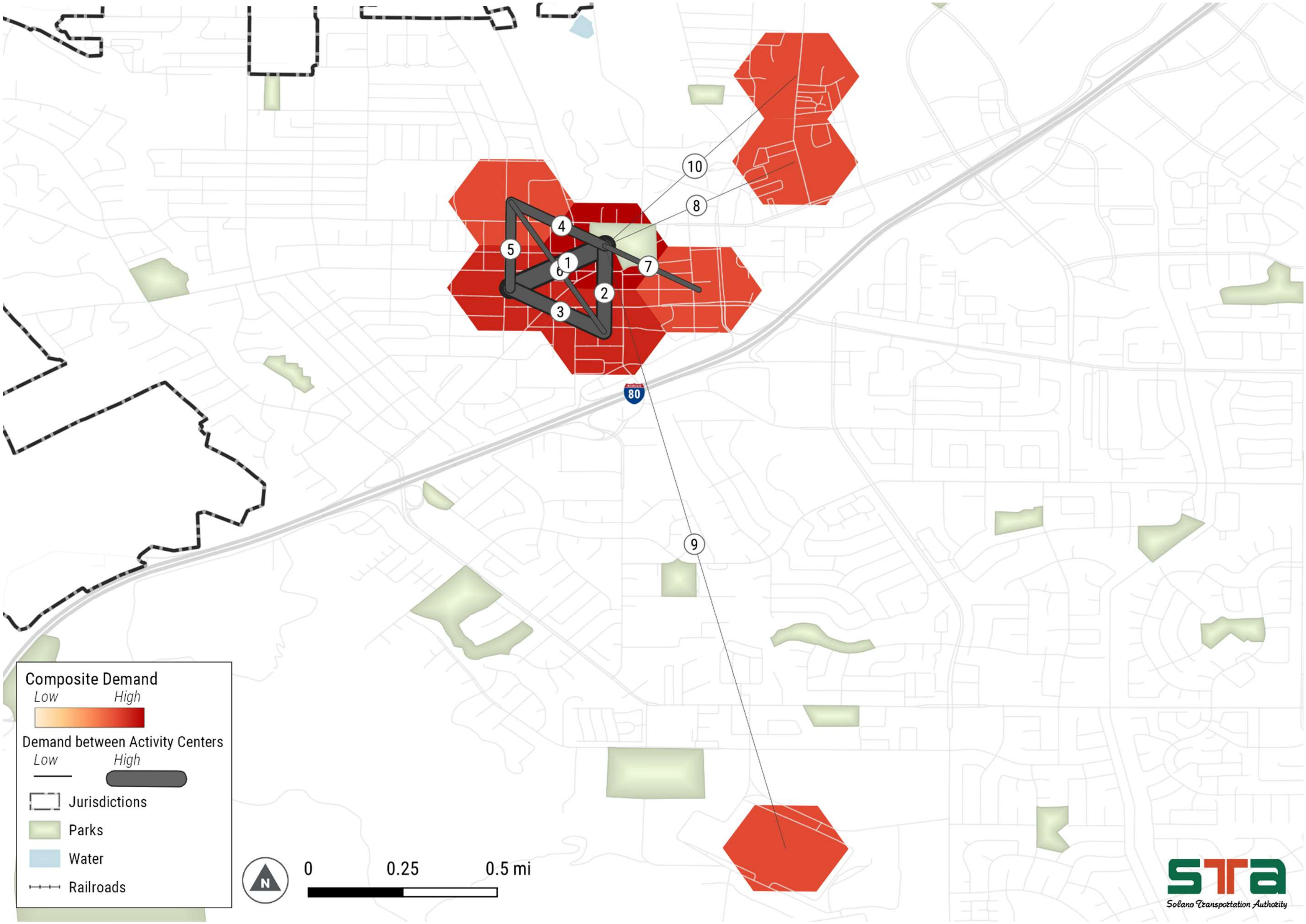


Figure 12 Demand Between Activity Centers, Vacaville



Vallejo

Most of the activity center pairs are congregated around downtown, with some connections to residential and medical facilities in other locations in the city. See Table 10 for descriptions on the pairs, and Figure 13 and Figure 14 for the composite demand and the illustrated calculated composite trip demand between activity centers.

Table 10 Top Activity Center Pairs, Vallejo

Jurisdiction	Activity Center 1	Activity Center 2	Calculated Composite Trips Demand	Reference Number	Description
Vallejo	Downtown	Downtown	43,437,544	1	Downtown near Carolina Street and Sacramento Street to downtown near York Street and Maine Street
	Downtown/residential	Downtown	34546,758	2	Downtown near Carolina Street and Sacramento Street to Napa Street and Virginia Street
	Downtown/residential	Downtown	29,926,252	3	Downtown near York Street and Maine Street to Napa Street and Virginia Street
	Downtown	Transportation	27,534,762	4	Downtown near Carolina Street and Sacramento Street to Marina Vista park
	Downtown	Transportation	23,852,086	5	Downtown near York Street and Maine Street to Marina Vista Park
	Downtown/residential	Transportation	18,184,996	6	Napa Street and Virginia Street to Marina Vista Park
	Residential	Downtown	15,613,775	7	Downtown near Carolina Street and Sacramento Street to Sacramento Street and Nebraska Street
	Residential/medical	Downtown	14,366,426	8	Downtown near Carolina Street and Sacramento Street to Serano Drive and North Camino Alto
	Residential	Downtown	13,704,681	9	Downtown near Carolina Street and Sacramento Street to Redwood Street and North Camino Alto
	Residential	Downtown	12,766,719	10	Downtown near York Street and Maine Street to Sacramento Street and Nebraska Street

Figure 13 Composite Demand, Vallejo

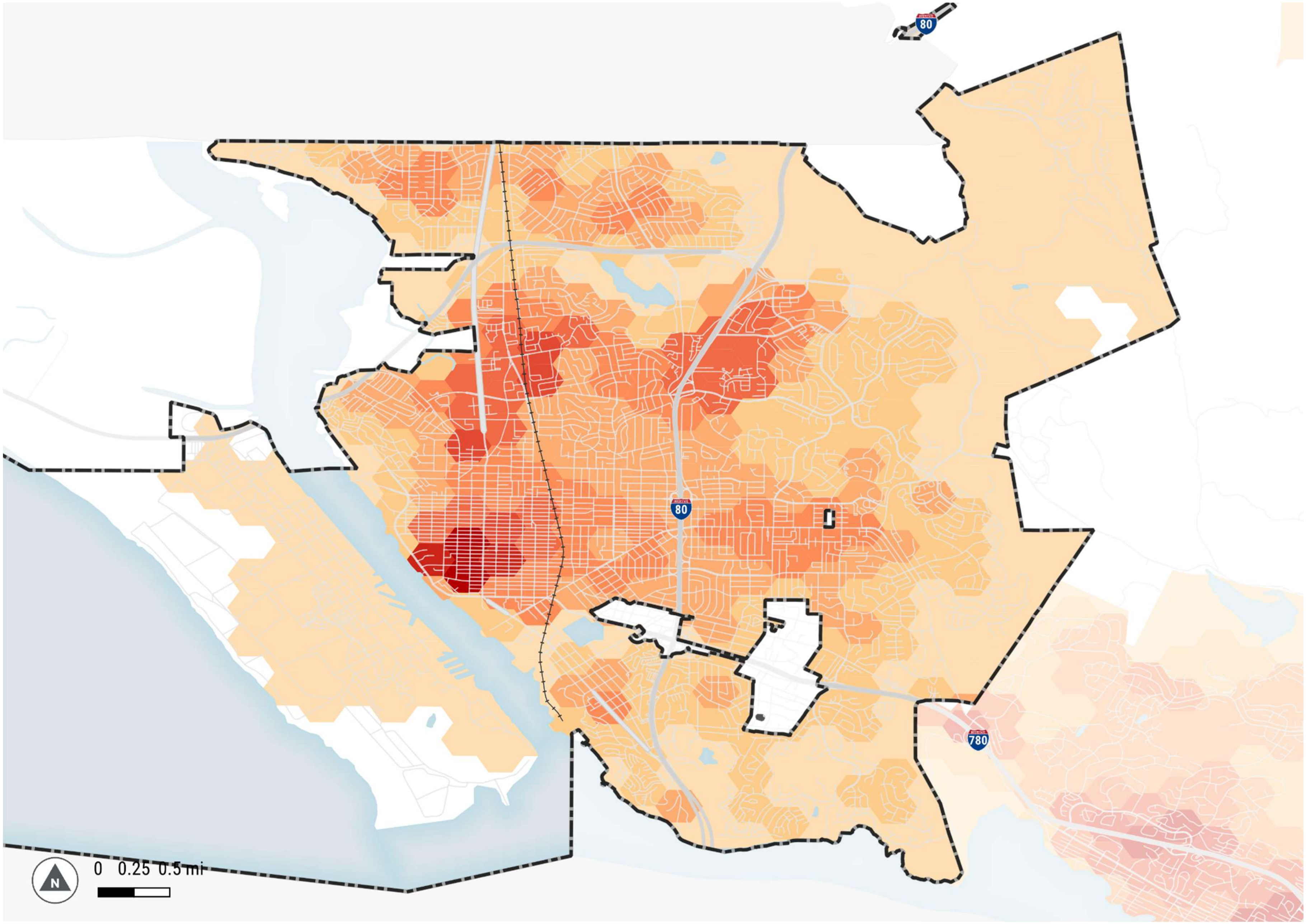
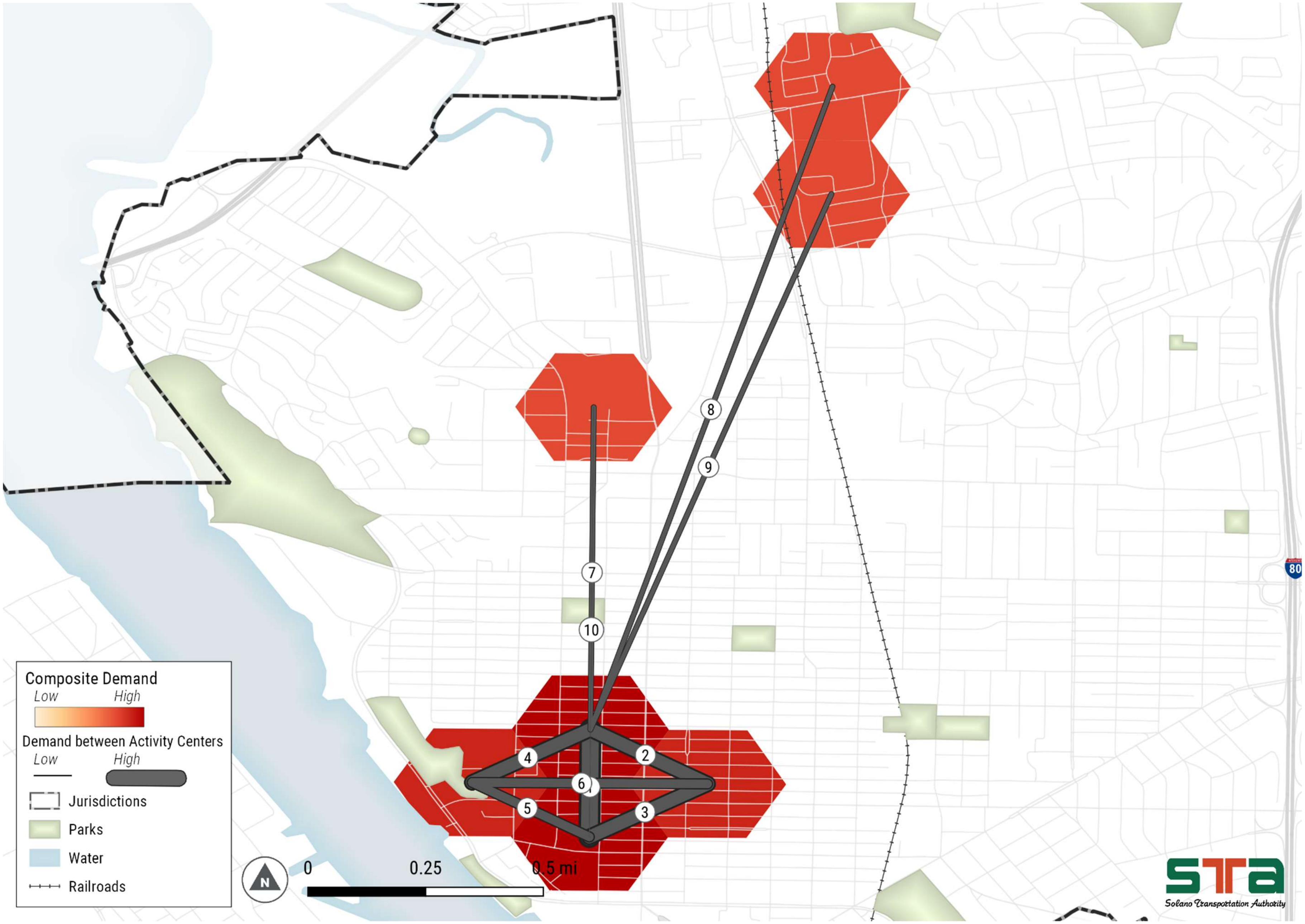


Figure 14 Demand Between Activity Centers, Vallejo



Countywide

Most of the activity center pairs are congregated around the downtowns of Vallejo, Vacaville, Fairfield, Benicia, and Suisun City. There are some additional areas close to regional parks or other regional amenities. See Table 10 for descriptions on the pairs, and Figure 15 and Figure 16 for the composite demand and the illustrated calculated composite trip demand between activity centers.

Table 11 Top Activity Center Pairs, Countywide

Jurisdiction	Activity Center 1	Activity Center 2	Calculated Composite Trips Demand	Reference Number	Description[4]
Countywide	Downtown	Downtown/ residential/ school	107,879,688	1	Downtown Vallejo to Hederal Terrace Elementary School
	Downtown	Downtown	99,943,917	2	Downtown Vallejo to downtown Fairfield
	Major retail	Downtown	76,188,049	3	Downtown Vallejo to retail at Nut Tree Road and Nut Tree Parkway
	Downtown	Major retail	53,923,620	4	Downtown Fairfield to Fairfield-Suisun train station
	Downtown	Downtown	49,055,038	5	Downtown Fairfield to Downtown Suisun
	Downtown	Major retail	47,078,804	6	Downtown Fairfield to Solano Mall
	Commercial	Downtown	44,302,026	7	Downtown Vacaville to Alamo Drive and Peabody road
	Downtown	Major retail	37,477,567	8	Downtown Fairfield to Walmart at Hawthorne and Orchid Street
	Downtown	University	37,062,277	9	Downtown Fairfield to Solano Community College
	Downtown	Commercial/ residential/ school	35,971,076	10	Downtown Vallejo to Springstowne Center
	Downtown	Major retail	35,650,617	11	Downtown Vallejo to Solano County Fairgrounds

[4] Note that while a point may be described, the demand is summed at the scale of a two mile hexagon.

	Downtown	Commercial/ residential	32,464,224	12	Downtown Vallejo to I-780 and Glen Cove Parkway
	Downtown	Major retail	29,865,519	13	Downtown Fairfield to Cordelia
	Major retail	Downtown	28,321,041	14	Downtown Fairfield to retail at Nut Tree Road and Nut Tree Parkway
	Commercial/ employment	Downtown	26,282,907	15	Downtown Vacaville to Kaiser Vacaville Medical Center
	Downtown	Employment	25,750,362	16	Downtown Fairfield to I-80 CA 12 interchange
	Commercial	Downtown	23,555,254	17	Downtown Fairfield to Alamo Drive and Peabody road
	Downtown	Downtown	21,841,575	18	Downtown Vallejo to downtown Benicia
	Downtown/ residential/ school	Major retail	19,962,976	19	Hederal Terrace Elementary School to Solano County Fairgrounds
	Downtown	Downtown	18,230,928	20	Downtown Vallejo to downtown Fairfield
	Transit	Downtown	18,024,639	21	Downtown Fairfield to Fairfield Vacaville train station
	Commercial	Major retail	16,968,600	22	Alamo Drive and Peabody road to retail at Nut Tree Road and Nut Tree Parkway
	Commercial	Downtown	16,663,517	23	Downtown Vacaville to Elmira Road and Leisure Town road
	Downtown/ residential/ school residential	Commercial/ residential/ school	15,029,403	24	Hederal Terrace Elementary School to Springstowne Center
	Commercial/ employment	Major retail	15,018,038	25	Retail at Nut Tree Road and Nut Tree Parkway to Kaiser Vacaville Medical Center

Figure 15 Composite Demand, Countywide

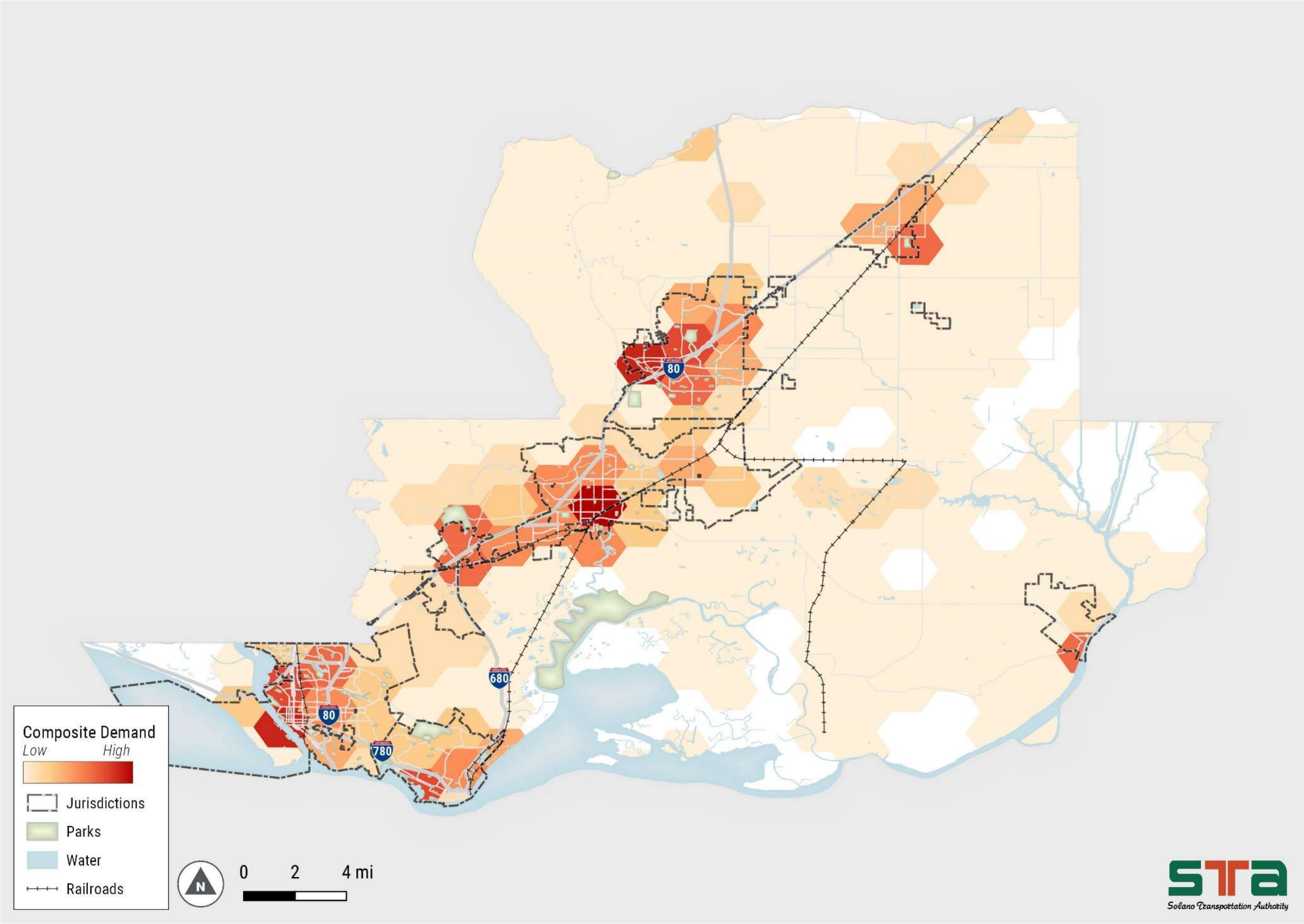
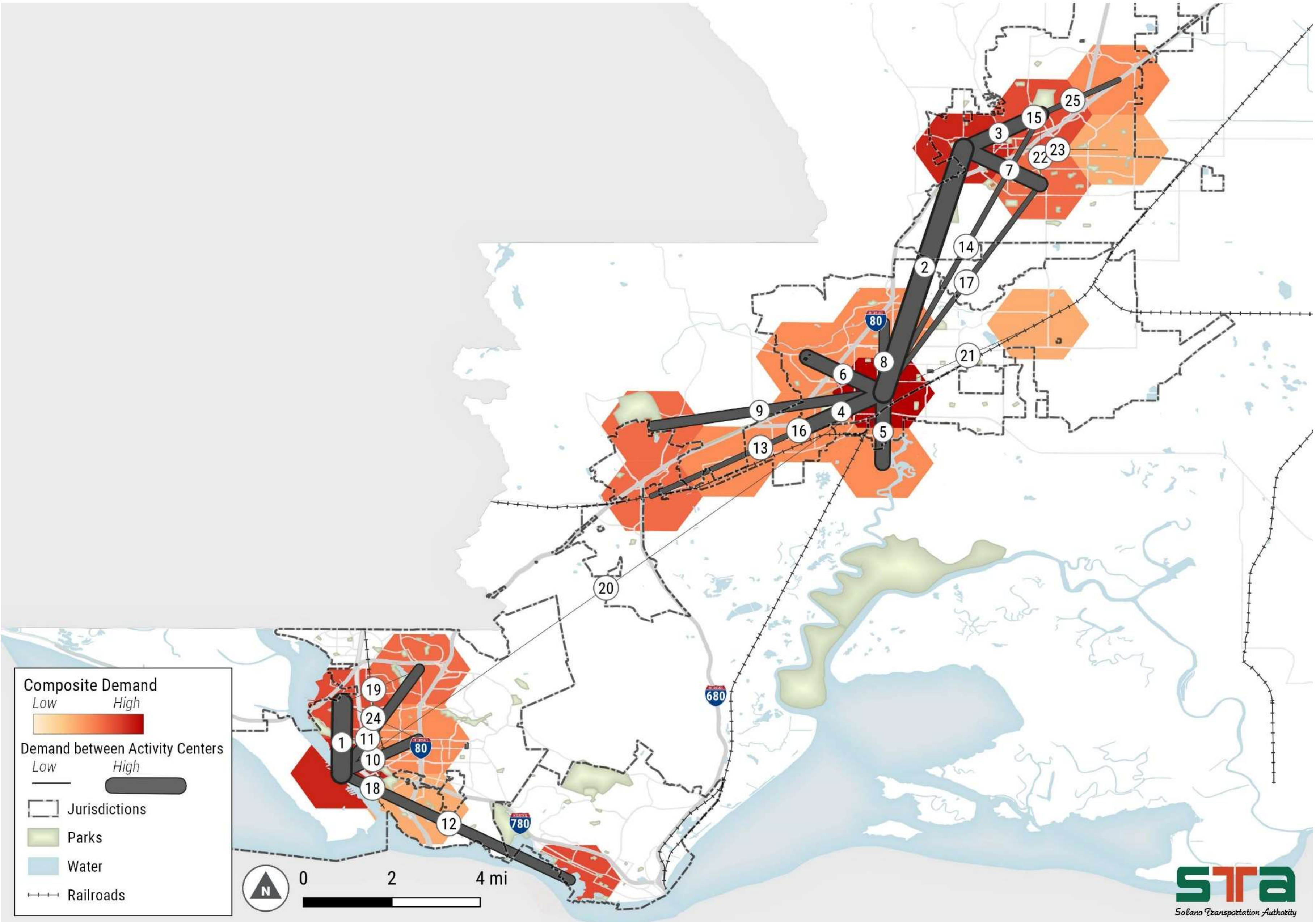


Figure 16 Demand Between Activity Centers, Countywide



TOOLE DESIGN

1635 BROADWAY
SUITE 200
OAKLAND, CA 94612

510.298.0740
TOOLEDESIGN.COM

MEMORANDUM

May 17, 2019

To: Anthony Adams
Organization: Solano Transportation Authority
From: Patrick Gilster, Toole Design
Project: Solano Active Transportation Plan

Re: Task 5.3 Network Gap Analysis

Overview

The purpose of the network gap analysis is to document where how the gaps exist in the network derived from the Attractors/Generators results. This derived high demand network is known as the "backbone network" and represents the routes with highest propensity for producing walking and biking trips. Two levels of backbone networks were derived from the attractors/generators analysis: (1) countywide backbone network that links the top 25 highest composite demand areas throughout Solano; and, (2) local backbone networks that link the top 10 highest composite demand areas within each City. Within each jurisdiction, the countywide backbone network routes were overlapped with the local backbone network routes where feasible.

The networks produced as part of this task do not represent the complete networks for each jurisdiction. The complete networks will include the routes shown in each jurisdiction's section within this memorandum and include other items listed in the Network Development Approach memorandum. These networks will primarily service as prioritization tools where the local and countywide backbone network will receive additional weighting factors to show their importance in the overall bicycling and walking networks. Additionally, during the network and project development stage that will occur after this task, the backbone networks will feature all ages and abilities bikeway recommendations.

The network gaps on the backbone networks were defined as the categories listed below and are included in each jurisdiction's corresponding tables. The "Existing Low Stress Facility" designation for bikeways are not included in the tables, as they are not considered gaps but are shown on the maps. For sidewalk gaps, each side of the street is measure separately and then both sides are summed to produce the total lane miles of missing sidewalks. For the purposes of this task, it is assumed both sides of the street must have sidewalks. However, sidewalk on one side of the street may be sufficient in rural or industrial locations.

- **Bicycle Facility Gaps**
  - No Existing Facilities
  - No Facility & High Stress
  - Existing Facility & High Stress
- **Pedestrian Facility Gaps**
  - Sidewalk gaps

Benicia Network Gaps

In total there are about 7.5 miles of bikeway network gaps and 8.5 miles of sidewalk gaps in the City of Benicia on the proposed backbone network.

Table 1. Benicia Bikeway Network Gaps

STREET / FACILITY NAME	EXTENTS	EXISTING FACILITY	GAP TYPE	DISTANCE (MI)
COLUMBUS PKWY	Benicia Rd to Rose Dr	Class II Bike Lane	Existing Facility & High Stress	0.21
DILLON POINT RD	SF Bay Trail to State Park Rd	None	No Existing Facility & High Stress	0.05
SF BAY TRAIL	Parking Lot Trail Head to Military West St	None	No Existing Facility & High Stress	0.16
MILITARY W ST	W K St to E 2nd St	Class II Bike Lane	Existing Facility & High Stress	1.94
MILITARY E ST	E 2nd St to Adams St	None	No Existing Facility & High Stress	0.39
SOUTHHAMPTON RD/W 7TH ST	Chelsea Hills Dr to Lori Dr	Class II Bike Lane	Existing Facility & High Stress	0.24
E 2ND ST	St. Augustine Dr to Military E St	Class III Bike Route	Existing Facility & High Stress	0.19
1ST ST	Military W St to E J St	Class III Bike Route	Existing Facility & High Stress	0.14
2ND ST	E J St to E H St	None	No Existing Facility & High Stress	0.13
E H ST	1st St to E 5th St	None	No Existing Facility	0.52
ADAMS ST	Military E St to Park Rd	None	No Existing Facility	0.11
PARK RD	Oak Rd to E 2nd St	None	No Existing Facility	2.50
E 2ND ST	Park Rd to Lake Herman Rd	None	No Existing Facility & High Stress	0.61
LAKE HERMAN RD	Northgate Church to Gateway Plaza Dr	None	No Existing Facility & High Stress	0.39
LAKE HERMAN RD	Gateway Plaza Dr to Industrial Way	None	No Existing Facility	0.12
TOTAL				**7.68**

Solano Countywide Active Transportation Plan: Benicia Gap Analysis Bike Network

Backbone Network
- Existing Low Stress Facility
- No Existing Facility
- No Faclility & High Stress
- Existing Faclility & High Stress

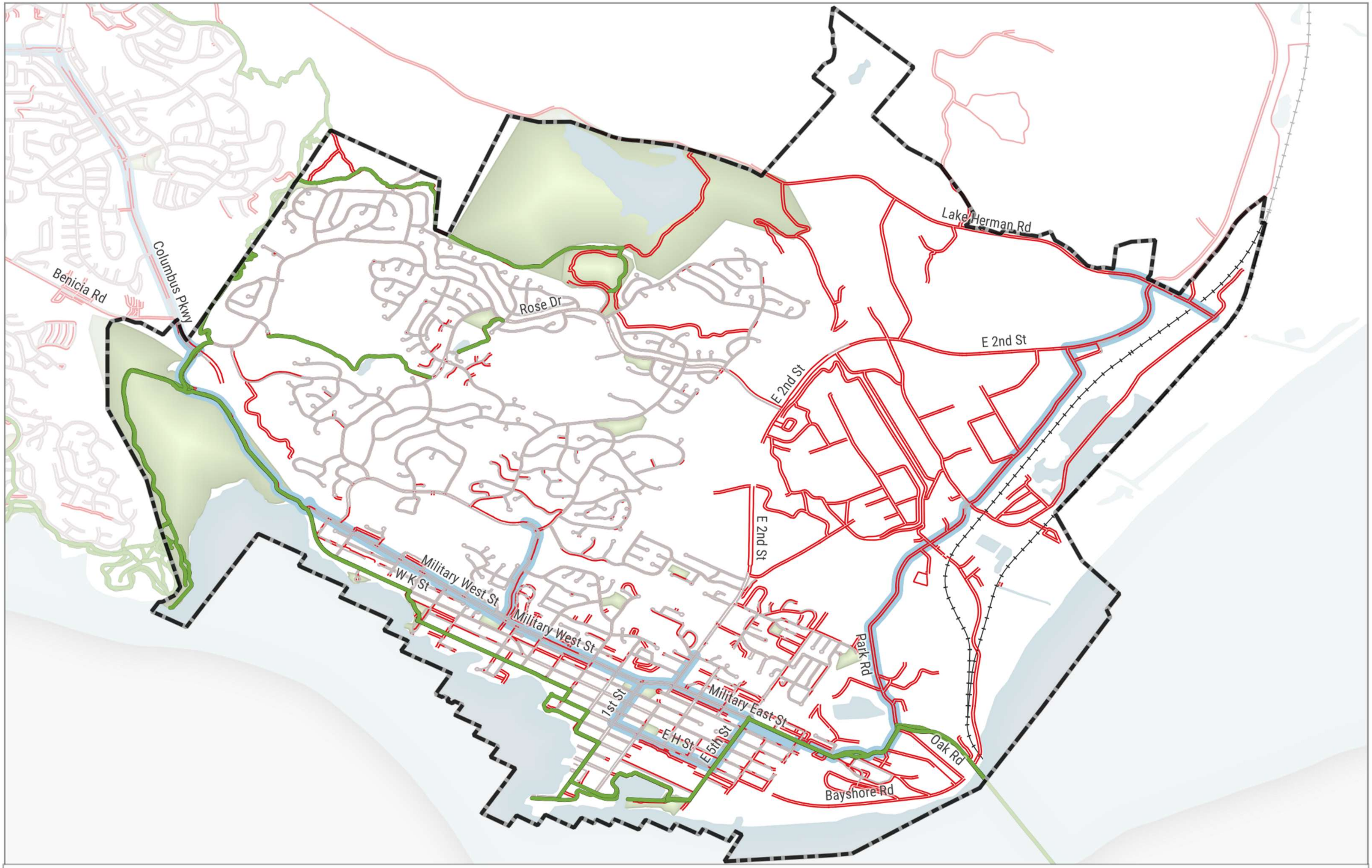
Other
- Railroads
- Parks
- Water

STA Solano Transportation Authority

0 0.15 0.3 mi

Table 2. Benicia Pedestrian Network Gaps

STREET / FACILITY NAME	EXTENTS	NORTH OR WEST SIDE OF STREET DISTANCE (MI)	SOUTH OR EAST SIDE OF STREET DISTANCE (MI)	TOTAL DISTANCE (MI)
COLUMBUS PKWY	Benicia Rd to Rose Dr	0.08	0.19	0.27
DILLON POINT RD	SF Bay Trail Crossing to SF Bay Trail Trailhead	0.00	0.05	0.05
MILITARY WEST ST	W 5th St to W 3rd St	0.19	0.22	0.40
MILITARY WEST ST	W 3rd St to W 2nd St	0.01	0.11	0.12
ADAMS ST	Military East St to Park Rd	0.00	0.05	0.05
PARK RD	Adams St to Oak Rd	0.01	0.27	0.28
PARK RD	Oak Rd to Industrial Way	1.37	1.36	2.73
PARK RD	Industrial Way to E 2nd St	1.05	1.05	2.10
E 2ND ST	Park Rd to Lake Herman Rd	0.59	0.48	1.07
LAKE HERMAN RD	Northgate Church to Egret Ct	0.52	0.52	1.05
W 7TH ST	Military West St to Lori Dr	0.00	0.27	0.27
SOUTHHAMPTON RD	Chelsea Hills Dr to EB I-780 Ramps	0.00	0.17	0.17
E H ST	E 3rd St to E 4th St	0.02	0.00	0.02
E 5TH ST	E K St to E L St	0.00	0.02	0.02
E 5TH ST	E L St to Military East St	0.00	0.01	0.01
TOTAL		3.85	4.75	8.61



Solano Countywide Active Transportation Plan: Benicia Sidewalk Gap Analysis

Bicycle and Pedestrian Network
- Countywide Backbone Bicycle Network
- Existing Sidewalks
- Trails

Street Network
- Sidewalk gaps

Other
- Railroads
- Parks
- Water

Solano Transportation Authority

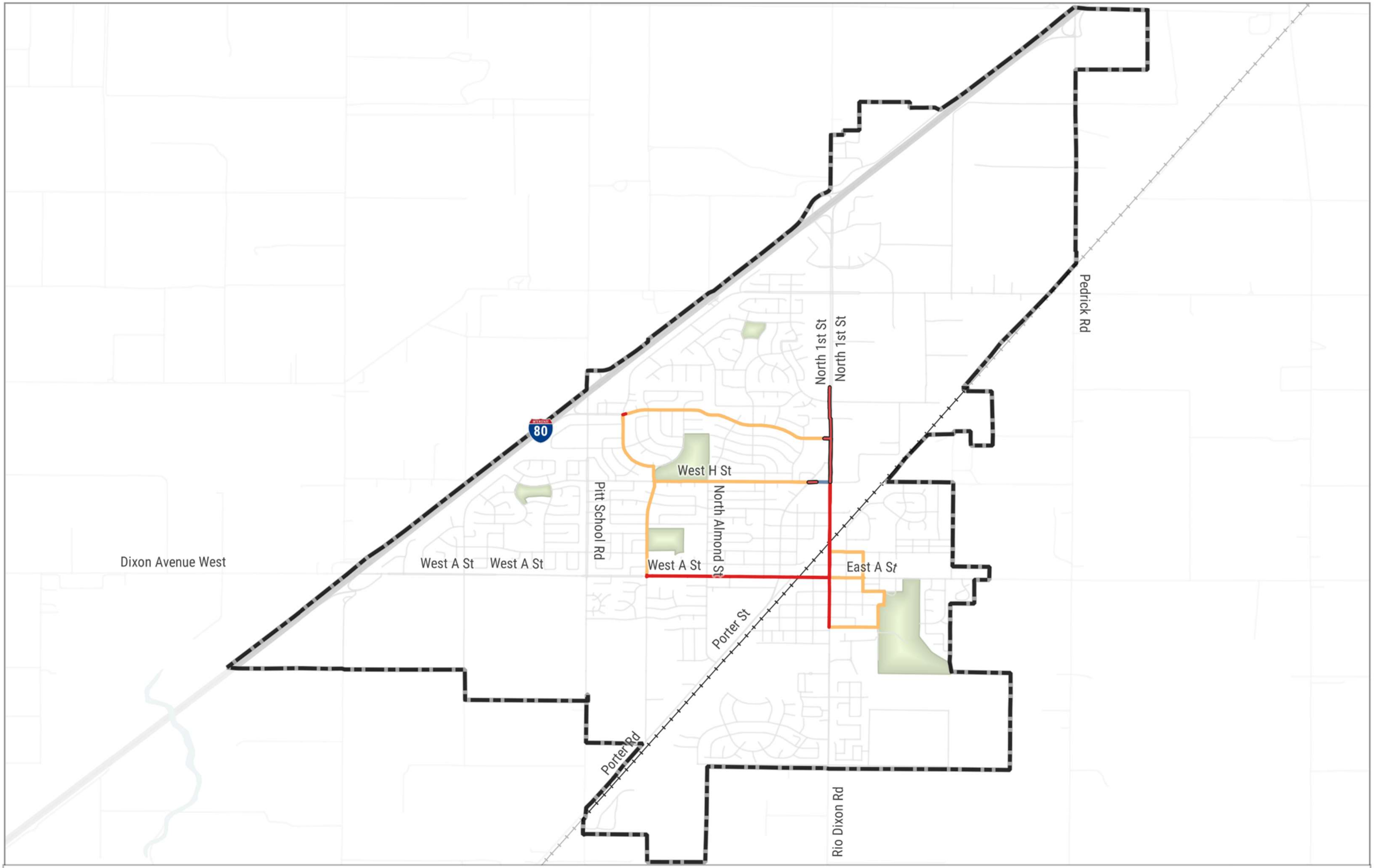
0 0.15 0.3 mi

Dixon Network Gaps

In total there are about 5.5 miles of bikeway network gaps and 0.5 miles of sidewalk gaps in the City of Dixon on the proposed backbone network.

Table 3. Dixon Bikeway Network Gaps

STREET / FACILITY NAME	EXTENTS	EXISTING FACILITY	GAP TYPE	DISTANCE (MI)
N 1ST ST	N Dixon Greenway to W H St	Class II	Existing Facility & High Stress	0.50
N 1ST ST	W H St to E Chesnut St	None	No Existing Facility & High Stress	0.76
E CHESTNUT ST	N 1st St to Hall Park Dr	None	No Existing Facility	0.20
HALL PARK DR	E Chestnut St to E Mayes St	None	No Existing Facility	0.21
E MAYES ST	S 4th St to Hall Park Dr	None	No Existing Facility	0.02
N/S 4TH ST	E Mayes St to E C St	None	No Existing Facility	0.20
E A ST	S 4th St to Hall Park Dr	None	No Existing Facility	0.21
W A ST	N Lincoln St to S 1st St	None	No Existing Facility & High Stress	0.75
W A ST	Pitt School Rd to N Lincoln Dr	None	No Existing Facility & High Stress	0.25
N LINCOLN ST	W A St to Stratford Ave	None	No Existing Facility	0.93
W H ST	Lincoln St to N Adams St	None	No Existing Facility	0.64
W H ST	N Adams St	Class II	Existing Facility & High Stress	0.10
STRATFORD AVE	N Lincoln St to N 1st St	None	No Existing Facility	0.89
TOTAL				**5.65**



Solano Countywide Active Transportation Plan: Dixon Gap Analysis Bike Network

Backbone Network
- Existing Low Stress Facility
- No Existing Facility
- No Faclility & High Stress
- Existing Faclility & High Stress

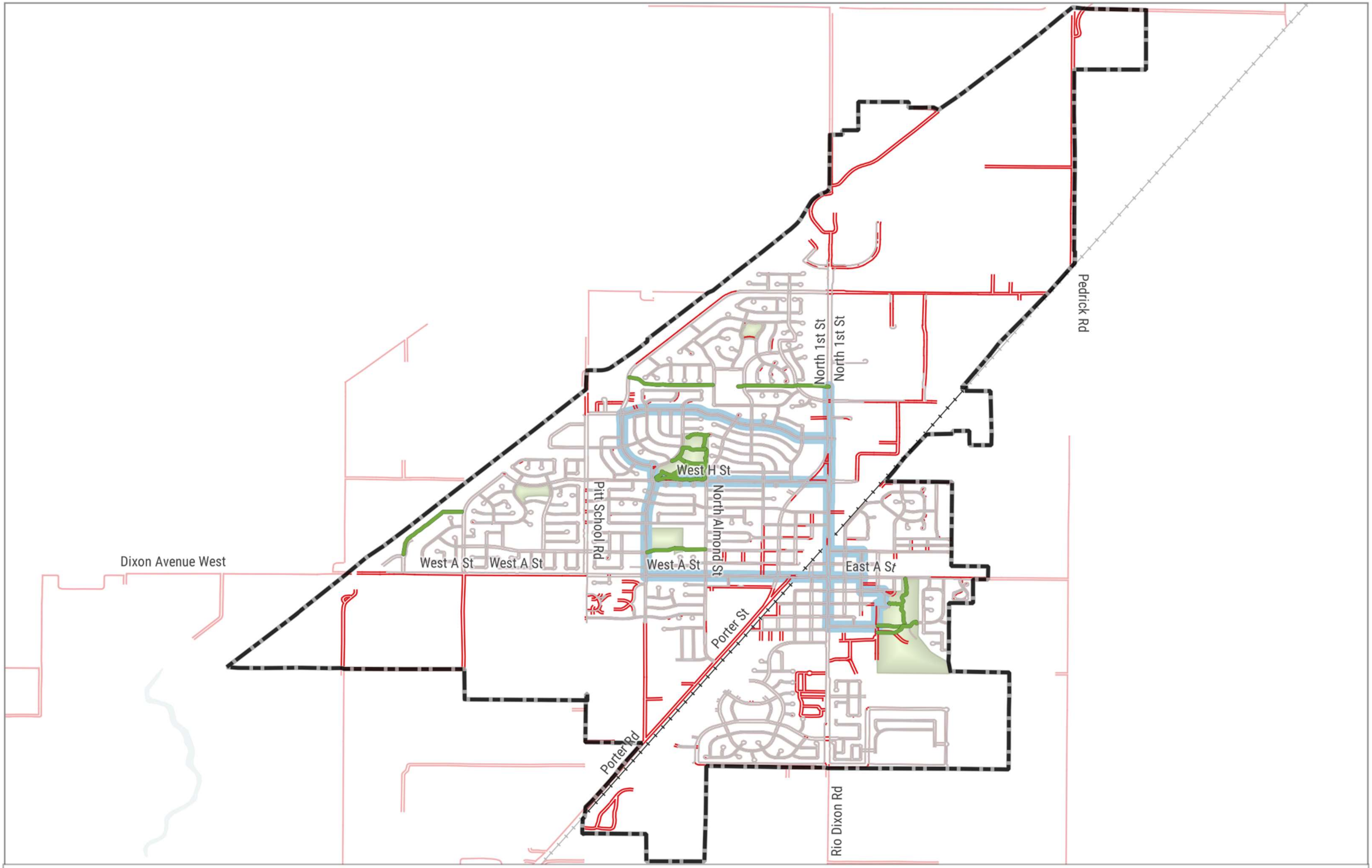
Other
- Railroads
- Parks
- Water

STA
Solano Transportation Authority

0 0.14 0.28 mi

Table 4. Dixon Pedestrian Network Gaps

STREET / FACILITY NAME	EXTENTS	NORTH OR WEST SIDE OF STREET DISTANCE (MI)	SOUTH OR EAST SIDE OF STREET DISTANCE (MI)	TOTAL DISTANCE (MI)
W A ST	Porter St to Jackson St	0.03	0.03	0.06
HALL PARK DR	Mayes St to Chestnut St	0.20	0.00	0.20
S 1ST ST	E C St to W E St	0.04	0.02	0.06
N 1ST ST	W H St to Stratford Ave	0.07	0.00	0.07
W H ST	N 1st St to N Adams St	0.07	0.00	0.07
TOTAL		**0.42**	**0.05**	**0.46**



Solano Countywide Active Transportation Plan: Dixon Sidewalk Gap Analysis

Bicycle and Pedestrian Network
- Countywide Backbone Bicycle Network
- Existing Sidewalks
- Trails

Street Network
- Sidewalk gaps

Other
- Railroads
- Parks
- Water

Solano Transportation Authority

0 0.14 0.28 mi

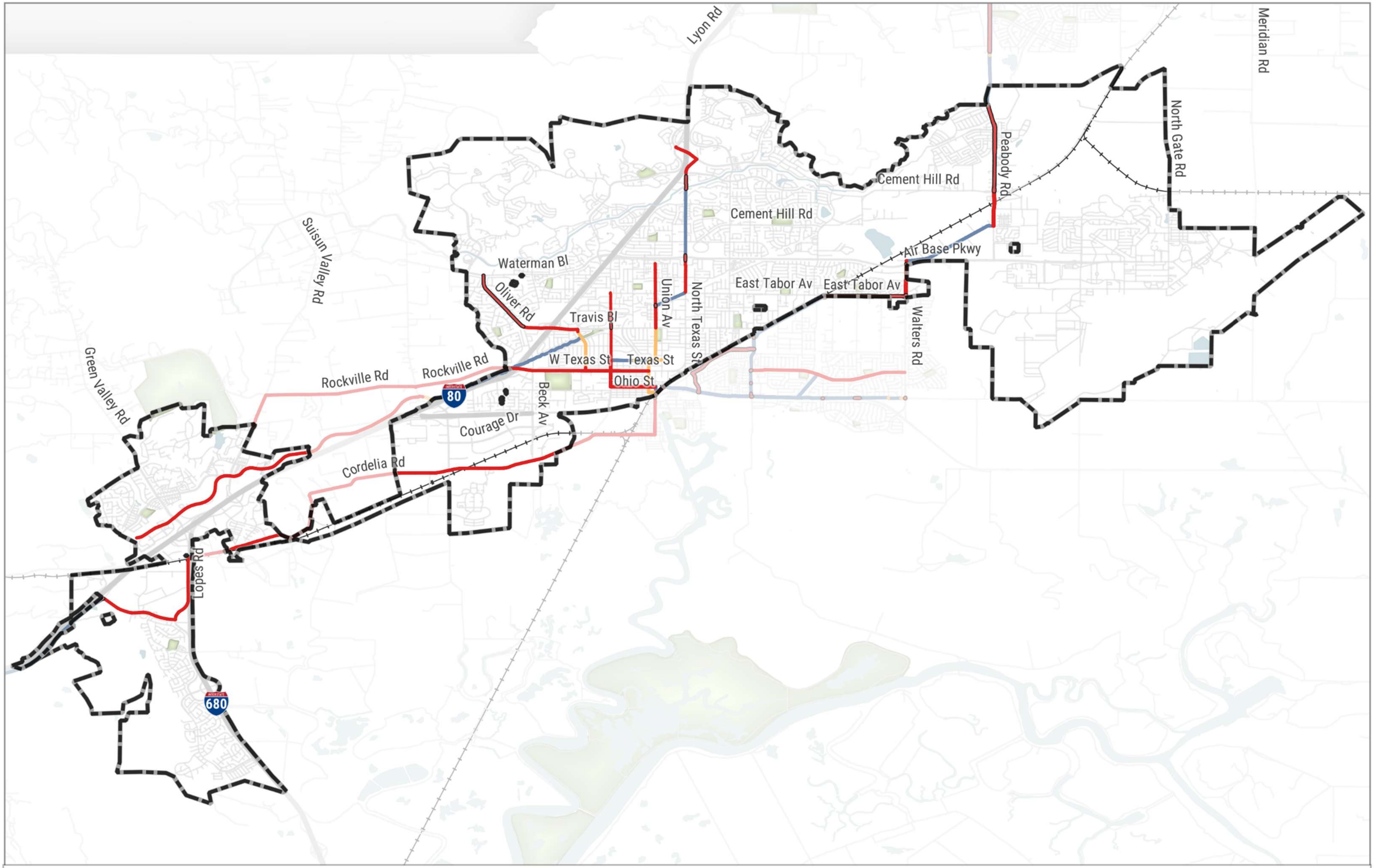
Fairfield Network Gaps

In total there are about 21 miles of bikeway network gaps and 14.5 miles of sidewalk gaps in the City of Fairfield on the proposed backbone network.

Table 5. Fairfield Bikeway Network Gaps

STREET / FACILITY NAME	EXTENTS	EXISTING FACILITY	GAP TYPE	DISTANCE (MI)
RED TOP RD	McGary Rd to Lopes Rd	Class II	Existing Facility & High Stress	0.90
LOPES RD	Red Top Rd to Cordelia Rd	None	No Existing Facility & High Stress	0.95
CORDELIA RD	Pittman Rd to Romania Rd	None	No Existing Facility & High Stress	0.70
CORDELIA RD	Hale Ranch Rd to Pennsylvania Ave	None	No Existing Facility & High Stress	2.38
BUSINESS CENTER DR	City Limit to Suisun Pkwy	None	No Existing Facility & High Stress	2.51
W TEXAS ST	Oliver Rd to Pennsylvania Ave	None	No Existing Facility & High Stress	1.13
W TEXAS ST	Pennsylvania Ave to Union Ave	None	No Existing Facility & High Stress	0.51
OLIVER RD/TRAVIS BLVD	Waterman Blvd to Holiday Ln	Class II	Existing Facility & High Stress	1.06
TRAVIS BLVD	Holiday Ln to 2nd St	None	No Existing Facility & High Stress	0.45
2ND ST	Travis Blvd to W Texas St	None	No Existing Facility	0.63
PENNSYLVANIA AVE	Tabor Ave to Broadway St	None	No Existing Facility & High Stress	1.36
JEFFERSON AVE	Ohio St to Kentucky St	None	No Existing Facility	0.46
BROADWAY ST	Pennsylvania Ave to Union Ave/Hwy 12 Bike Bridge	None	No Existing Facility & High Stress	0.51
KENTUCKY ST	Pennsylvania Ave to Union Ave	None	No Existing Facility	0.51
KENTUCKY ST	Union Ave to Washington St	None	No Existing Facility	0.07
UNION AVE	Kentucky St to Travis Blvd	None	No Existing Facility	0.47

STREET / FACILITY NAME	EXTENTS	EXISTING FACILITY	GAP TYPE	DISTANCE (MI)
UNION AVE	Travis Blvd to Air Base Pkwy	None	No Existing Facility & High Stress	1.00
N TEXAS ST	Tabor Ave to Northern Air Base Pkwy Ramps	None	No Existing Facility & High Stress	0.55
N TEXAS ST	Northern Air Base Pkwy Ramps to Putah South Canal	Class II	Check roadway volumes	0.97
N TEXAS ST	Putah South Canal to Dickson Hill Rd	Class II	Existing Facility & High Stress	0.22
N TEXAS ST	Dickson Hill Rd to Manual Campos Pkwy	None	No Existing Facility & High Stress	0.25
MANUEL CAMPOS PKWY	Hilborn Rd to N Texas St	None	No Existing Facility & High Stress	0.31
E TABOR AVE	Railroad Ave to Walters Rd	Class III Bike Route	Existing Facility & High Stress	0.90
WALTERS RD	E Tabor Ave to Huntington Dr	None	No Existing Facility & High Stress	0.53
HUNTINGTON DR	Walters Rd to Crocker Cir	None	No Existing Facility & High Stress	0.07
PEABODY RD	Huntington Dr to Chuck Hammond Dr	Class II	Existing Facility & High Stress	1.69
TOTAL				**21.10**



Solano Countywide Active Transportation Plan: Fairfield Gap Analysis Bike Network

Backbone Network
- Existing Low Stress Facility
- No Existing Facility
- No Faclility & High Stress
- Existing Faclility & High Stress

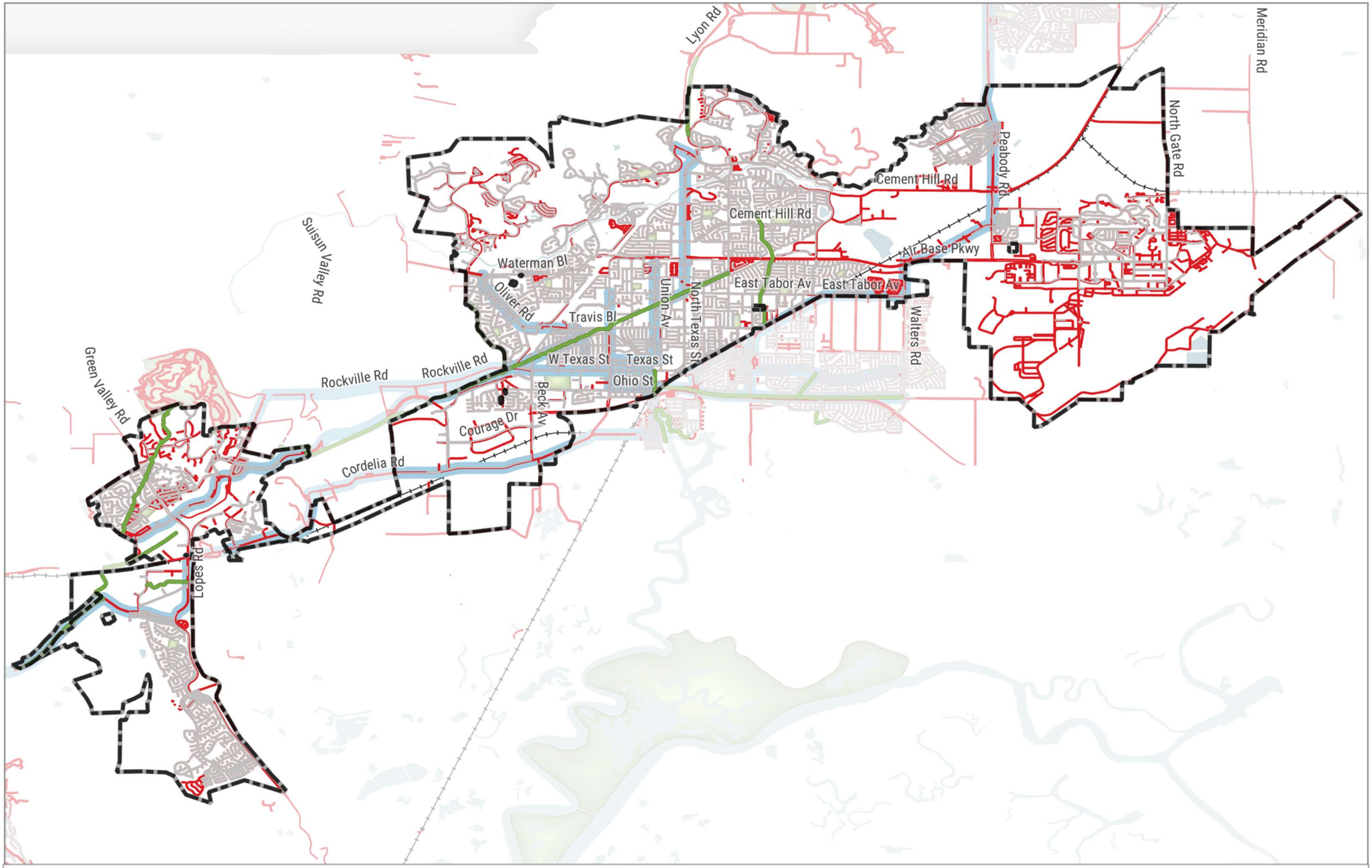
Other
- Railroads
- Parks
- Water

STA Solano Transportation Authority

0 0.39 0.78 mi

Table 6. Fairfield Pedestrian Network Gaps

STREET / FACILITY NAME	EXTENTS	NORTH OR WEST SIDE OF STREET DISTANCE (MI)	SOUTH OR EAST SIDE OF STREET DISTANCE (MI)	TOTAL DISTANCE (MI)
RED TOP ROAD	McGary St to River Rd	0.37	0.46	0.82
LOPES RD	Red Top Rd to Cordelia Rd	0.60	0.95	1.55
CORDELIA RD	Pittman Rd to Romania Rd	0.66	0.66	1.32
CORDELIA RD	Hale Ranch Rd to Pennsylvania Ave	1.21	1.92	3.13
BUSINESS CENTER DR	Green Valley Rd to Suisun Valley Rd	0.42	0.41	0.82
BUSINESS CENTER DR	Suisun Valley Rd to Suisun Creek	0.00	0.40	0.40
WEST TEXAS ST	Oliver Rd to Beck Ave	0.00	0.22	0.22
PENNSYLVANIA AVE	Empire St to Kansas St	0.44	0.00	0.44
TRAVIS BLVD	Holiday Ln to Maupin Rd	0.29	0.00	0.29
MANUEL CAMPOS PKWY	Hilborn Rd to North Texas St	0.27	0.00	0.27
E TABOR AVE	Railroad Ave to Walters Rd	0.09	0.89	0.99
WALTERS RD	E Tabor Ave to Huntington Dr	0.15	0.41	0.57
HUNTINGTON DR	Walters Rd to Peabody Rd	1.14	0.70	1.84
PEABODY RD	Huntington Dr to Vanden Rd	0.48	0.00	0.48
PEABODY RD	Vanden Rd to Huber Dr	0.52	0.55	1.07
PEABODY RD	Josheph Gerevas Dr to Chuck Hammond Dr	0.00	0.19	0.19
TOTAL		**6.65**	**7.77**	**14.42**



Solano Countywide Active Transportation Plan: Fairfield Sidewalk Gap Analysis

Bicycle and Pedestrian Network
- Countywide Backbone Bicycle Network
- Existing Sidewalks
- Trails

Street Network
- Sidewalk gaps

Other
- Railroads
- Parks
- Water

STA Solano Transportation Authority

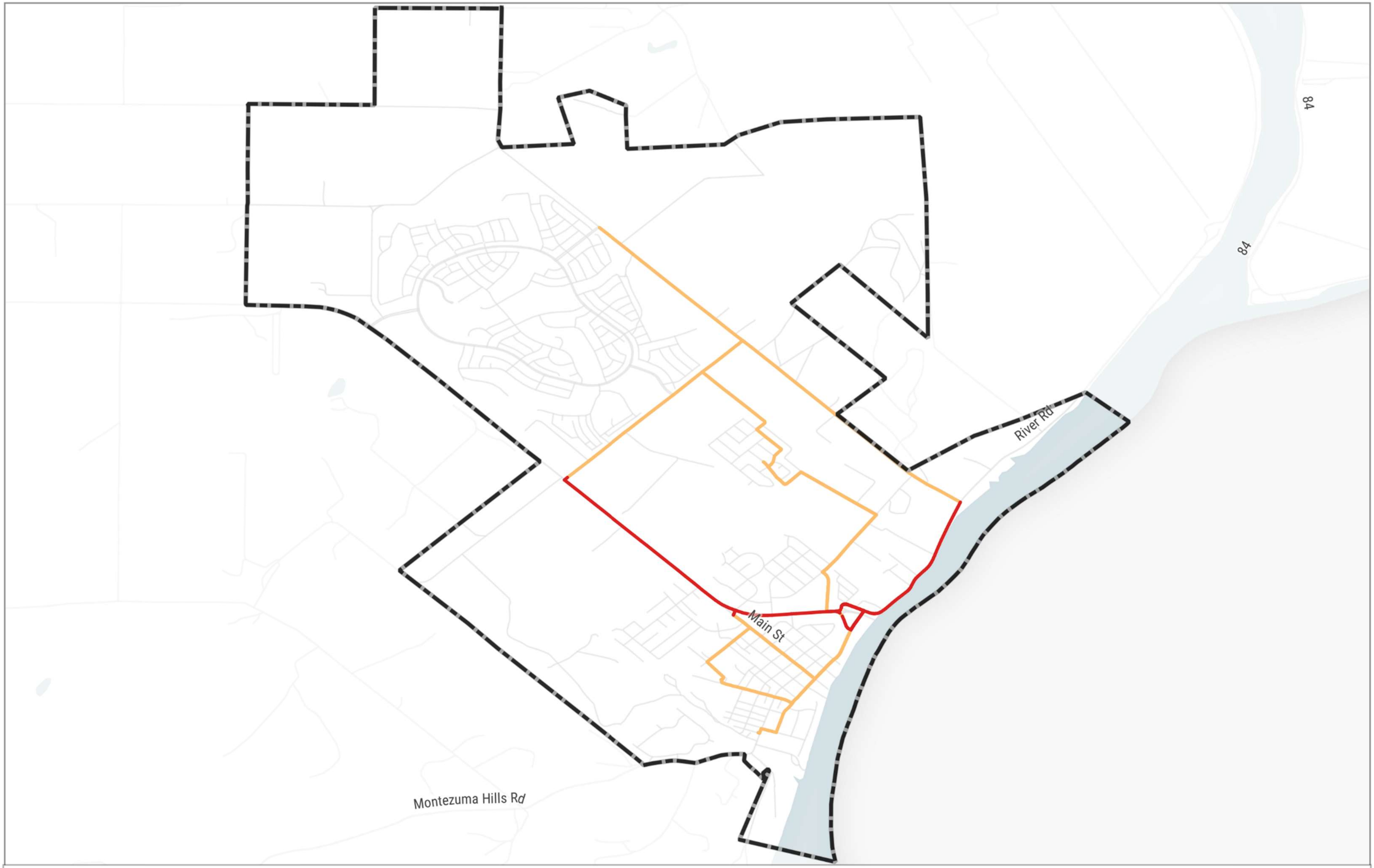
0 0.39 0.78 mi

Rio Vista Network Gaps

In total there are about 8.5 miles of bikeway network gaps and 10.5 miles of sidewalk gaps in the City of Rio Vista on the proposed backbone network.

Table 7. Rio Vista Bikeway Network Gaps

STREET / FACILITY NAME	EXTENTS	EXISTING FACILITY	GAP TYPE	DISTANCE (MI)
AIRPORT RD	Church Rd to Hwy 84	None	No Existing Facility	1.18
CHURCH RD	Airport Rd to Hwy 12	None	No Existing Facility	0.99
HARRIS RD/MADERE WY/POPPY HOUSE RD	Church Rd to St Francis Way	None	No Existing Facility	1.23
ST FRANCIS RD	Poppy House Rd to Virginia Dr	None	No Existing Facility	0.36
VIRGINIA DR	St Francis Way to Hwy 12	None	No Existing Facility	0.21
HWY 84	Airport Rd to Hwy 12/N Front St	None	No Existing Facility & High Stress	0.95
N FRONT ST	Hwy 84 to N Front St	None	No Existing Facility & High Stress	0.11
N FRONT ST	N Front St to Hamilton Ave	None	No Existing Facility	0.60
HAMILTON AVE	S Front St to S 2nd St	None	No Existing Facility	0.06
S 2ND ST	Hamilton Ave to Marina Dr	None	No Existing Facility	0.09
MAIN ST	Hwy 12 to N Front St	None	No Existing Facility	0.52
S 7TH ST	Main St to Bruning Ave	None	No Existing Facility	0.24
BRUNING AVE	S 7th St to N Front St	None	No Existing Facility	0.43
HWY 12	Church Rd to N Front St	None	No Existing Facility & High Stress	1.46
TOTAL				**8.43**



Solano Countywide Active Transportation Plan: Rio Vista Gap Analysis Bike Network

Backbone Network
- Existing Low Stress Facility
- No Existing Facility
- No Faclility & High Stress
- Existing Faclility & High Stress

Other
- Railroads
- Parks
- Water

STA
Solano Transportation Authority

0 0.13 0.26 mi

N

Table 8. Rio Vista Pedestrian Network Gaps

STREET / FACILITY NAME	EXTENTS	NORTH OR WEST SIDE OF STREET DISTANCE (MI)	SOUTH OR EAST SIDE OF STREET DISTANCE (MI)	TOTAL DISTANCE (MI)
AIRPORT RD	Palisades Dr to Church Rd	0.00	0.81	0.81
AIRPORT RD	Church Rd to Hwy 84	1.19	1.19	2.38
CHURCH RD	Hwy 12 to Airport Rd	0.99	0.99	1.97
HARRIS RD	Church Rd to Viera Way	0.00	0.36	0.36
POPPY HOUSE RD	Sullivan St to St. Francis Way	0.00	0.37	0.37
ST. FRANCIS WAY	Poppy House Rd to Virginia Dr	0.07	0.29	0.36
HWY 84	Airport Rd to Front St	0.72	0.72	1.44
HWY 85	Front St to Hwy 12	0.13	0.09	0.22
FRONT ST	Hwy 12 to N Front St	0.11	0.09	0.19
FRONT ST	Hwy 84 to Logan St	0.10	0.26	0.36
BRUNING AVE	7th St to Bruning Ave (Around Parking Lot)	0.13	0.14	0.26
MAIN ST	Hwy 12 to 7th St	0.00	0.06	0.06
HWY 12	Church Rd to Drouin Dr	0.76	0.76	1.53
HWY 13	Drouin Dr to Hwy 84	0.19	0.29	0.48
TOTAL		**4.38**	**6.42**	**10.80**

Solano Countywide Active Transportation Plan: Rio Vista Sidewalk Gap Analysis

Bicycle and Pedestrian Network
- Countywide Backbone Bicycle Network
- Existing Sidewalks
- Trails

Street Network
- Sidewalk gaps

Other
- Railroads
- Parks
- Water

Solano Transportation Authority

0 0.13 0.26 mi

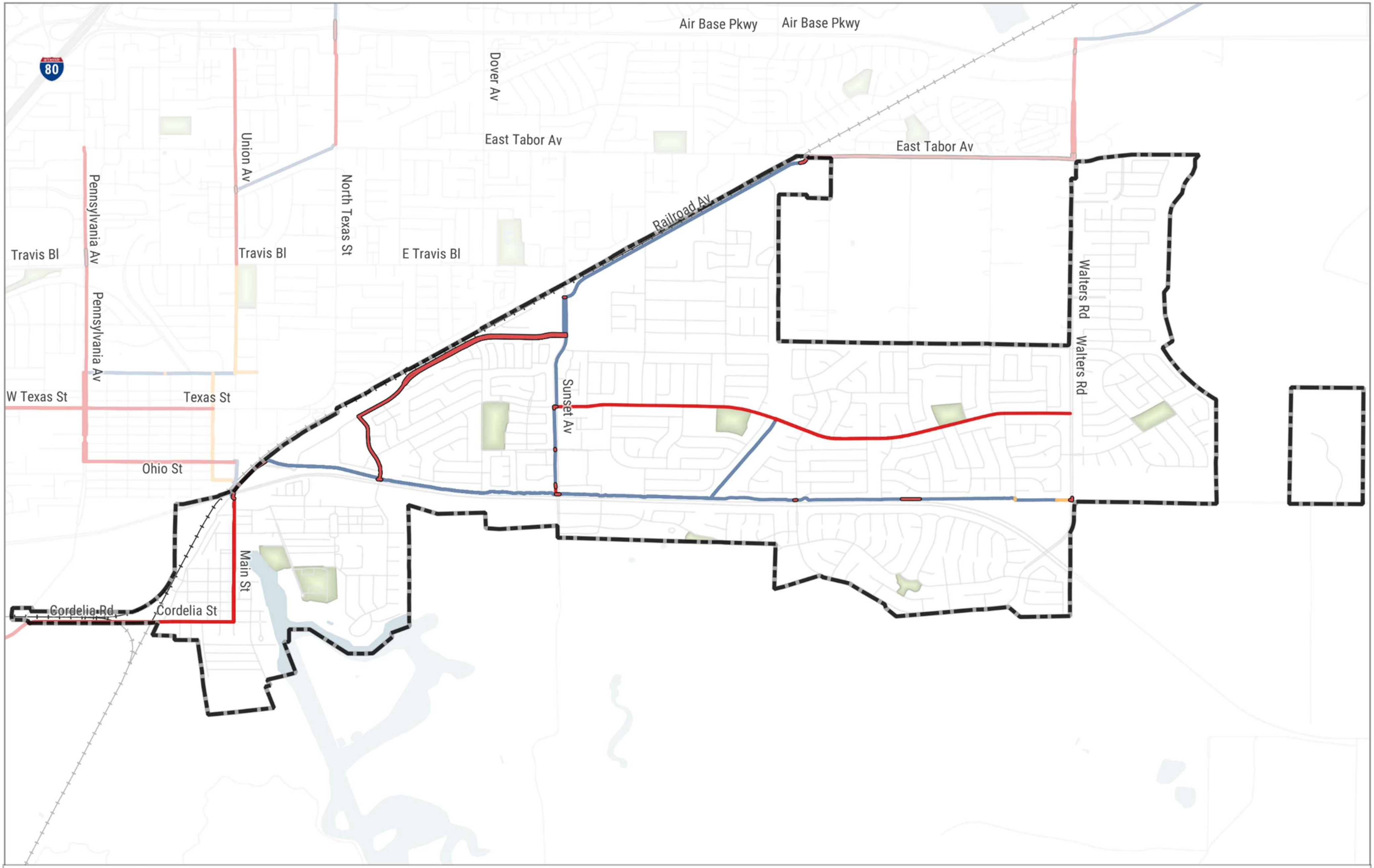
N

Suisun City Network Gaps

In total there are about 4 miles of bikeway network gaps and 5.5 miles of sidewalk gaps in the City of Suisun City on the proposed backbone network.

Table 9. Suisun City Bikeway Network Gaps

STREET / FACILITY NAME	EXTENTS	EXISTING FACILITY	GAP TYPE	DISTANCE (MI)
CORDELIA ST	Pennsylvania Ave to Main St	None	No Existing Facility & High Stress	0.70
MAIN ST	Cordelia St to Railroad Ave/Central County Bikeway	None	No Existing Facility & High Stress	0.53
MARINA BLVD	Hwy 12 to Railroad Ave	Class II Bike Lane	Existing Facility & High Stress	0.30
RAILROAD AVE	Marina Blvd to Sunset Ave	Class II Bike Lane	Existing Facility & High Stress	0.83
SUNSET AVE	Sunset Center Driveway to Hwy 12	None	No Existing Facility & High Stress	0.06
PINTAIL DR	Sunset Ave to Walters Rd	None	No Existing Facility & High Stress	1.80
TOTAL				**4.22**



Solano Countywide Active Transportation Plan: Suisun City Gap Analysis Bike Network

Backbone Network
- Existing Low Stress Facility
- No Existing Facility
- No Faclility & High Stress
- Existing Faclility & High Stress

Other
- Railroads
- Parks
- Water

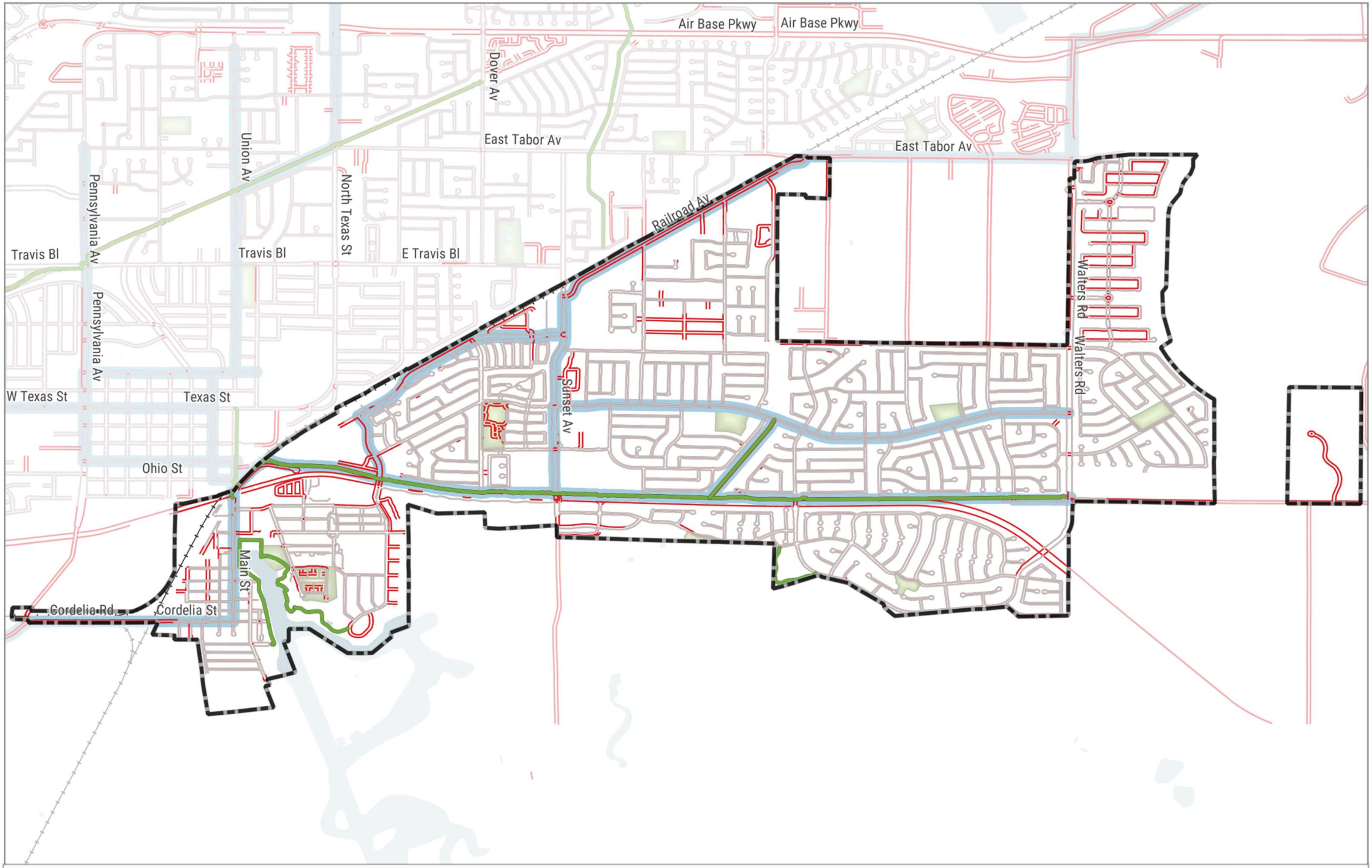
STA
Solano Transportation Authority

0 0.11 0.22 mi

Table 10. Suisun City Pedestrian Network Gaps

STREET / FACILITY NAME	EXTENTS	NORTH OR WEST SIDE OF STREET DISTANCE (MI)	SOUTH OR EAST SIDE OF STREET DISTANCE (MI)	TOTAL DISTANCE (MI)
CORDELIA ST	Pennsylvania Ave to Main St	0.51	0.50	1.01
HWY 12	Marina Blvd to Marina Center	0.00	0.17	0.17
HWY 12	Grizzly Island Rd to Walters Rd	0.00	1.69	1.69
MARINA BLVD	Hwy 12 to Railroad Ave	0.28	0.06	0.34
RAILROAD AVE	Marina Blvd to Sunset Ave	0.38	0.00	0.38
RAILROAD AVE	Sunset Ave to E Tabor St	1.02	0.91	1.93
TOTAL		**2.19**	**3.33**	**5.51**

Solano Countywide Active Transportation Plan: Suisun City Sidewalk Gap Analysis



Bicycle and Pedestrian Network
- Countywide Backbone Bicycle Network
- Existing Sidewalks
- Trails

Street Network
- Sidewalk gaps

Other
- Railroads
- Parks
- Water

Solano Transportation Authority

0 0.11 0.22 mi

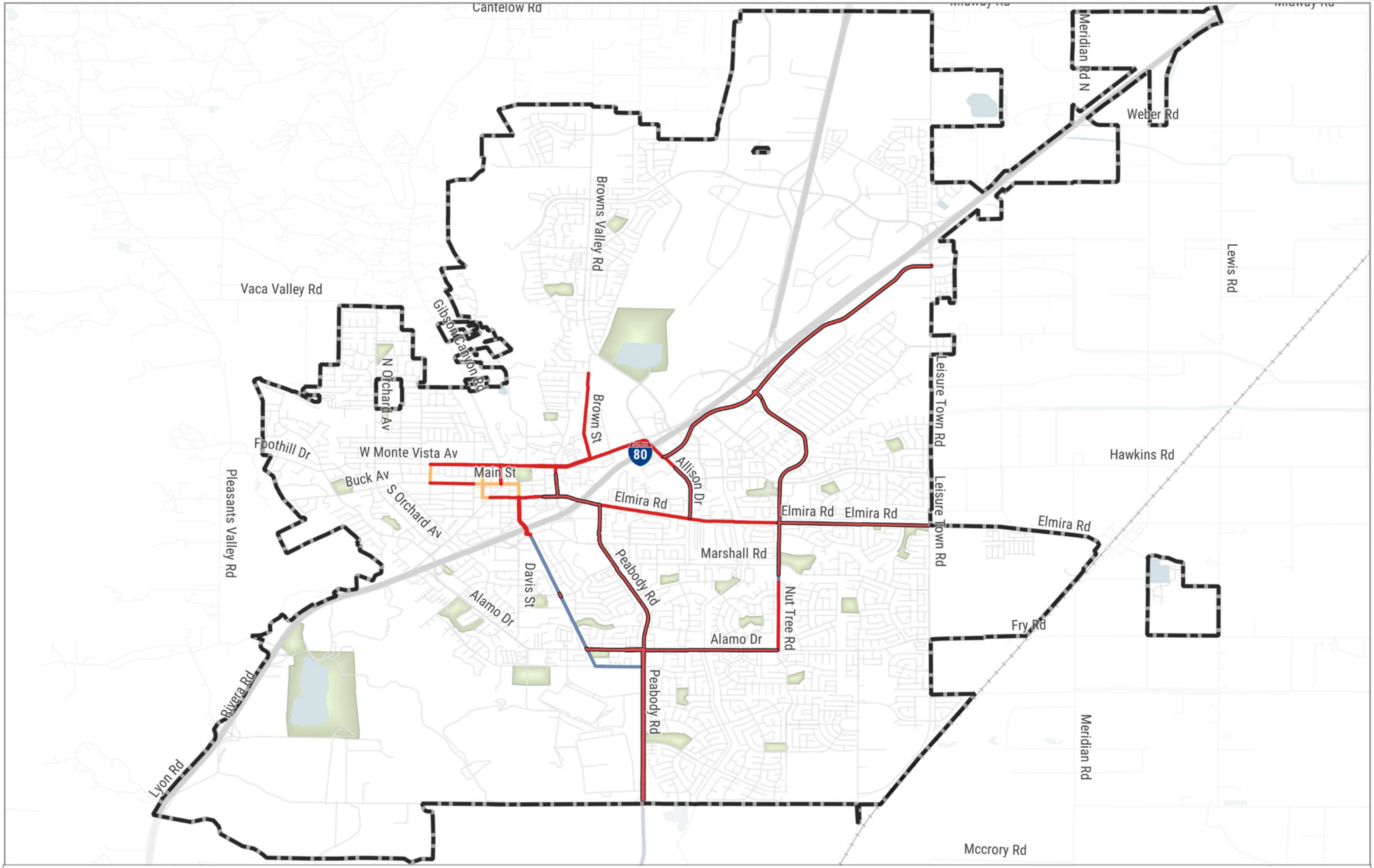
Vacaville Network Gaps

In total there are about 17 miles of bikeway network gaps and 4 miles of sidewalk gaps in the City of Vacaville on the proposed backbone network.

Table 11. Vacaville Bikeway Network Gaps

STREET / FACILITY NAME	EXTENTS	EXISTING FACILITY	GAP TYPE	DISTANCE (MI)
PEABODY RD	City Limit to California Dr	Class II	Existing Facility & High Stress	1.22
PEABODY RD	California Dr to Elmira Rd	Class II	Existing Facility & High Stress	1.54
SOUTHSIDE BIKEWAY	Crossing at Marshall Rd	Class I	Existing Facility & High Stress	0.01
DAVIS ST	Hume Way/Southside Bikeway to Mason St	None	No Existing Facility & High Stress	0.36
DAVIS ST	Mason St to E Main St	None	No Existing Facility	0.11
MAIN ST	Davis St to West St	None	No Existing Facility	0.31
BUCK AVE	West St to Chestnut St	None	No Existing Facility & High Stress	0.30
CHESTNUT ST	Buck Ave to W Monte Vista	None	No Existing Facility	0.16
W MONTE VISTA AVE	Chestnut St to Dobbins St	None	No Existing Facility & High Stress	0.47
W MONTE VISTA AVE	Dobbins St to Allison Dr	None	No Existing Facility & High Stress	1.06
CERNON ST	Buck Ave to Mason St	None	No Existing Facility	0.12
DOBBINS ST	E Monte Vista Ave to E Main St	None	No Existing Facility & High Stress	0.17
MASON ST	Cernon St to Merchant St	None	No Existing Facility	0.06
MASON ST	Merchant St to Depot St	None	No Existing Facility & High Stress	0.46
ELMIRA RD	Depot St to Peabody Rd	Class II	Existing Facility & High Stress	0.31
ELMIRA RD	Peabody Rd to Nut Tree Rd	None	No Existing Facility & High Stress	1.26
ELMIRA RD	Nut Tree Rd to Leisure Town Rd	Class II	Existing Facility & High Stress	1.04
ALLISON DR	E Monte Vista Ave to Ulatis Dr	None	No Existing Facility & High Stress	0.48
ALLISON DR	Ulatis Dr to Elmira Rd	Class II	Existing Facility & High Stress	0.32
ALAMO DR	Southside Bikeway to Nut Tree Rd	Class II	Existing Facility & High Stress	1.32

STREET / FACILITY NAME	EXTENTS	EXISTING FACILITY	GAP TYPE	DISTANCE (MI)
NUT TREE RD	Alamo Dr to Marshall Rd	None	No Existing Facility & High Stress	0.76
NUT TREE RD	Marshall Rd to Orange Dr	Class II	Existing Facility & High Stress	1.73
NUT TREE PKWY/ORANGE DR	Allison Dr to Leisure Town Rd	Class II	Existing Facility & High Stress	2.58
BROWN ST	E Monte Vista Ave to Markham Ave	None	No Existing Facility & High Stress	0.76
TOTAL				16.91



Solano Countywide Active Transportation Plan: Vacaville Gap Analysis Bike Network

Backbone Network
- Existing Low Stress Facility
- No Existing Facility
- No Facility & High Stress
- Existing Facility & High Stress

Other
- Railroads
- Parks
- Water

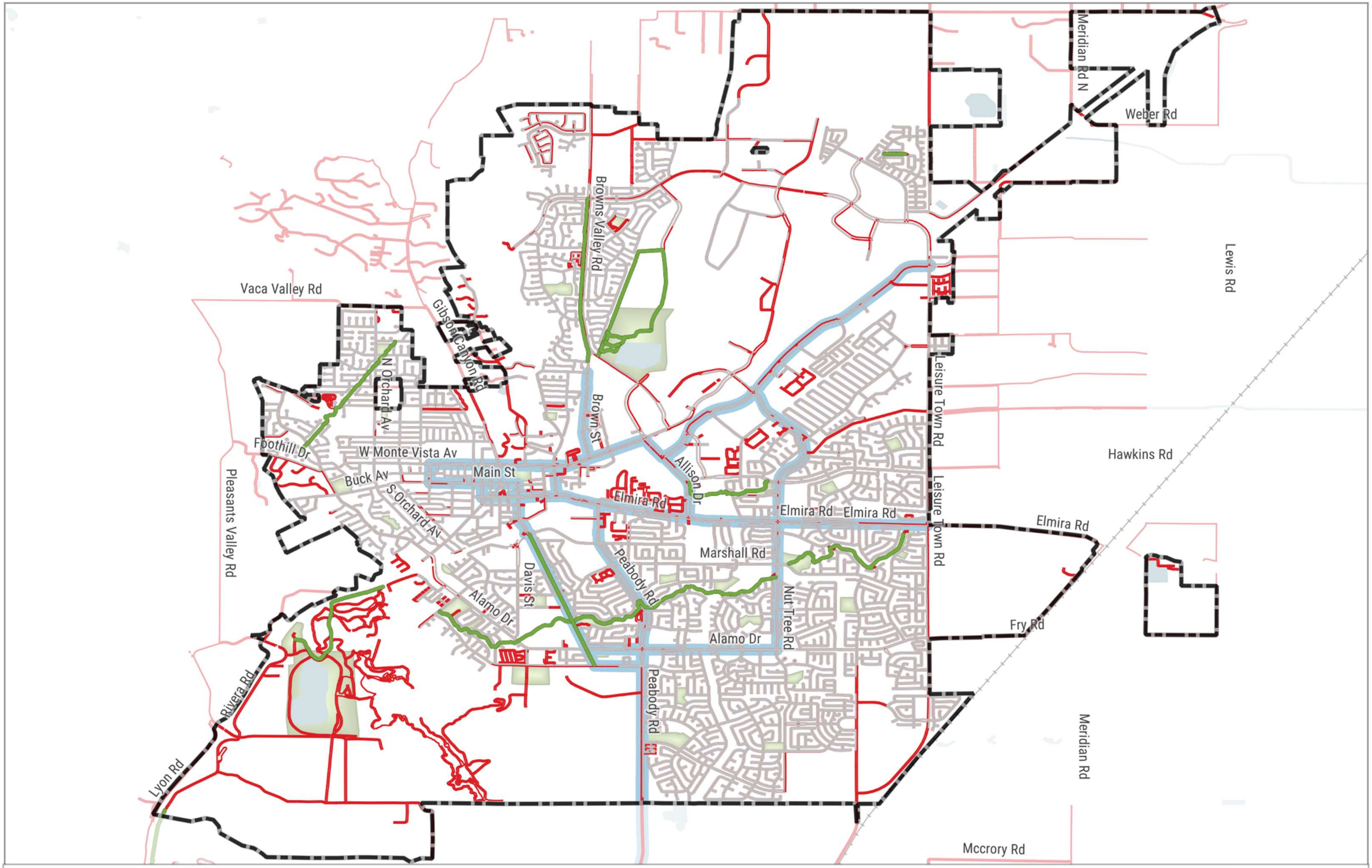
STA
Solano Transportation Authority

0 0.24 0.48 mi

N

Table 12. Vacaville Pedestrian Network Gaps

STREET/FACILITY NAME	EXTENTS	NORTH OR WEST SIDE OF STREET DISTANCE (MI)	SOUTH OR EAST SIDE OF STREET DISTANCE (MI)	TOTAL DISTANCE (MI)
PEABODY RD	City Limit to Alamo Dr	1.20	0.00	1.20
CALIFORNIA DR	South Side Bikeway to Peabody Rd	0.00	0.17	0.17
NUT TREE PKWY	Allison Dr to Nut Tree Rd	0.25	0.00	0.25
ORANGE DR	Nut Tree Rd to Leisure Town Rd	0.67	0.35	1.01
ALLISON DR	E Monte Vista Ave to Nut Tree Pkwy	0.20	0.00	0.20
ALLISON DR	Nut Tree Pkwy to Elmira Rd	0.00	0.10	0.10
ELMIRA RD	Leisure Town Rd to Edwin Dr	0.46	0.00	0.46
BUCK AVE	Chestnut St to Kentucky St	0.00	0.13	0.13
CHESTNUT ST	Buck Ave to Neil St	0.06	0.00	0.06
BROWN ST	Bennett Hill Dr to Markham Ave	0.00	0.08	0.08
TOTAL		2.84	0.83	3.67



Solano Countywide Active Transportation Plan: Vacaville Sidewalk Gap Analysis

Bicycle and Pedestrian Network
- Countywide Backbone Bicycle Network
- Existing Sidewalks
- Trails

Street Network
- Sidewalk gaps

Other
- Railroads
- Parks
- Water

STA Solano Transportation Authority

0 0.24 0.48 mi

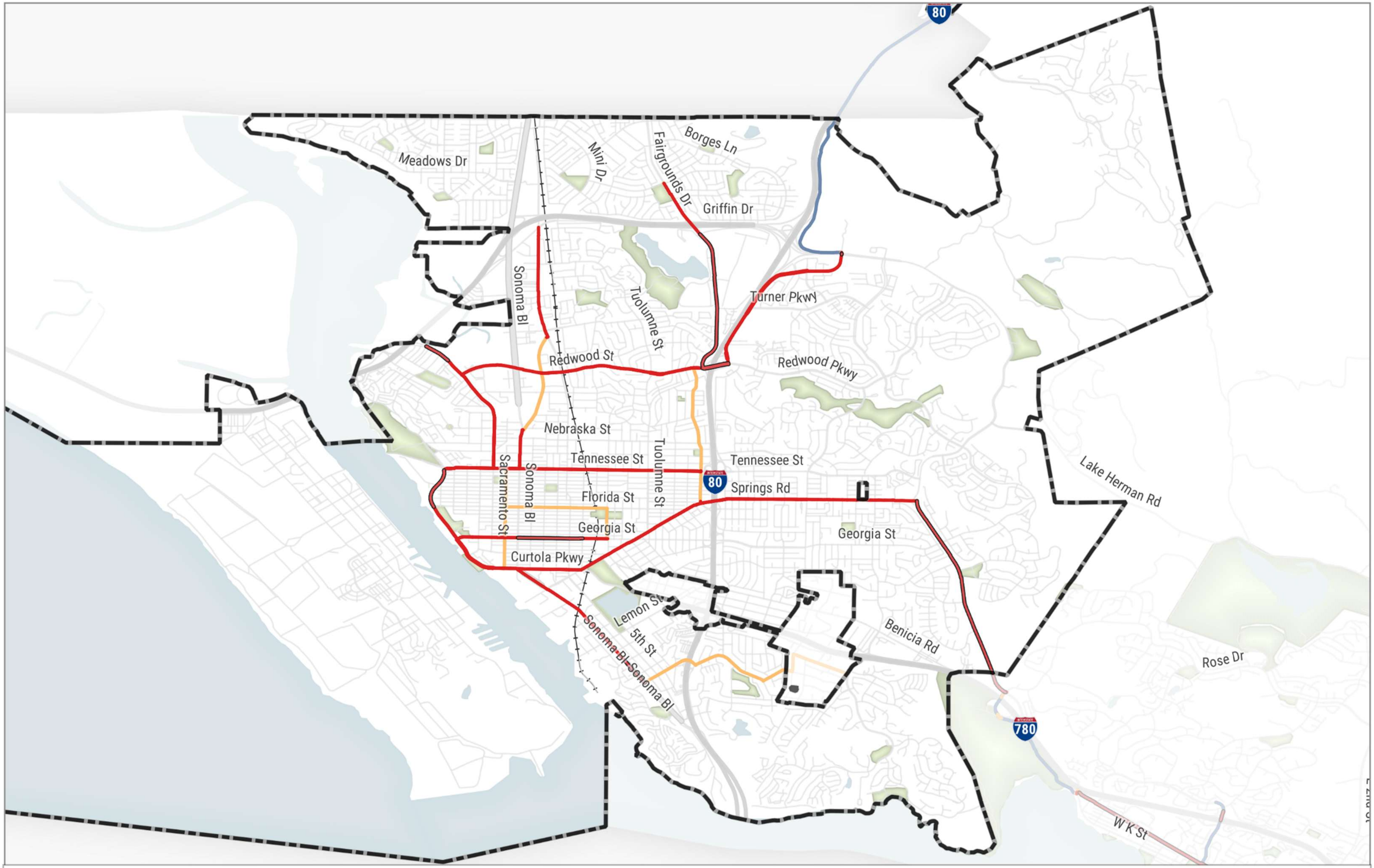
Vallejo Network Gaps

In total there are about 21 miles of bikeway network gaps and 7.5 miles of sidewalk gaps in the City of Vallejo on the proposed backbone network.

Table 13. Vallejo Bikeway Network Gaps

STREET/FACILITY NAME	EXTENTS	EXISTING FACILITY	GAP TYPE	DISTANCE (MI)
COLUMBUS PKWY	Benicia Rd to Springs Rd	Class II	Existing Facility & High Stress	1.62
SPRINGS RD	Columbus Pkwy to Mariposa St	None	No Existing Facility & High Stress	1.52
SOLANO AVE	Mariposa St to Georgia St	None	No Existing Facility & High Stress	0.57
SOLANO AVE	Georgia St to Curtola Pkwy	None	No Existing Facility & High Stress	0.46
CURTOLA PKWY/MARE ISLAND WAY	Solano Ave to Florida St	None	No Existing Facility & High Stress	1.34
MARE ISLAND WAY	Florida St to Tennessee St	Class II	Existing Facility & High Stress	0.39
SONOMA BLVD (HWY 29)	Curtola Pkwy to Cherry St	None	No Existing Facility & High Stress	1.13
SONOMA BLVD (HWY 29)	Cherry St to Magazine St	Class II	Existing Facility & High Stress	0.23
MAGAZINE ST	Sonoma Blvd to Palou St	None	No Existing Facility	1.16
MARIN ST	Curtola Pkwy to Capitol St	None	No Existing Facility	0.41
MARIN ST	Alabama St to Tennessee St	None	No Existing Facility	0.07
GEORGIA ST	Mare Island Way to Sonoma Blvd	None	No Existing Facility & High Stress	0.43
GEORGIA ST	Sonoma Blvd to Monterey St	Class II	Existing Facility & High Stress	0.46
GEORGIA ST	Monterey St to Amador St	None	No Existing Facility & High Stress	0.18
AMADOR ST	Georgia St to Florida St	None	No Existing Facility	0.28
FLORIDA ST	Amador St to Alameda St	None	No Existing Facility	0.26
FLORIDA ST	Alameda St to Marin St	None	No Existing Facility	0.45

STREET/FACILITY NAME	EXTENTS	EXISTING FACILITY	GAP TYPE	DISTANCE (MI)
TENNESSEE ST	Mare Island Way to Tuolumne St	None	No Existing Facility & High Stress	1.44
TENNESSEE ST	Tuolumne St to Mariposa St	None	No Existing Facility & High Stress	0.37
MARIPOSA ST	Solano Ave to Redwood St	None	No Existing Facility	1.21
REDWOOD ST	Sacramento St to Fairgrounds Dr	None	No Existing Facility & High Stress	1.74
REDWOOD ST	Fairgrounds Dr to Admiral Callaghan Ln	Class II	Existing Facility & High Stress	0.05
ADMIRAL CALLAGHAN LN	Redwood Pkwy to Columbus Pkwy	None	No Existing Facility & High Stress	0.00
FAIRGROUNDS DR	Redwood St to Coach Ln	None	No Existing Facility & High Stress	0.56
FAIRGROUNDS DR	Coach Ln to Sage St	Class II	Existing Facility & High Stress	0.68
FAIRGROUNDS DR	Sage St to Whitney Ave	None	No Existing Facility & High Stress	0.52
BROADWAY ST	Lewis Brown Dr to Couch St	None	No Existing Facility & High Stress	0.99
COUCH ST	Broadway St to Sonoma Blvd	None	No Existing Facility	0.90
SONOMA BLVD (HWY 29)	Couch St to Tennessee St	None	No Existing Facility & High Stress	0.34
SACRAMENTO ST	Tennessee St to Redwood St	None	No Existing Facility & High Stress	0.90
SACRAMENTO ST	Redwood St to Baldwin St	None	No Existing Facility & High Stress	0.16
SACRAMENTO ST	Baldwin St to SF Bay Trail	Class II	Existing Facility & High Stress	0.19
TOTAL				**21.01**



Solano Countywide Active Transportation Plan: Vallejo Gap Analysis Bike Network

Backbone Network
- Existing Low Stress Facility
- No Existing Facility
- No Faclility & High Stress
- Existing Faclility & High Stress

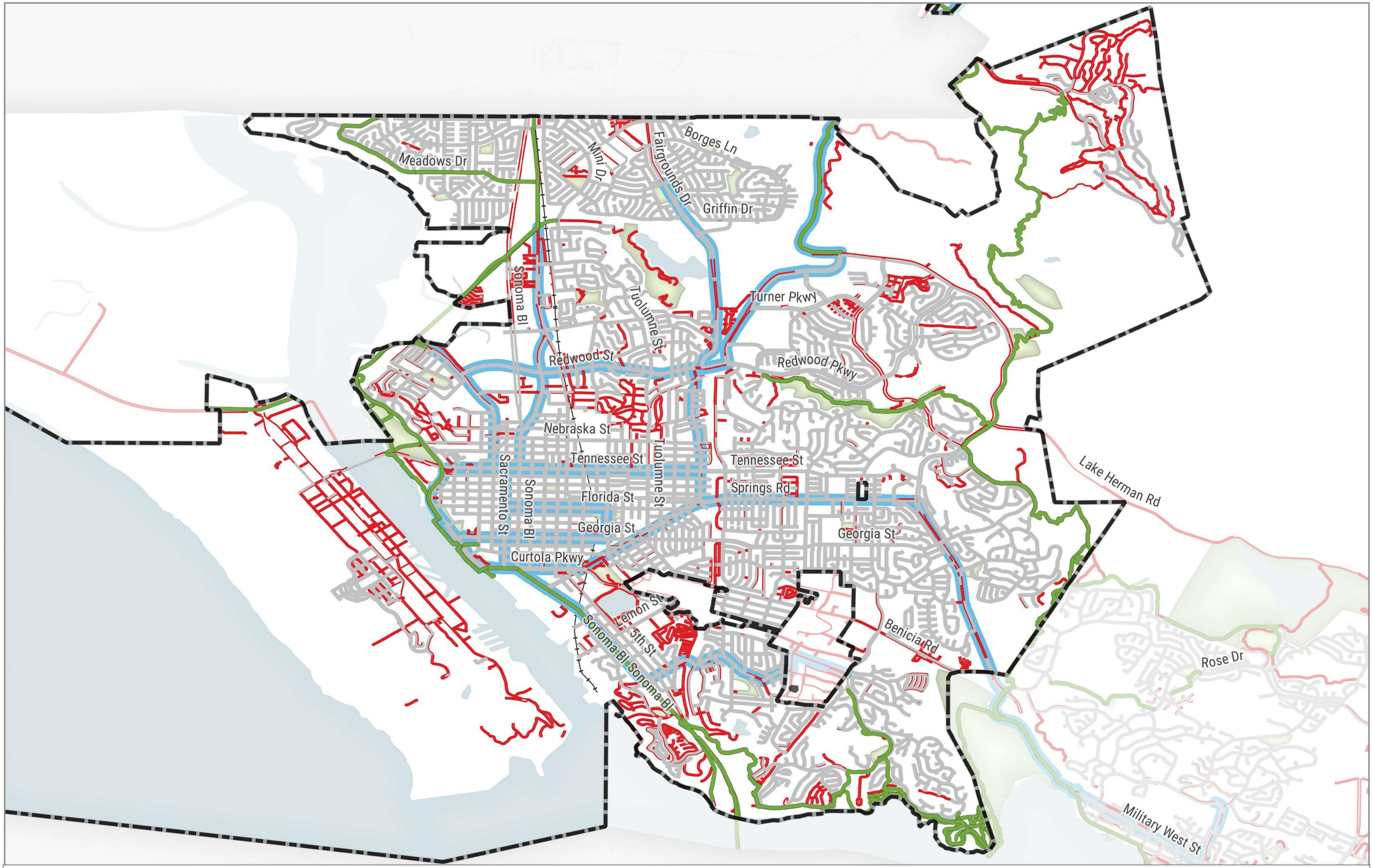
Other
- Railroads
- Parks
- Water

STA
Solano Transportation Authority

0 0.24 0.48 mi

Table 14. Vallejo Pedestrian Network Gaps

STREET/FACILITY NAME	EXTENTS	NORTH OR WEST SIDE OF STREET DISTANCE (MI)	SOUTH OR EAST SIDE OF STREET DISTANCE (MI)	TOTAL DISTANCE (MI)
MAGAZINE ST	Lincoln Rd to Pin St	0.00	0.15	0.15
SONOMA BLVD	Magazine St to Cherry St	0.00	0.13	0.13
SOLANO AVE	Curtola Pkwy to Maine St	0.20	0.15	0.35
SOLANO AVE	Amador St to Georgia St	0.09	0.11	0.19
SOLANO AVE	Georgia St to Virginia St	0.03	0.00	0.03
SPRINGS RD	Avian Dr to Columbus Pkwy	0.14	0.00	0.14
COLUMBUS PKWY	Springs Rd to Benicia Rd	1.45	1.29	2.74
SACRAMENTO ST	Denio St to SF Bay Trail	0.00	0.62	0.62
COUCH ST	Broadway St to Redwood St	0.22	0.08	0.30
BROADWAY ST	Couch St to Sereno Dr	0.02	0.00	0.02
BROADWAY ST	Sereno Dr to Lewis Brown Dr	0.24	0.51	0.75
MARIPOSA ST	Arkansas St to Nebraska St	0.00	0.04	0.04
MARIPOSA ST	Greenfield Ave to Claremont Ave	0.00	0.06	0.06
MARIPOSA ST	Redwood St to Greenfield Ave	0.09	0.09	0.19
FAIRGROUNDS DR	Sereno Dr to Sage St	0.43	0.00	0.43
ADMIRAL CALLAGHAN LN	Redwood Pkwy to Plaza Dr	0.89	0.26	1.15
REDWOOD ST	Admiral Callaghan Ln to Fairgrounds Dr	0.00	0.16	0.16
REDWOOD ST	Fairgrounds Dr to Moorland St	0.00	0.06	0.06
TOTAL		**3.80**	**3.72**	**7.52**



Solano Countywide Active Transportation Plan: Vallejo Sidewalk Gap Analysis

Bicycle and Pedestrian Network
- Countywide Backbone Bicycle Network
- Existing Sidewalks
- Trails

Street Network
- Sidewalk gaps

Other
- Railroads
- Parks
- Water

STA
Solano Transportation Authority

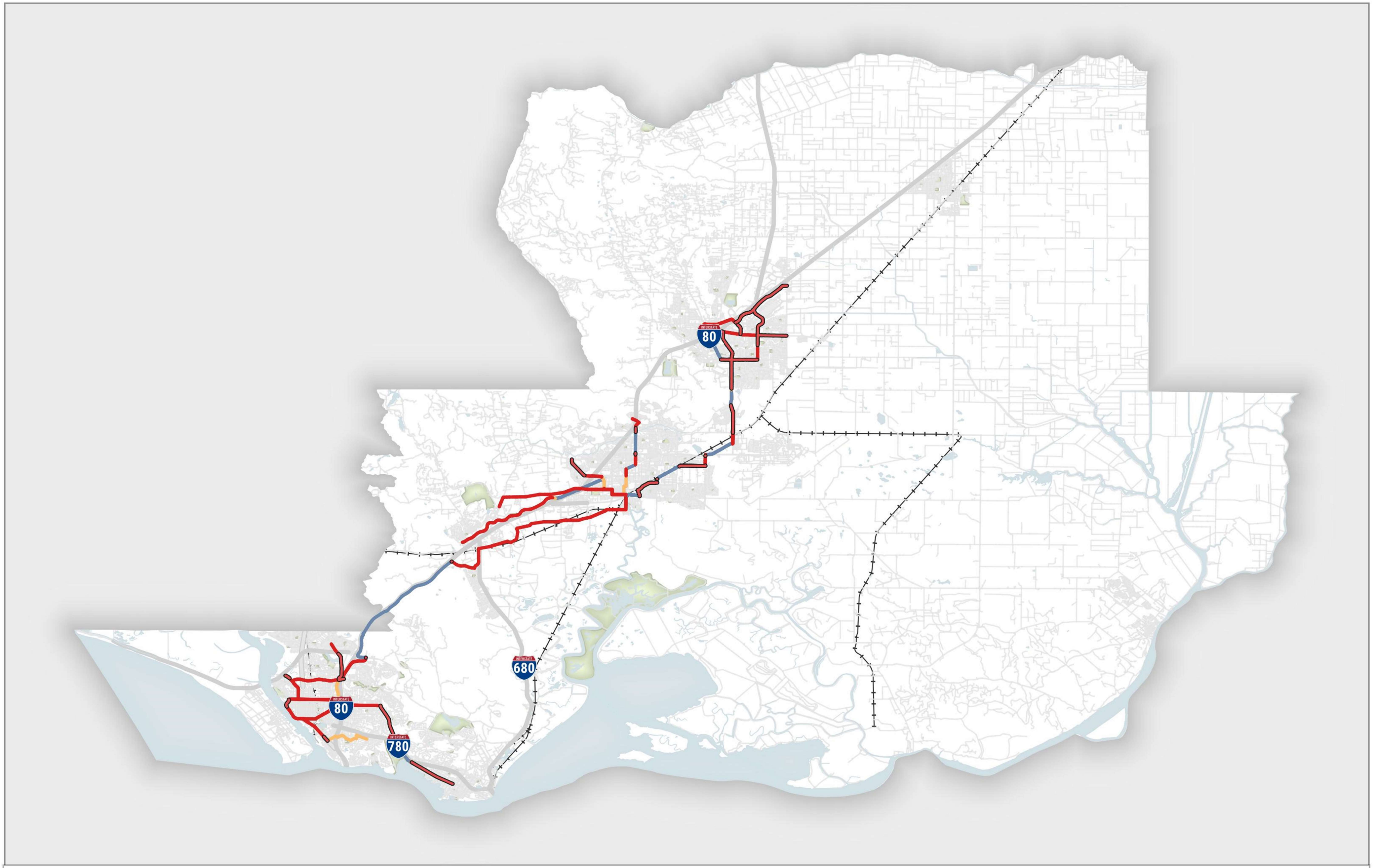
0 0.24 0.48 mi

Unincorporated Solano County Network Gaps

In total there are about 8 miles of bikeway network gaps and 14.5 miles of sidewalk gaps in Unincorporated Solano County on the proposed backbone network. The maps presented in this section show the entire countywide backbone network including the connections through unincorporated areas. No map was produced for Countywide sidewalk gaps as the data was not legible at that scale.

Table 15. Unincorporated Solano County Bikeway Network Gaps

STREET / FACILITY NAME	EXTENTS	EXISTING FACILITY	GAP TYPE	DISTANCE (MI)
CORDELIA RD	Lopes Rd to Pittman Rd	None	No Existing Facility & High Stress	0.57
CORDELIA RD	Romania Rd to Hale Ranch Rd	None	No Existing Facility & High Stress	1.76
SUISUN PKWY	Business Center Rd to Abernathy Rd	None	No Existing Facility & High Stress	1.53
SUISUN VALLEY RD	Monte Vista Ct to Rockville Rd	None	No Existing Facility & High Stress	0.47
ROCKVILLE RD	Suisun Valley Rd to Oliver Rd	None	No Existing Facility & High Stress	2.86
MAGAZINE ST	Palou St to Old Glen Cove Rd	None	No Existing Facility	0.39
OLD GLEN COVE RD	Magazine St to Glen Cove Pkwy	None	No Existing Facility	0.28
TOTAL				**7.86**



Solano Countywide Active Transportation Plan: Countywide Gap Analysis Bike Network

Backbone Network
- Existing Low Stress Facility
- No Existing Facility
- No Faclility & High Stress
- Existing Faclility & High Stress

Other
- Railroads
- Parks
- Water

Solano Transportation Authority

Table 16. Unincorporated Solano County Pedestrian Network Gaps

STREET / FACILITY NAME	EXTENTS	NORTH OR WEST SIDE OF STREET DISTANCE (MI)	SOUTH OR EAST SIDE OF STREET DISTANCE (MI)	TOTAL DISTANCE (MI)
CORDELIA RD	Lopes Rd to Pittman Rd	0.00	0.57	0.57
CORDELIA RD	Romania Rd to Hale Ranch Rd	1.76	1.76	3.52
SUISUN PKWY	Suisun Creek to Abernathy Rd/Fairfield Linear Park	0.00	1.54	1.54
SUISUN VALLEY RD	Monte Vista Ct to Rockville Rd	0.47	0.47	0.94
ROCKVILLE RD	Suisun Valley Rd to Oliver Rd	2.71	2.71	5.42
PEABODY RD	Chuck Hammond Dr to Vacaville City Limits	0.75	0.81	1.55
OLD GLEN COVE RD	Glen Cove Pkwy to Magazine St	0.26	0.05	0.31
MAGAZINE ST	Palou St to Old Glen Cove Rd	0.33	0.33	0.66
TOTAL		**6.27**	**8.23**	**14.50**

1970 Broadway, Suite 740
Oakland, CA 94612-2219
510.763.2061
www.dksassociates.com

MEMORANDUM

DATE:	December 17, 2019
TO:	Patrick Gilster, Toole Design
FROM:	Josh Pilachowski, PE, DKS Associates Mahdi Rouholamin, PE, DKS Associates
SUBJECT:	STA Active Transportation Plan - Wayfinding Signs

A review of the existing bicycle wayfinding signs along the established regional backbone network in Solano County shows that the available signs are scarcely placed with the majority of the study network without any signs. The inventory of these signs proved a considerable gap in the existing wayfinding signs that need to be filled based on the future plans to adopt an active transportation plan centered around biking and walking. This memorandum provides a summary of the proposed principles and guidelines to place various types of bicycle wayfinding signs consistently throughout the Solano County as part of the Solano Transportation Authority (STA) Active Transportation Plan (ATP).

TYPES OF WAYFINDING SIGNS

There is currently three types of wayfinding signs to guide road users through the roadway network, as defined below:

- **Confirmation signs**: These signs are intended to confirm that the roadway is a designated bikeway. Confirmation signs generally show the distance to the key destinations ahead, however, no directional arrows are provided on these signs. Up to three destinations ahead can be mentioned on one Confirmation sign.
- **Decision signs**: These signs provide direction to key destinations and are supplemented with directional arrows and distance. Up to three destinations can be included in one Decision sign.
- **Turn signs**: These signs direct cyclists through an intersection where one bikeway changes the direction without intersection another bikeway. These signs are supplemented with a directional arrow but with no distance on the sign.

Figure 1 depicts examples of bicycle wayfinding signs.

Figure 1. Examples of Bicycle Wayfinding Signs

Confirmation Sign **Decision Sign** **Turn Sign**

WAYFINDING SIGNS PLACEMENT PRINCIPLES

The general guidelines to place the wayfinding signs along the bikeways are presented below, based on the type of sign.

- **Confirmation Signs**: These signs should be placed at the beginning of each bikeway, shortly after the intersection of two or more bikeways, and shortly after a bikeway changes the direction.
- **Decision Signs**: Decision signs are to be placed in the near-side corner of the intersection of two or more bikeways. These signs are suggested to be placed 50'-150' in advance of the target intersection; however, for the left-turn maneuvers when crossing multiple lanes is required, the distance to the decision point can increase to up to 300'.
- **Turn Signs**: These signs are proposed to be placed at the near-side corner of an intersection where the bikeway changes direction. Just like Decision signs, adequate notification to left-turn cyclists should be given by placing the left-turn Turn sign up to 300', depending on the number of lanes, before the turning point.

In terms of sign frequency, it is suggested to keep an interval of half a mile to one mile between confirmation signs. Depending on the density of the side street, the interval between signs might be short (such as in downtown areas), whereas in rural areas the signs can be placed at one-mile intervals.

WAYFINDING SIGNS RECOMMENDATION SUMMARY

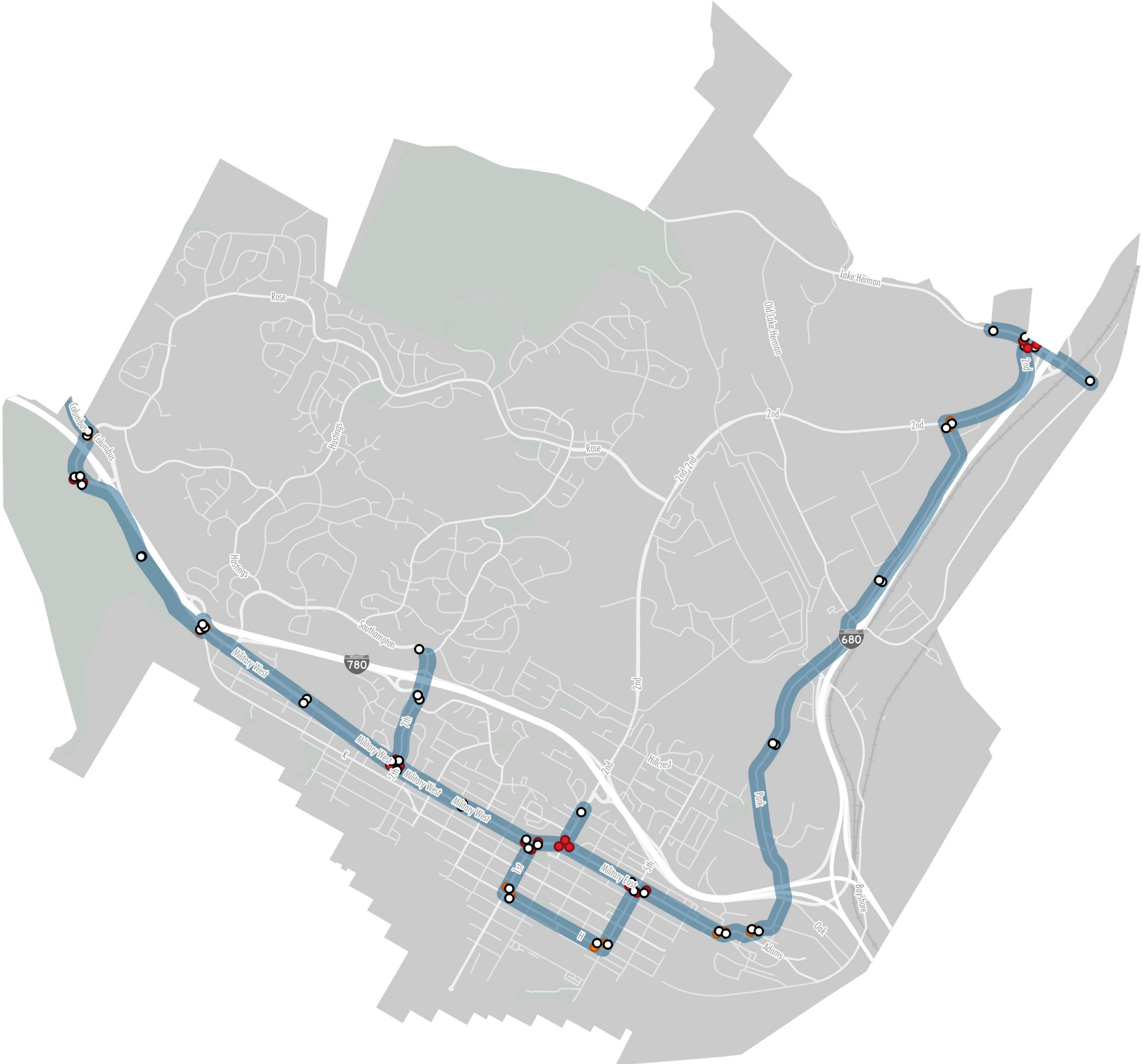
The number of recommended signs for each jurisdiction by type and total number is provided below in Table 1.

Table 1: Number of Recommended Signs by Jurisidiction

Jurisdiction	Turn Signs	Decision Signs	Confirmation Signs	Total Signs
Benicia	16	18	47	81
Dixon	18	19	38	75
Fairfield	24	32	86	142
Rio Vista	22	33	59	114
Suisun City	8	21	33	62
Unincorporated County	2	0	12	14
Vacaville	6	41	61	108
Vallejo	18	34	72	124

Benicia

STA
Countywide Active Transportation Plan
Wayfinding



County
Jurisdictions
Parks
Water
Backbone Network

Wayfinding Signs
Confirmation
Turn
Decision

0 0.5 1 mi

Dixon

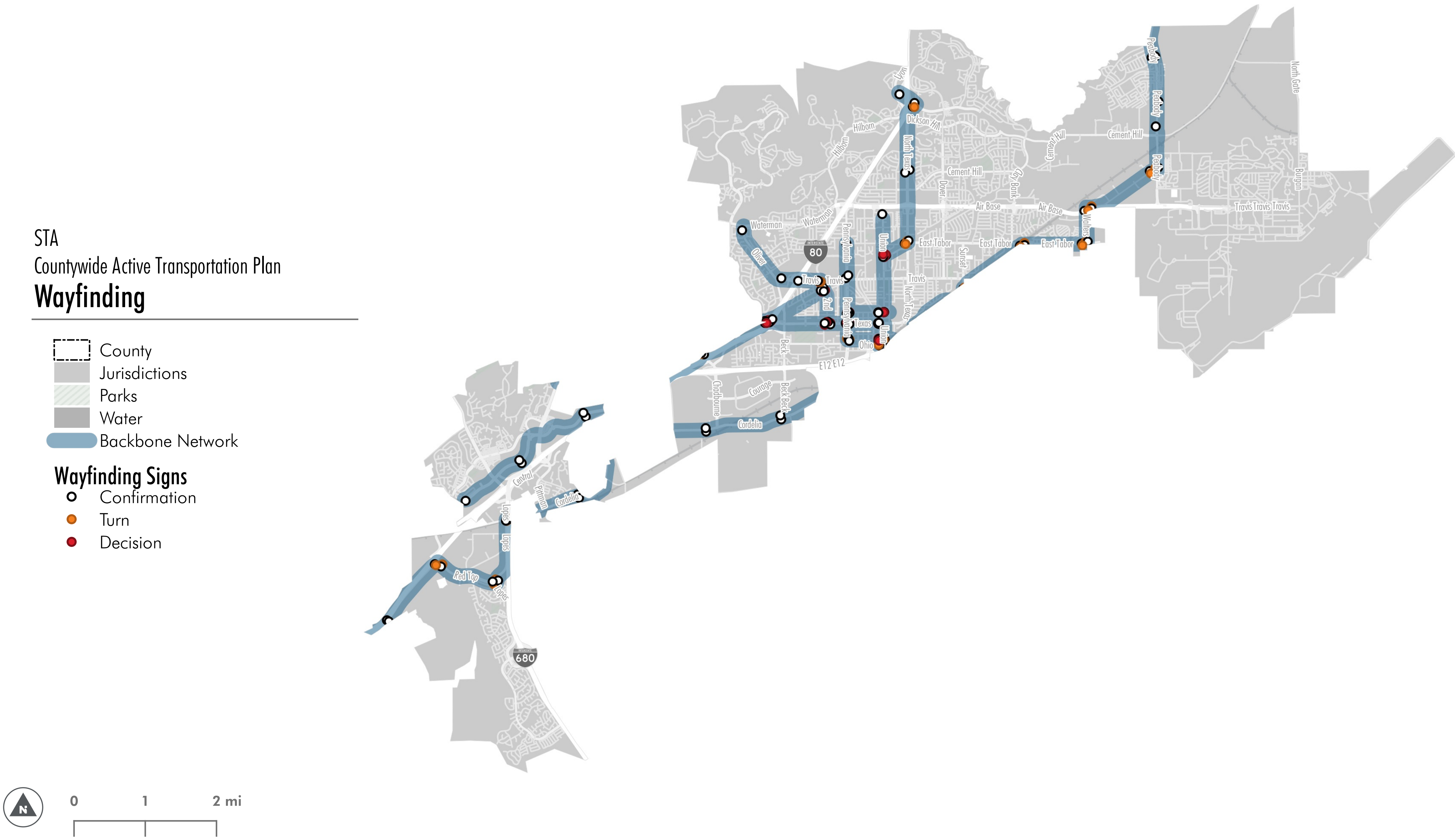
STA
Countywide Active Transportation Plan
Wayfinding

County
Jurisdictions
Parks
Water
Backbone Network

Wayfinding Signs
Confirmation
Turn
Decision

Fairfield

STA
Countywide Active Transportation Plan
Wayfinding



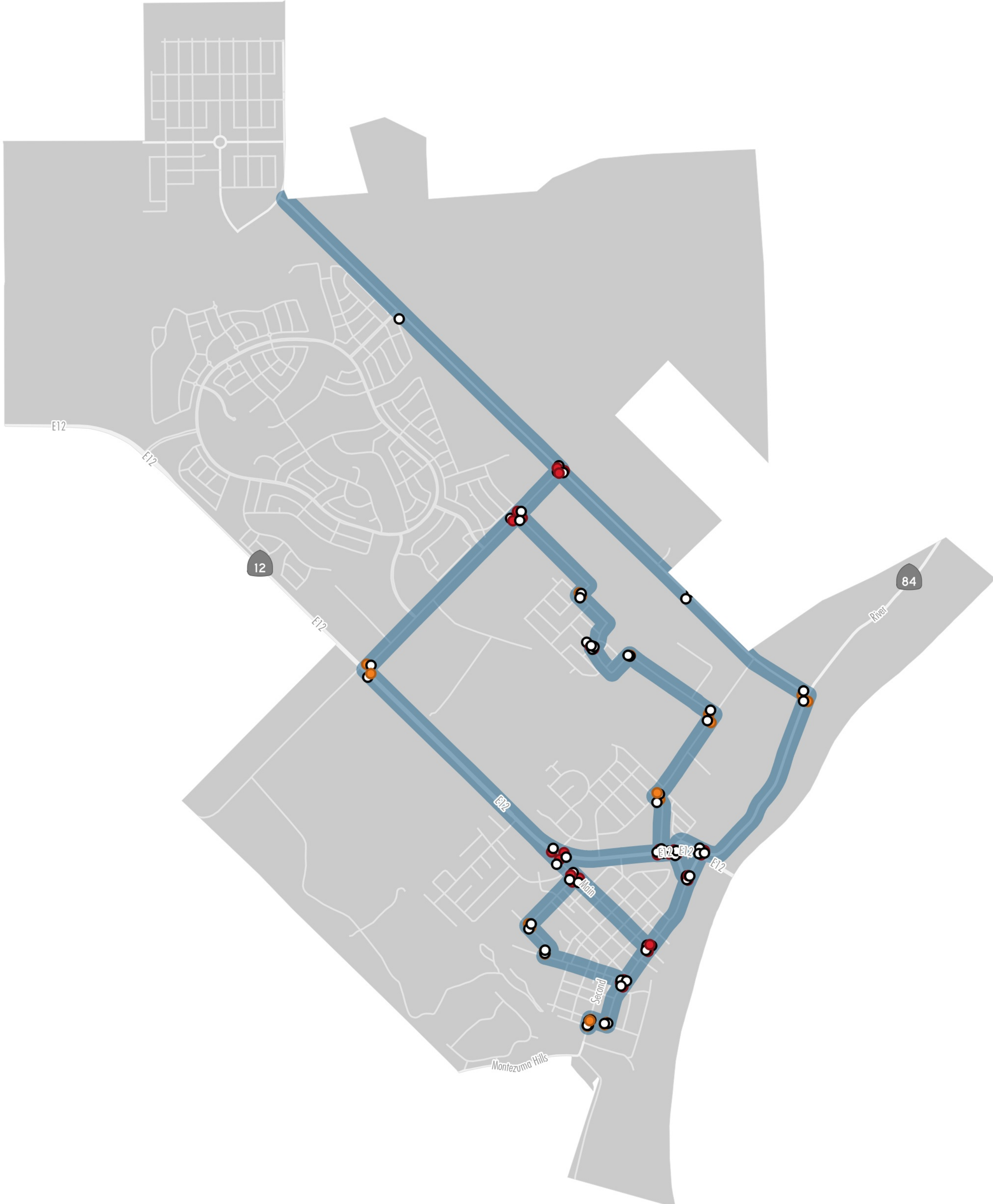
Rio Vista

STA
Countywide Active Transportation Plan
Wayfinding

- County
- Jurisdictions
- Parks
- Water
- Backbone Network

Wayfinding Signs

- Confirmation
- Turn
- Decision

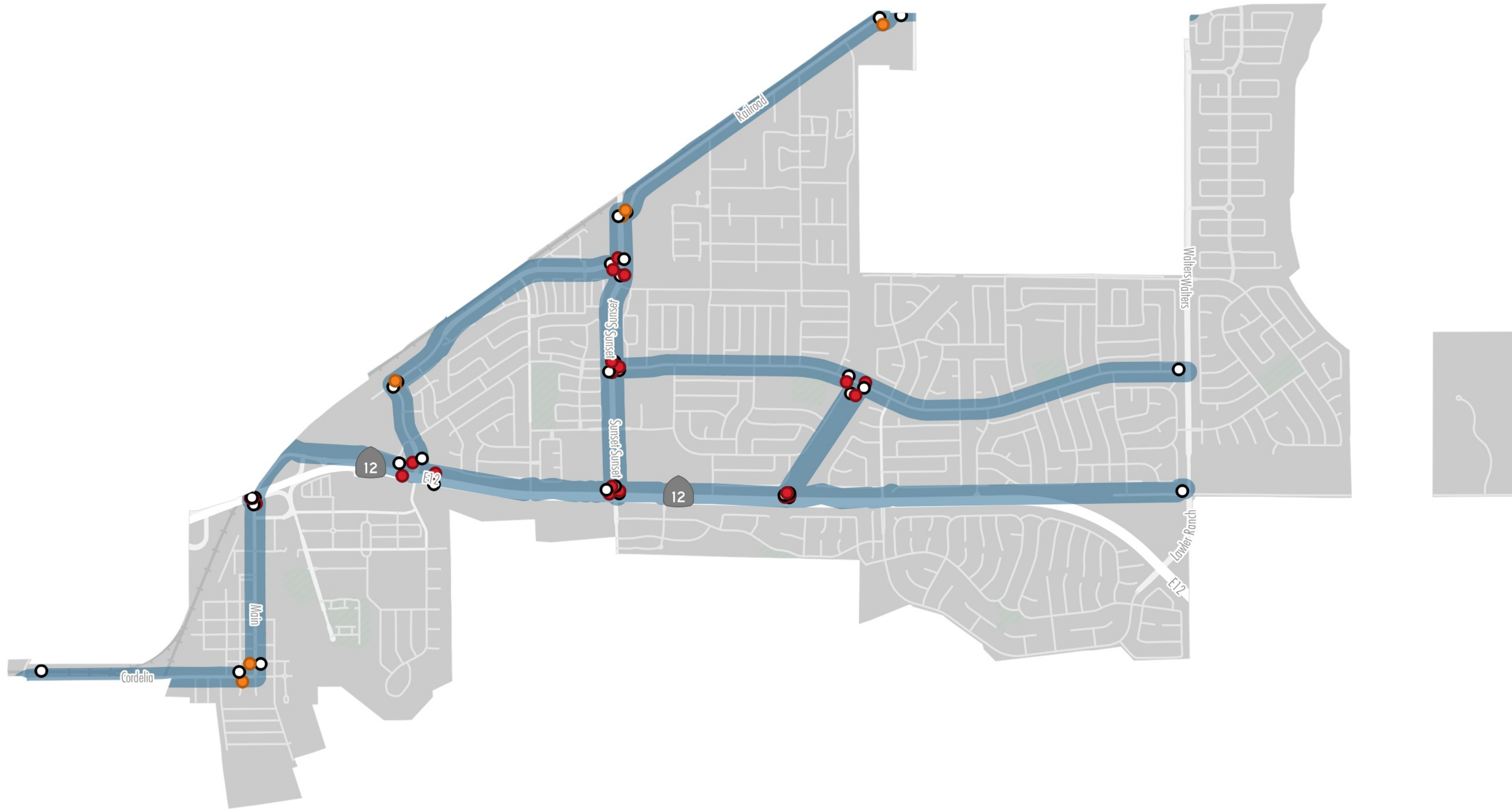


Suisun City

STA
Countywide Active Transportation Plan
Wayfinding

County
Jurisdictions
Parks
Water
Backbone Network

Wayfinding Signs
Confirmation
Turn
Decision



0 0.5 1 mi

Unincorporated Solano County

STA

Countywide Active Transportation Plan

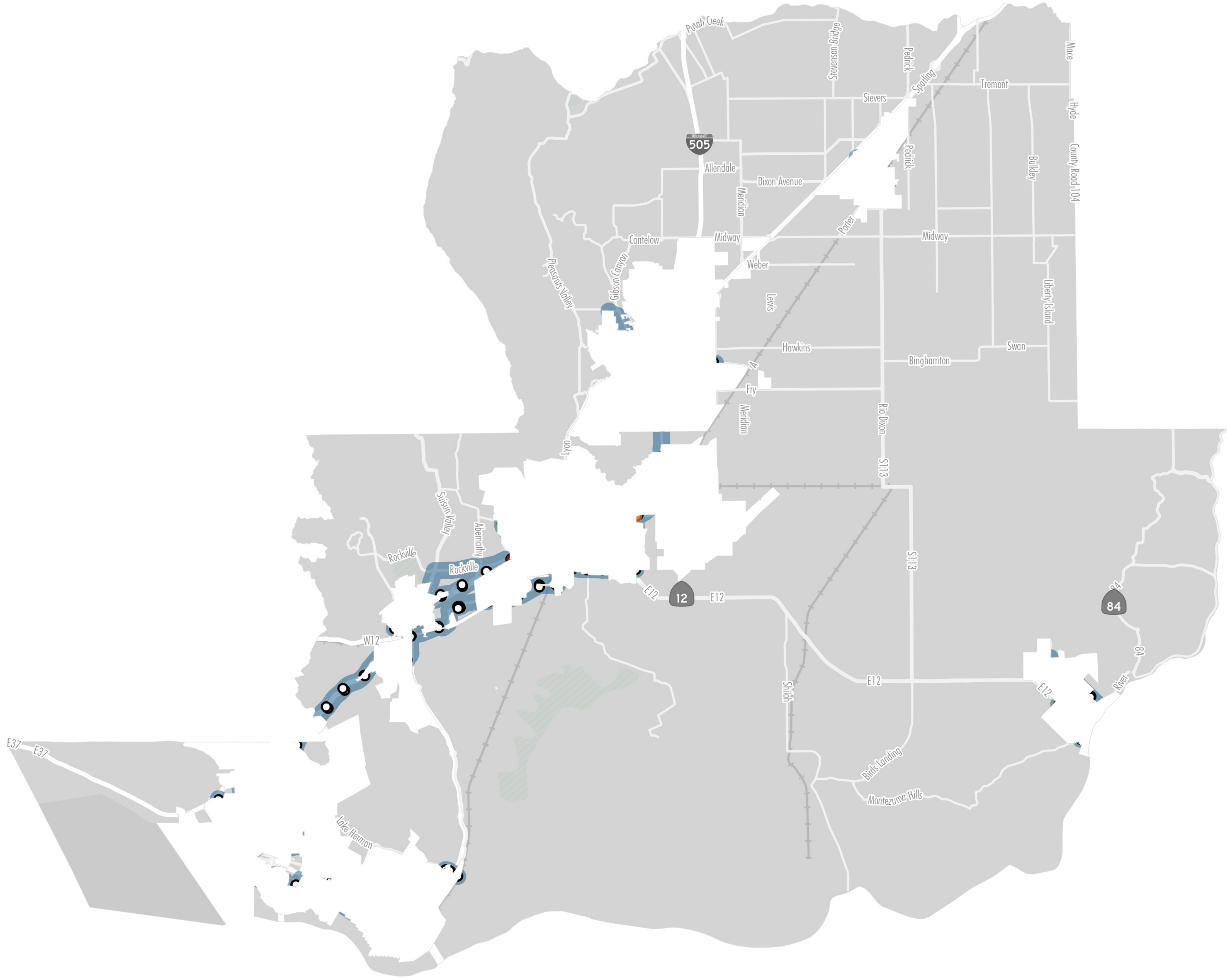
Wayfinding

- County
- Jurisdictions
- Parks
- Water
- Backbone Network

Wayfinding Signs

- Confirmation
- Turn
- Decision

0 5 10 mi

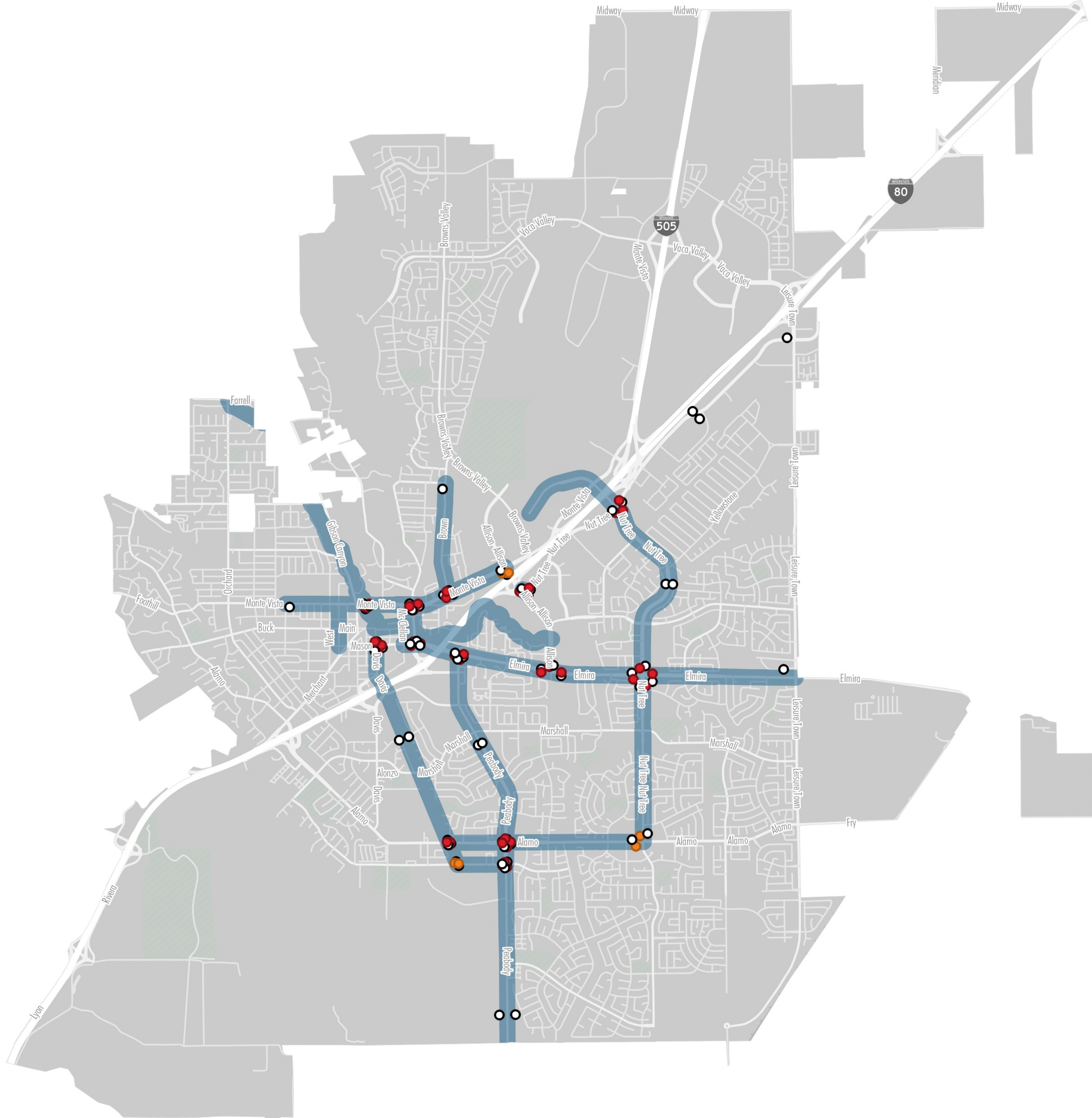


Vacaville

STA
Countywide Active Transportation Plan
Wayfinding

County
Jurisdictions
Parks
Water
Backbone Network

Wayfinding Signs
Confirmation
Turn
Decision



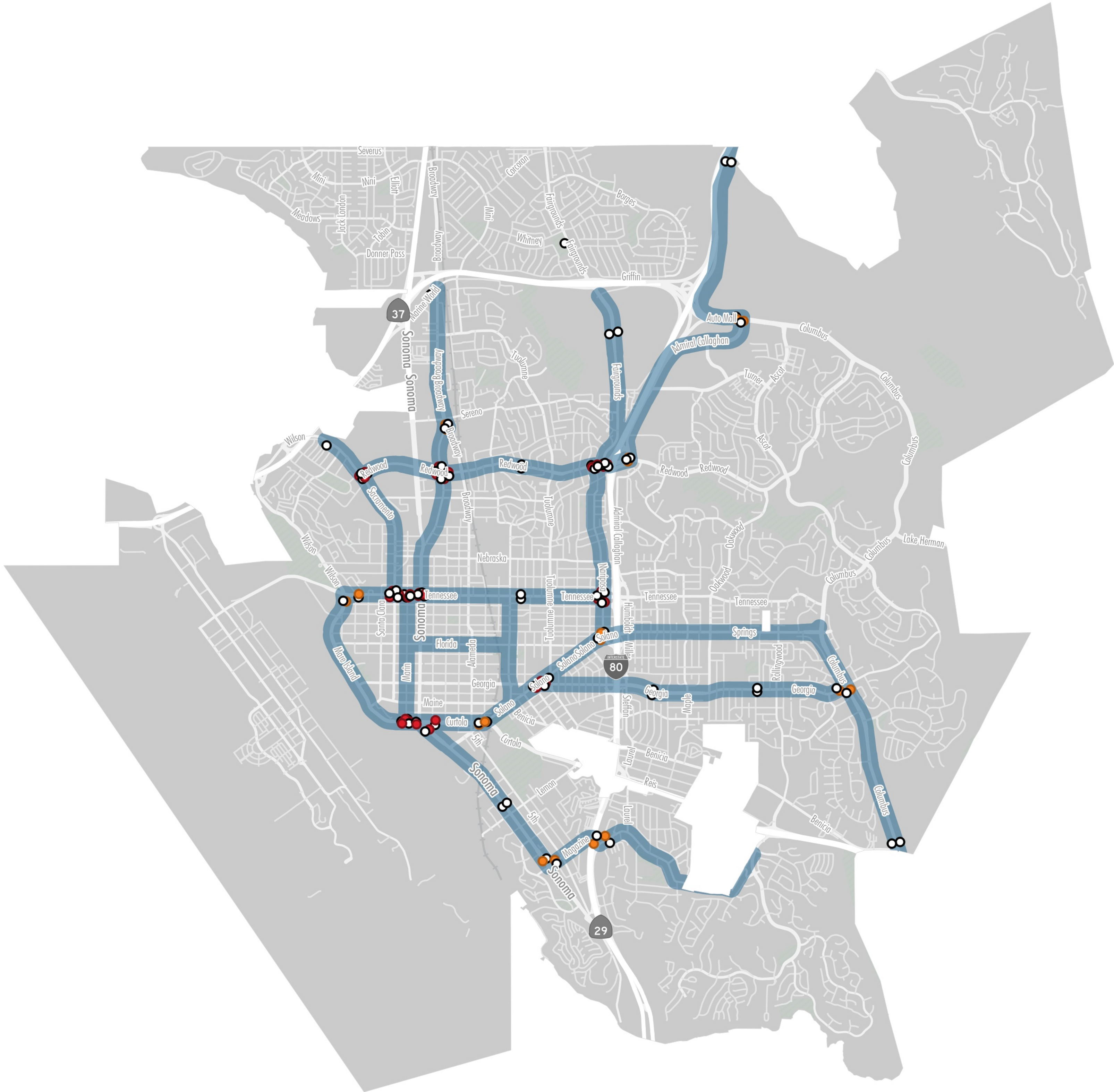
Vallejo

STA
Countywide Active Transportation Plan
Wayfinding

- County
- Jurisdictions
- Parks
- Water
- Backbone Network

Wayfinding Signs
- Confirmation
- Turn
- Decision

0 1 2 mi



1970 Broadway, Suite 740
Oakland, CA 94612-2219
510.763.2061
www.dksassociates.com

MEMORANDUM

DATE:	March 29, 2019
TO:	Patrick Gilster, Toole Design
FROM:	Josh Pilachowski, DKS Associates
SUBJECT:	Funding Sources relevant to STA Active Transportation Projects

This memo provides a summary of funding sources at the Federal, State, and Regional Level. For each funding source, the relevant managing agency, a summary of the program, and any criteria or constraints as related to active transportation projects is provided. Attached to this memo is a spreadsheet summarizing the funding sources by relevant projects.

Federal Funding Sources

Better Utilizing Investments to Leverage Development (BUILD)

Managing Agency: United States Department of Transportation

The Better Utilizing Investments to Leverage Development, or BUILD Transportation Discretionary Grant program, provides a unique opportunity for the United States Department of Transportation to invest in road, rail, transit and port projects that promise to achieve national objectives. Previously known as Transportation Investment Generating Economic Recovery, or TIGER Discretionary Grants, Congress has dedicated nearly $5.6 billion for nine rounds of National Infrastructure Investments to fund projects that have a significant local or regional impact. The eligibility requirements of BUILD allow project sponsors at the State and local levels to obtain funding for multi-modal, multi-jurisdictional projects that are more difficult to support through traditional DOT programs. BUILD can fund port and freight rail projects, for example, which play a critical role in our ability to move freight but have limited sources of Federal funds.

Congestion Management & Air Quality (CMAQ)

Managing Agency: Federal Highway Administration

The Congestion Mitigation and Air Quality Improvement (CMAQ) program provides a flexible funding source for State and local governments to fund transportation projects and programs to help meet the requirements of the Clean Air Act (CAA) and its amendments. CMAQ money supports transportation projects that reduce mobile source emissions in areas designated by the U.S. Environmental Protection Agency (EPA) to be in nonattainment or maintenance of the national ambient air quality standards. Since its beginning in 1992, the CMAQ program has provided more than $30 billion for over 29,000 transportation-related emission reduction projects for State transportation departments (DOTs), metropolitan planning organizations (MPOs), and other sponsors across the country. All CMAQ projects must come from a transportation plan and Transportation Improvement Program. The Federal share for most CMAQ-eligible projects is 80 percent, but certain safety projects that include an air quality or congestion relief component (e.g., carpool/vanpool projects), may have a Federal share of 100 percent.

Surface Transportation Block Grant (STBG) Program

Managing Agency: Federal Highway Administration

The Fixing America's Surface Transportation (FAST) Act converts the long-standing Surface Transportation Program (STP) into the Surface Transportation Block Grant Program (STBG) acknowledging that this program has the most flexible eligibilities among all Federal-aid highway programs and aligning the program's name with how the Federal Highway Administration (FHWA) has historically administered it. The STBG promotes flexibility in State and local transportation decisions and provides flexible funding to best address State and local transportation needs. STBG funding may be used for projects to preserve and improve the conditions and performance on any Federal-aid highway, bridge and tunnel projects on any public road, pedestrian and bicycle infrastructure, and transit capital projects, including intercity bus terminals.

Land and Water Conservation Fund (LWCF)

Managing Agency: National Park Service

The LWCF provides matching grants to States and local governments for the acquisition and development of public outdoor recreation areas and facilities. Over its first 49 years (1965 - 2014), LWCF has provided more than $16.7 billion to acquire new Federal recreation lands as grants to State and local governments. Projects can include acquisition of open space, development of small city and neighborhood parks, and construction of trails or greenways. In February 2019, the Senate permanently reauthorized the program.

Rivers, Trails, and Conservation Assistance Program

Managing Agency: National Park Service

The National Park Service Rivers, Trails, and Conservation Assistance program supports community-led natural resource conservation and outdoor recreation projects across the nation. The National Park Service helps community groups, nonprofits, tribes, and state and local governments to design trails and parks, conserve and improve access to rivers, protect special places, and create recreation opportunities.

State Funding Sources

Active Transportation Program (ATP) Grants

Managing Agency: California Department of Transportation (Caltrans)

The Active Transportation Program consolidates existing federal and state transportation programs, including the Transportation Alternatives Program (TAP), Bicycle Transportation Account (BTA), and State Safe Routes to School (SR2S), into a single program with a focus to make California a national leader in active transportation. The ATP administered by the Division of Local Assistance, Office of State Programs. The purpose of the ATP is to encourage increased use of active modes of transportation by increasing the proportion of trips accomplished by biking and walking, increasing safety of non-motorized users, reduce greenhouse gases, enhance public health, and ensure that disadvantaged communities full share in the benefits of the program.

Sustainable Communities Grants

Managing Agency: California Department of Transportation (Caltrans)

The Sustainable Transportation Planning Grant Program was created to support the California Department of Transportation's (Caltrans) Mission: Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability. The California Legislature passed, and Governor Edmund G. Brown Jr. signed into law, Senate Bill (SB) 1, the Road Repair and Accountability Act of 2017, a transportation funding bill that will provide a reliable source of funds to maintain and integrate the State's multi-modal transportation system. Eligible planning projects must have a transportation nexus ideally demonstrating that planning projects directly benefit the multi-modal transportation system. Sustainable Communities Grants will also improve public health, social equity, environmental justice, the environment, and provide other important community benefits.

Strategic Partnerships Grants

Managing Agency: California Department of Transportation (Caltrans)

Strategic Partnerships are intended to fund planning projects that address needs on the State highway system, while the transit component will address multimodal planning projects that focus on transit. A smaller amount of funds is dedicated to Strategic Partnership – Transit allocations to better integrate transit into the overall transportation system. Strategic Partnerships are funded through California Senate Bill (SB) 1 and are allocated in conjunction with Sustainable Communities grants.

Adaptation Planning Grants

Managing Agency: California Department of Transportation (Caltrans)

Climate change adaptation aims to anticipate and prepare for climate change impacts to reduce the damage from climate change and extreme weather events. Adaptation is distinct from, but complements, climate change mitigation, which aims to reduce GHG emissions. This funding is intended to advance adaptation planning on California's transportation infrastructure, including but not limited to roads, railways, bikeways, trails, bridges, ports, and airports. Adaptation efforts will enhance the resiliency of the transportation system to help protect against climate impacts. The overarching goal of this grant program is to support planning actions at local and regional levels that advance climate change adaptation efforts on the transportation system, especially efforts that serve the communities most vulnerable to climate change impacts. Strategic Partnerships are funded through California Senate Bill (SB) 1 under the Public Transportation Account (PTA).

State Highway Operation and Protection Program (SHOPP)

Managing Agency: California Department of Transportation (Caltrans)

The 2018 State Highway Operation and Protection Program (SHOPP) is the State Highway System's "fix-it-first" program that funds the repair and preservation, emergency repairs, safety improvements, and some highway operational improvements on the State Highway System (SHS). By continuously repairing and rehabilitating the SHS, the SHOPP protects the enormous investment that has been made over many decades to create and manage the apprximately 50,000 lane-mile SHS. The SHS includes statutorily designated state-owned roads, highways (including the Interstate system) and bridges (including associated bicycle and pedestrian facilities) and their supporting infrastructure such as culverts, transportation management systems (TMS), safety roadside rest areas, and maintenance stations. Revenues for the SHOPP are generated by federal and state gas taxes and are fiscally constrained by the State Transportation Improvement Program Fund Estimate that is produced by Caltrans and adopted by the California Transportation Commission.

Highway Safety Improvement Program (HSIP) Grant

Managing Agency: California Department of Transportation (Caltrans)

The Highway Safety Improvement Program (HSIP) is one of the core federal-aid programs in the federal surface transportation act, Fixing America's Surface Transportation Act (FAST), and is administered by Caltrans. The purpose of the HSIP program is to achieve a significant reduction in traffic fatalities and serious injuries on all public roads, including non-State-owned public roads and roads on tribal land. Example safety projects include, but are not limited to: crosswalk markings, rapid flashing beacons, curb extensions, speed feedback signs, guard rails, pedestrian refuge islands, slurry seal, and other pavement markings.

Transit and Intercity Rail Capital Program (TIRCP)

Managing Agency: California Transportation Commission

The Transit and Intercity Rail Capital Program (TIRCP) was created by Senate Bill (SB) 862 and modified by Senate Bill 9 to provide grants from the Greenhouse Gas Reduction Fund to fund transformative capital improvements that will modernize California's intercity, commuter, and urban rail systems, and bus and ferry transit systems to reduce emissions of greenhouse gases by reducing congestion and vehicle miles traveled throughout California. The primary program objectives include reducing greenhouse gas emissions, expanding and improving rail service to increase ridership, integrate the rail service of the state's various rail operations (including integration with the high-speed rail system), and improving safety. Caltrans, in collaboration with CalSTA, are responsible for administering this program.

State Transportation Improvement Program (STIP)

Managing Agency: California Transportation Commission

The State Transportation Improvement Program (STIP) is the biennial five-year plan adopted by the California Transportation Commission for future allocations of certain state transportation funds for state highway improvements, intercity rail, and regional highway and transit improvements. State law requires the Commission to update the STIP biennially, in even-numbered years, with each new STIP adding two new years to prior programming commitments. CTC staff recommendations are based on the combined programming capacity for the Public Transportation Account (PTA) and State Highway Account (SHA) as identified in the Fund Estimate adopted by the CTC. The Commission's adopted STIP may include only projects that have been nominated by a regional agency in its regional transportation improvement program (RTIP) or by Caltrans in its interregional transportation improvement program (ITIP).

Trade Corridor Enhancement Program (TCEP)

Managing Agency: California Transportation Commission

The objective of the Trade Corridor Enhancement Program is to fund infrastructure improvements on federally designated Trade Corridors of National and Regional Significance, on the Primary Freight Network, as identified in the California Freight Mobility Plan, and along other corridors that have a high volume of freight movement as determined by the Commission. The Trade Corridor Enhancement Program will also support the goals of the National Highway Freight Program, the California Freight Mobility Plan, and the guiding principles in the California Sustainable Freight Action Plan.

State-Local Partnership Program (LPP)

Managing Agency: California Transportation Commission

The Road Repair and Accountability Act of 2017 (Senate Bill 1) created the Local Partnership Program, which is modeled closely after the Proposition 1B State Local Partnership Program. The purpose of this program is to provide local and regional transportation agencies that have passed sales tax measures, developer fees, or other imposed transportation fees with a continuous appropriation of $200 million annually from the Road Maintenance and Rehabilitation Account to fund road maintenance and rehabilitation, sound walls, and other transportation improvement projects. Consistent with the intent behind Senate Bill 1, the Commission intends this program to balance the need to direct increased revenue to the state's highest transportation needs while fairly distributing the economic impact of increased funding. The Local Partnership Program provides funding to local and regional agencies to improve aging Infrastructure, road conditions, active transportation, and health and safety benefits.

Office of Traffic Safety (OTS) Grants

Managing Agency: Office of Traffic Safety

The California Office of Traffic Safety (OTS) strives to eliminate traffic deaths and injuries. It does this by making available grants to local and state public agencies for programs that help them enforce traffic laws, educate the public in traffic safety, and provide varied and effective means of reducing fatalities, injuries and economic losses from collisions.

Recreational Trails Program (RTP) Program

Managing Agency: California Department of Park and Recreation

The Recreational Trails Program (RTP) provides funds annually for recreational trails and trails-related projects. The RTP is administered at the federal level by the Federal Highway Administration (FHWA). It is administered at the state level by the California Department of Parks and Recreation (DPR) and the Department of Transportation (Caltrans) Active Transportation Program (ATP). Eligible non-motorized projects include acquisition of easements and fee simple title to property for recreational trails and recreational trail corridors; and, development, or rehabilitation of trails, trailside, and trailhead facilities. The program requires a 12% match. FHWA must approve project recommendations before California State Parks can execute grant contracts. Prior to forwarding these projects to FHWA, each must comply with the National Historical Preservation Act of 1966 (Section 106), National Environmental Policy Act (NEPA), and be listed on the State Transportation Improvement Plan (STIP).

Affordable Housing and Sustainable Communities (AHSC) Program

Managing Agency: California Strategic Growth Council

The purpose of the AHSC Program is to reduce greenhouse gas (GHG) emissions through projects that implement land-use, housing, transportation, and agricultural land preservation practices to support infill and compact development, and that support related and coordinated public policy objectives. The AHSC program includes transportation focuses related to reducing air pollution, improving conditions in disadvantaged communities, supporting or improving public health, improving connectivity and accessibility to jobs, increasing options for mobility, and increasing transit ridership. Funding for the AHSC Program is provided from the Greenhouse Gas Reduction Fund (GGRF), an account established to receive Cap-and-Trade auction proceeds.

Transformative Climate Communities (TCC) Program

Managing Agency: California Strategic Growth Council

The Transformative Climate Communities Program was established by Assembly Bill (AB) 2722 to fund the development and implementation of neighborhood-level transformative climate community plans that include multiple, coordinated greenhouse gas emissions reduction projects that provide local economic, environmental, and health benefits to disadvantaged communities. The TCC Program is also an opportunity to realize the State's vision of Vibrant Communities and Landscapes, demonstrating how meaningful community engagement coupled with strategic investments in transportation, housing, food, energy, natural resources, and waste can reduce GHG emissions and other pollution, while also advancing social and health equity and enhancing economic opportunity and community resilience. The TCC Program funds both implementation and planning grants. While the program can fund a variety of projects, transportation-related projects can include, but are not limited to: developing active transportation and public transit projects; support transit ridership programs and transit passes for low-income riders; expand first/last mile connections, build safe and accessible biking and walking routes, and encourage education and planning activities to promote increased use of active modes of transportation.

Environmental Enhancement and Mitigation (EEM) Grant Program

Managing Agency: California Natural Resources Agency

This program authorizes the California state legislature to allocate up to $7 million each fiscal year from the Highway Users Tax Account. EEM projects must contribute to mitigation of the environmental effects of transportation facilities. The EEM Program does not generally fund commute-related trails or similar bicycle/pedestrian infrastructure. However, it does fund recreational and nature trails as part of stormwater management or green infrastructure projects.

Urban Greening Grant Program

Managing Agency: California Natural Resources Agency

As part of the California State Senate Bill (SB) 859, the California Natural Resources Agency's Urban Greening Program was created and is funded by the Greenhouse Gas Reduction Fund (GGRF) to support the development of green infrastructure projects that reduce GHG emissions and provide multiple benefits. In 2017, approximately $26 million was allocated from the GGRF to the Urban Greening Program. Projects should be focused in disadvantaged communities to maximize economic, environmental, and public benefits. The Urban Greening Program will fund projects that reduce greenhouse gases by sequestering carbon, decreasing energy consumption and reducing vehicle miles traveled, while also transforming the built environment into places that are more sustainable, enjoyable, and effective in creating healthy and vibrant communities. These projects will establish and enhance parks and open space, using natural solutions to improving air and water quality and reducing energy consumption, and creating more walkable and bike-able trails.

Environmental Justice (EJ) Small Grants Program

Managing Agency: California Environmental Protection Agency

The Environmental Justice (EJ) Small Grants Program offers funding opportunities to assist eligible non-profit community organizations and federally-recognized Tribal governments to address environmental justice issues in areas disproportionately affected by environmental pollution and hazards. The EJ Small Grants are awarded on a competitive basis with a maximum amount $50,000 per grant. EJ Small Grants can be used for a variety of environmental purposes but can also be used to augment community engagement, health, trainings, and programmatic opportunities in underserved communities.

Stormwater Management Program

Managing Agency: State Water Resources Control Board

The Storm Water Grant Program (SWGP) is intended to promote the beneficial use of storm water and dry weather runoff in California by providing financial assistance to eligible applicants for projects that provide multiple benefits while improving water quality. Under California Prop 1, the state authorized $7.545 billion in general obligation bonds for water projects including surface and groundwater storage, ecosystem and watershed protection and restoration, and drinking water protection. Funds can be made available for multi-benefit storm water management projects which may include, but shall not be limited to: green infrastructure, rainwater and storm water capture projects and storm water treatment facilities. The program can also fund Stormwater Resource Plans and project-specific planning projects. Transportation-related projects funded by the program include green streets, urban runoff enhancements, greenbelts, stormwater capture systems, and permeable pavement projects.

Regional Funding Sources

One Bay Area Grants (OBAG)

Managing Agency: Metropolitan Transportation Commission

MTC’s One Bay Area Grant program (OBAG) is a funding approach that aligns the Commission's investments with support for focused growth. Established in 2012, OBAG taps federal funds to maintain MTC's commitments to regional transportation priorities while also advancing the Bay Area's land-use and housing goals. OBAG includes both a regional program and a county program that both targets project investments in Priority Development Areas (PDAs) and rewards cities and counties that approve new housing construction and accept allocations through the Regional Housing Need Allocation (RHNA) process. Cities and counties can use these OBAG funds to invest in local street and road maintenance, streetscape enhancements, bicycle and pedestrian improvements, transportation planning, and Safe Routes to School projects. The most recent OBAG funding cycle (OBAG 2) identified $386 million in funding for 180 regional projects from 2017/2018 through 2021/2022. A majority of OBAG 2 County Program funds will be directed to active transportation projects including bicycle and pedestrian projects (15%), Safe Routes to School (8%), and Transportation for Livable Communities (34%) projects, which are generally oriented to bicycle access and walkability but also include streetscape improvements, road diets, or transit elements. Schedule for OBAG3 has not been identified yet.

Transportation Development Act (TDA) Article 3

Managing Agency: Metropolitan Transportation Commission

The Transportation Development Act Article 3, or TDA 3, provides funding annually for bicycle and pedestrian projects. Two percent of TDA funds collected in the county is used for TDA 3. MTC allows each county to determine how to use funds in their county. Some counties competitively select projects while other counties distribute the funds to jurisdictions based on population. Each county coordinates a consolidated annual request for projects to be funded in the county.

Regional Measure 1, 2, 3, and Future Regional Measures

Managing Agency: Metropolitan Transportation Commission

To help solve the Bay Area's growing congestion problems, MTC worked with the state Legislature to authorize a series of ballot measure that would finance a comprehensive suite of highway and transit improvements through an increase tolls on the region's seven state-owned toll bridges. In the most recent Regional Measure (RM 3), toll revenues will be used to finance a $4.45 billion slate of highway and transit improvements in the toll bridge corridors and their approach routes. Active transportation projects may be included as accessory parts to larger infrastructure projects. Recently, MTC identified $300 million in RM3 funds to be attached to Water Emergency Transit Authority infrastructure improvements, including a proposed doubling of ferry service at the Vallejo Ferry Terminal.

Regional Active Transportation Program

Managing Agency: Metropolitan Transportation Commission

While the California Department of Transportation (Caltrans) administers statewide Active Transportation Program grants, MTC is allocated a portion of the funds to administer a regional component. MTC provides a regional supplemental application in addition to the statewide application to apply for the competitive program funds.

Lifeline Transportation Program (LTP)

Managing Agency: Metropolitan Transportation Commission

The Metropolitan Transportation Commission (MTC) created a Bay Area Regional Lifeline Program to fund projects that result in improved mobility for low-income residents throughout the Bay Area. The Lifeline Program supports community-based transportation projects that are developed through a collaborative and inclusive planning process that includes broad partnerships.

Eligible programs or projects address transportation gaps and/or barriers identified in Community-Based Transportations Plans (CBTP) or the Solano Welfare to Work Transportation Plan that will result in improved mobility for low-income residents.

Transportation Fund for Clean Air (TFCA)

Managing Agency: Bay Area Air Quality Management District

In 1991, the California State Legislature authorized the Air District to impose a $4 surcharge on cars and trucks registered within its jurisdiction to be used to provide grant funding to eligible projects that reduce on-road motor vehicle emissions. The Air District allocates these funds to its Transportation Fund for Clean Air Program, which in turn provides funding to qualifying trip-reduction and alternative-fuel vehicle-based projects, including plug-in electric vehicles. Sixty percent of TFCA funds are awarded by the Air District to eligible programs and projects through a grant program known as the Regional Fund, through various Air District sponsored programs and projects including Spare the Air, and through certain alternative-fuel vehicle-based and bicycle facility programs. The remaining 40 percent of TFCA funds are passed through to the County Program Manager Fund and are awarded by the Congestion Management Agencies of the nine counties to TFCA-eligible projects located within those counties. Qualifying active transportation projects generally include the construction of new bicycle ways and the installation of new bike parking facilities, e.g., lockers and racks.

Bicycle Rack Voucher Program (BRVP)

Managing Agency: Bay Area Air Quality Management District

This program aims to reduce air pollution in the Bay Area by supporting clean, alternative modes of transportation. As of 2016, Bicycle Rack Vouchers may be awarded in the amount of up to $60 per bicycle parking space created. Funding is normally limited to a maximum of $15,000 per applicant per year in Voucher awards. Only new bicycle rack(s) that are deployed in locations that have not previously been funded by and are not currently under consideration for funding by the Air District are eligible for funding through the BRVP.

Clean Air Funds (CAFs)– Category: Alternative Transportation and or Public Education

Managing Agency: YOLO-SOLANO Air Quality Management District (YS-AQMD)

In 1990, AB 2766 allowed air districts to collect $4 on each annual vehicle registration within borders, one potential use of these funds is to reduce emissions caused by mobile sources. Portion of this funding is used for Clean Air Funds for the most cost-effective, impactful projects, including design and construction of pedestrian and bicycle facilities, transit projects, and public information and education programs. The 2019 Clean Air Funds program application period is now closed with announcement of grant awards at the June 12, 2019 Board Meeting. It is not clear when the next cycle will occur.

Clean Air Funds (CAFs)– Category: Alternative Transportation and or Public Education

Managing Agency: YOLO-SOLANO Air Quality Management District (YS-AQMD)

In 1990, AB 2766 allowed air districts to collect $4 on each annual vehicle registration within borders, one potential use of these funds is to reduce emissions caused by mobile sources. Portion of this funding is used for Clean Air Funds for the most cost-effective, impactful projects, including design and construction of pedestrian and bicycle facilities, transit projects, and public information and education programs. The 2019 Clean Air Funds program application period is now closed with announcement of grant awards at the June 12, 2019 Board Meeting. It is not clear when the next cycle will occur.

LOCAL CITY/COUNTY FUNDING SOURCES

Developer Fees/Transportation Impact Fees

Managing Agency: Local City/County

As proposed developments are analyzed for transportation impacts, conditions of approval, mitigations, and developer fees can be used to partially or fully fund transportation projects at locations either identified to be impacted by regional growth or specific projects. Details will vary by city and project.

Solano Active Transportation Plan

Per Mile Facility Type Cost Estimates

December 2019

The following tabs provide planning-level cost estimates for the facility types listed below. When applicable, low-end and high-end costs are provided to account for the various implementation methods and/or materials used.

Facility Types	Rounded Per-Mile Cost
Class I Shared-Use Path	$1,610,000
Class II Bicycle Lanes (Low Cost - Without Buffer)	$80,000
Class II Bicycle Lanes (High Cost - Without Buffer)	$270,000
Class II Bicycle Lanes (Low Cost - With Buffer)	$120,000
Class II Bicycle Lanes (High Cost - With Buffer)	$310,000
Class III Bike Boulevards (Shared Lanes)	$220,000
Class III Rural Routes (Shared Lanes)	$1,390,000
Class III Urban Routes (Shared Lanes)	$60,000
Class IV Separated Bike Lanes - Buffer+Posts	$370,000
Class IV Separated Bike Lanes - Concrete Curb	$3,350,000
Sidewalk - 5-foot & Spot ADA Ramp Upgrades	$990,000

Year Conversions

2018 cost data was used given the wider availability of example costs.
Costs were adjusted to match 2020 dollars.
An annual compounding interest of 3% was used to account for inflation and should be applied for projects scoped in future years.

Contingencies and Soft Costs

As applicable, contingencies for construction, environmental impacts, drainage, utilities, and design are assumed. Contingencies that vary facility type to facility type are based upon our experience with the complexities of implementing them.

Class I Shared-Use Path

Assumes an average path width of 10 feet with 2 foot shoulder, and that path can be constructed within existing Right of Way
Assumes a bike symbol marking at each street crossing
Assumes 4 non-signalized street crossings per mile and 4 signalized crossings per mile
Unit prices per recent Bid Items on the Alameda CTC Cost Estimating Tool website and Caltrans Contract Cost Data
All costs adjusted to 2020 dollars

Item	Unit	Quantity	2020 Unit Cost	Total Cost	Assumptions
Roadway Excavation	CY	2347	$17.42	$40,888	Per Caltrans
Class 2 Aggregate Subbase	CY	1760	$44.71	$78,695	Per Caltrans
Asphalt Path	SF	52800	$9.55	$504,140	Per recent bid items via Alameda CTC Cost Estimating Tool
Thermoplastic Bike Symbol	EA	32	$318.27	$10,185	Per recent bid items via Alameda CTC Cost Estimating Tool
Path Curb Ramp	EA	16	$3,182.70	$50,923	Per recent bid items via Alameda CTC Cost Estimating Tool
Decomposed Granite Shoulder	SF	10560	$2.12	$22,406	Per recent bid items via Alameda CTC Cost Estimating Tool
Raised Crosswalk	EA	4	$10,609.00	$42,436	Per recent bid items via Alameda CTC Cost Estimating Tool
Bike Detection Loops	EA	8	$1,060.90	$8,487	Per recent bid items via Alameda CTC Cost Estimating Tool
Bike Detection Push Buttons	EA	8	$424.36	$3,395	Per recent bid items via Alameda CTC Cost Estimating Tool
Rectangular Rapid Flashing Beacon	EA	4	$26,522.50	$106,090	Per recent bid items via Alameda CTC Cost Estimating Tool
Construction Cost Subtotal				**$867,645**	

25% Construction Cost Contingency	$216,911.28
15% Design Costs	$130,146.77
10% Engineering Support	$86,764.51
5% Mobilization	$43,382.26
5% Traffic Control	$43,382.26
10% Construction Management	$86,764.51
5% Utility Contingency	$43,382.26
5% Drainage Contingency	$43,382.26
5% Environmental Contingency	$43,382.26

Total Cost/Mile	**$1,605,143.44**

Rounded Cost/Mile	**$1,610,000.00**

Actual costs may vary based on project scope and current market conditions.
Future project costs should be inflated relative to a base year of 2018. Caltrans maintains historical cost indices and forecast at:
http://www.dot.ca.gov/design/pjs/index.html

Class II Bicycle Lanes (Low Cost - Without Buffer)

Assumes a lane width of 6 feet, bike symbol every 200 feet, along with R81(CA) signs with posts every 1000'
Assumes adding a bike lane in **both** directions, on each side of the street, without any painted buffer
Assumes bike lanes are added **as part of an existing re-paving project** - costs shown are for the bike lane component **only**
Unit prices per recent Bid Items on the Alameda CTC Cost Estimating Tool website and Caltrans Contract Cost Data
All costs adjusted to 2020 dollars

Item	**Unit**	**Quantity**	**2020 Unit Cost**	**Total Cost**	**Assumptions**
Thermoplastic Bike Lane Line (6")	LF	10560	$2.12	$22,406	Per recent bid items via Alameda CTC Cost Estimating Tool
R81(CA) Signs/Posts	EA	10	$477.41	$4,774	Per recent bid items via Alameda CTC Cost Estimating Tool
Thermoplastic Bike Symbol	EA	53	$318.27	$16,805	Per recent bid items via Alameda CTC Cost Estimating Tool
Construction Cost Subtotal				**$43,985**	

25% Construction Cost Contingency	$10,996.23
15% Design Costs	$6,597.74
10% Engineering Support	$4,398.49
5% Mobilization	$2,199.25
5% Traffic Control	$2,199.25
10% Construction Management	$4,398.49
0% Utility Contingency	$0.00
0% Drainage Contingency	$0.00
0% Environmental Contingency	$0.00

Total Cost/Mile	**$74,774.35**

Rounded Cost/Mile	**$80,000.00**

Actual costs may vary based on project scope and current market conditions.
Future project costs should be inflated relative to a base year of 2018. Caltrans maintains historical cost indices and forecast at:
http://www.dot.ca.gov/design/pjs/index.html

Class II Bicycle Lanes (High Cost - Without Buffer)

Assumes a lane width of 6 feet, bike symbol every 200 feet, along with R81(CA) signs with posts every 1000'
Assumes adding a bike lane in **both** directions, on each side of the street, without any painted buffer
Assumes bike lanes are added **as part of a lane reduction/reallocation project (Road Diet)**
Unit prices per recent Bid Items on the Alameda CTC Cost Estimating Tool website and Caltrans Contract Cost Data
All costs adjusted to 2020 dollars

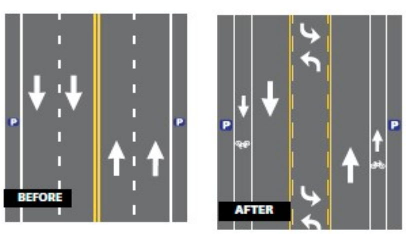
Item	**Unit**	**Quantity**	**2020 Unit Cost**	**Total Cost**	**Assumptions**
Remove Existing Channelization Line (8")	LF	10560	$0.53	$5,602	Per Caltrans
Remove Existing Channelization Line (8" - Skip)	LF	3168	$0.53	$1,680	Per Caltrans
Remove Existing Channelization Line (8")	LF	10560	$0.53	$5,602	Per Caltrans
Thermoplastic Bike Lane Line (6")	LF	21120	$2.12	$44,812	Per recent bid items via Alameda CTC Cost Estimating Tool
Channelization Line (8")	LF	10560	$5.30	$56,016	Per recent bid items via Alameda CTC Cost Estimating Tool
Channelization Line (8" - Skip)	LF	2640	$5.30	$14,004	Per recent bid items via Alameda CTC Cost Estimating Tool
R81(CA) Signs/Posts	EA	10	$477.41	$4,774	Per recent bid items via Alameda CTC Cost Estimating Tool
Thermoplastic Bike Symbol	EA	53	$318.27	$16,805	Per recent bid items via Alameda CTC Cost Estimating Tool
Construction Cost Subtotal				**$149,294**	

25% Construction Cost Contingency	$37,323.52
15% Design Costs	$22,394.11
10% Engineering Support	$14,929.41
5% Mobilization	$7,464.70
5% Traffic Control	$7,464.70
10% Construction Management	$14,929.41
5% Utility Contingency	$7,464.70
0% Drainage Contingency	$0.00
0% Environmental Contingency	$0.00

Total Cost/Mile	**$261,264.66**

Rounded Cost/Mile	**$270,000.00**

Actual costs may vary based on project scope and current market conditions.
Future project costs should be inflated relative to a base year of 2018. Caltrans maintains historical cost indices and forecast at:
http://www.dot.ca.gov/design/pjs/index.html



https://safety.fhwa.dot.gov/road_diets/case_studies/

Class II Bicycle Lanes (Low Cost - With Buffer)

Assumes a lane width of 6 feet, bike symbol every 200 feet, along with R81(CA) signs with posts every 1000'
Assumes adding a bike lane in **both** directions, on each side of the street, with a 3' painted buffer
Assumes buffered bike lanes are added **as part of an existing re-paving project** - costs shown are for the buffered bike lane component **only**
Unit prices per recent Bid Items on the Alameda CTC Cost Estimating Tool website and Caltrans Contract Cost Data
All costs adjusted to 2020 dollars

Item	Unit	Quantity	2020 Unit Cost	Total Cost	Assumptions
Thermoplastic Bike Lane Line (6")	LF	10560	$2.12	$22,406	Per recent bid items via Alameda CTC Cost Estimating Tool - Vehicle side line
Thermoplastic Bike Lane Line (4")	LF	10560	$1.59	$16,805	Per recent bid items via Alameda CTC Cost Estimating Tool - Bike side line
Channelization Line (8")	LF	1584	$5.30	$8,402	Per recent bid items via Alameda CTC Cost Estimating Tool - Hatching
R81(CA) Signs/Posts	EA	10	$477.41	$4,774	Per recent bid items via Alameda CTC Cost Estimating Tool
Thermoplastic Bike Symbol	EA	53	$318.27	$16,805	Per recent bid items via Alameda CTC Cost Estimating Tool
Construction Cost Subtotal				**$69,192**	

25% Construction Cost Contingency	$17,297.97
15% Design Costs	$10,378.78
10% Engineering Support	$6,919.19
5% Mobilization	$3,459.59
5% Traffic Control	$3,459.59
10% Construction Management	$6,919.19
0% Utility Contingency	$0.00
0% Drainage Contingency	$0.00
0% Environmental Contingency	$0.00

Total Cost/Mile	**$117,626.23**

Rounded Cost/Mile	**$120,000.00**

Actual costs may vary based on project scope and current market conditions.
Future project costs should be inflated relative to a base year of 2018. Caltrans maintains historical cost indices and forecast at:
http://www.dot.ca.gov/design/pjs/index.html

Class II Bicycle Lanes (High Cost - With Buffer)

Assumes a lane width of 6 feet, bike symbol every 200 feet, along with R81(CA) signs with posts every 1000'
Assumes adding a bike lane in **both** directions, on each side of the street, with a 3' painted buffer
Assumes bike lanes are added **as part of a lane reduction/reallocation project (Road Diet)**
Unit prices per recent Bid Items on the Alameda CTC Cost Estimating Tool website and Caltrans Contract Cost Data
All costs adjusted to 2020 dollars

Item	Unit	Quantity	2020 Unit Cost	Total Cost	Assumptions
Remove Existing Channelization Line (8")	LF	10560	$0.53	$5,602	Per Caltrans
Remove Existing Channelization Line (8" - Skip)	LF	3168	$0.53	$1,680	Per Caltrans
Remove Existing Channelization Line (8")	LF	10560	$0.53	$5,602	Per Caltrans
Thermoplastic Bike Lane Line (6")	LF	21120	$2.12	$44,812	Per recent bid items via Alameda CTC Cost Estimating Tool
Thermoplastic Bike Lane Line (4")	LF	10560	$1.59	$16,805	Per recent bid items via Alameda CTC Cost Estimating Tool - Bike side line
Channelization Line (8")	LF	1584	$5.30	$8,402	Per recent bid items via Alameda CTC Cost Estimating Tool - Hatching
Channelization Line (8")	LF	10560	$5.30	$56,016	Per recent bid items via Alameda CTC Cost Estimating Tool
Channelization Line (8" - Skip)	LF	2640	$5.30	$14,004	Per recent bid items via Alameda CTC Cost Estimating Tool
R81(CA) Signs/Posts	EA	10	$477.41	$4,774	Per recent bid items via Alameda CTC Cost Estimating Tool
Thermoplastic Bike Symbol	EA	53	$318.27	$16,805	Per recent bid items via Alameda CTC Cost Estimating Tool
Construction Cost Subtotal				**$174,501**	

25% Construction Cost Contingency	$43,625.27
15% Design Costs	$26,175.16
10% Engineering Support	$17,450.11
5% Mobilization	$8,725.05
5% Traffic Control	$8,725.05
10% Construction Management	$17,450.11
5% Utility Contingency	$8,725.05
0% Drainage Contingency	$0.00
0% Environmental Contingency	$0.00

Total Cost/Mile	**$305,376.88**

Rounded Cost/Mile	**$310,000.00**

Actual costs may vary based on project scope and current market conditions.
Future project costs should be inflated relative to a base year of 2018. Caltrans maintains historical cost indices and forecast at:
http://www.dot.ca.gov/design/pjs/index.html

Class III Bike Boulevards (Shared Lanes)

Assumes adding shared lane marking every 200 feet, along with R4-11 signs with posts every 1000'
Assumes adding shared lanes in **both** directions
Assumes adding traffic calming features: 2 neighborhood traffic circles and one diverter (median island) per mile
Assumes shared lanes can be added without the need for modifications to existing roadway pavement markings
Assumes one intersection per mile with bike lane approaches + lane extensions + RRFB + Bike Push Buttons
Adds 4" and 6" dotted bike lane extensions approaching/through intersections, as shown below (as 4DW and 6DW, respectively)
Adds green thermoplastic conflict markings between dotted lane extension lines, as shown below.
Right of way costs are not included.
Unit prices per recent Bid Items on the Alameda CTC Cost Estimating Tool website and Caltrans Contract Cost Data
All costs adjusted to 2020 dollars

Item	Unit	Quantity	2020 Unit Cost	Total Cost	Assumptions
R4-11 Signs/Posts	EA	10	$795.68	$7,957	Per recent bid items via Alameda CTC Cost Estimating Tool
Thermoplastic Shared Lane Marking	EA	53	$318.27	$16,805	Per recent bid items via Alameda CTC Cost Estimating Tool
Thermoplastic Bike Lane Line (6")	LF	26	$2.12	$55	Per recent bid items via Alameda CTC Cost Estimating Tool - Vehicle side line
Thermoplastic Bike Lane Line (4")	LF	26	$1.59	$41	Per recent bid items via Alameda CTC Cost Estimating Tool - Bike side line
Green Thermoplastic	SF	145	$31.83	$4,607	Per recent bid items via Alameda CTC Cost Estimating Tool
RRFB	EA	2	$26,522.50	$53,045	Per recent bid items via Alameda CTC Cost Estimating Tool
Neighborhood Traffic Circle	EA	2	$15,913.50	$31,827	Per recent bid items via Alameda CTC Cost Estimating Tool
Diverter/Median Refuge	EA	1	$3,713.15	$3,713	Per recent bid items via Alameda CTC Cost Estimating Tool
Construction Cost Subtotal				**$118,050**	

25% Construction Cost Contingency	$29,512.59
15% Design Costs	$17,707.56
10% Engineering Support	$11,805.04
5% Mobilization	$5,902.52
5% Traffic Control	$5,902.52
10% Construction Management	$11,805.04
5% Utility Contingency	$5,902.52
5% Drainage Contingency	$5,902.52
5% Environmental Contingency	$5,902.52

Total Cost/Mile	**$218,393.19**

Rounded Cost/Mile	**$220,000.00**

Actual costs may vary based on project scope and current market conditions.
Future project costs should be inflated relative to a base year of 2018. Caltrans maintains historical cost indices and forecast at:
http://www.dot.ca.gov/design/pjs/index.html

Class III Rural Routes (Widened Shoulders)

Assumes adding minimal shared lane markings, along with R4-11 signs with posts every 1000'

Assumes adding shoulders in **both** directions

- Assumes adding 10' asphalt pavement (5' per side of road), and 13' aggregate base (6.5' per side of road), to create a 5' usable widened area.
- Widening includes excavation, aggregate base and asphalt paving (using asphalt path costs as an analogue for narrow shoulder paving cost)
- Right of way costs are not included. Specific utility, drainage or environmental costs are included as a percentage, and may vary

Unit prices per recent Bid Items on the Alameda CTC Cost Estimating Tool website and Caltrans Contract Cost Data

All costs adjusted to 2020 dollars

Item	Unit	Quantity	2020 Unit Cost	Total Cost	Assumptions
R4-11 Signs/Posts	EA	10	$477.41	$4,774	Per recent bid items via Alameda CTC Cost Estimating Tool
Thermoplastic Shared Lane Marking	EA	4	$318.27	$1,273	Per recent bid items via Alameda CTC Cost Estimating Tool
Roadway Excavation	CY	3911	$17.42	$68,147	Per Caltrans
Class 2 Aggregate Subbase	CY	3813	$44.71	$170,506	Per Caltrans
Asphalt Path	SF	52800	$9.55	$504,140	Per recent bid items via Alameda CTC Cost Estimating Tool
Construction Cost Subtotal				**$748,840**	

25% Construction Cost Contingency	$187,209.98
15% Design Costs	$112,325.99
10% Engineering Support	$74,883.99
5% Mobilization	$37,442.00
5% Traffic Control	$37,442.00
10% Construction Management	$74,883.99
5% Utility Contingency	$37,442.00
5% Drainage Contingency	$37,442.00
5% Environmental Contingency	$37,442.00

Total Cost/Mile	**$1,385,353.85**

Rounded Cost/Mile	**$1,390,000.00**

Actual costs may vary based on project scope and current market conditions.

Future project costs should be inflated relative to a base year of 2018. Caltrans maintains historical cost indices and forecast at:

http://www.dot.ca.gov/design/pjs/index.html

Class III Urban Routes (Shared Lanes)

Assumes adding minimal shared lane markings, along with R4-11 signs with posts every 1000'
Assumes adding shared lanes in **both** directions
Assumes shared lanes can be added without the need for modifications to existing roadway pavement markings
Assumes up to 300 feet of spot widening/shoulder work per mile may be required
Assumes adding 5' asphalt pavement, and 6.5' aggregate base, to create a 4' usable widened area for bicycles.
Widening includes excavation, aggregate base and asphalt paving (using asphalt path costs as an analogue for narrow shoulder paving cost)
Right of way costs are not included. Specific utility, drainage or environmental costs are included as a percentage, and may vary
Unit prices per recent Bid Items on the Alameda CTC Cost Estimating Tool website and Caltrans Contract Cost Data
All costs adjusted to 2020 dollars

Item	Unit	Quantity	2020 Unit Cost	Total Cost	Assumptions
R4-11 Signs/Posts	EA	10	$477.41	$4,774	Per recent bid items via Alameda CTC Cost Estimating Tool
Thermoplastic Shared Lane Marking	EA	5	$318.27	$1,591	Per recent bid items via Alameda CTC Cost Estimating Tool
Roadway Excavation	CY	178	$17.42	$3,098	Per Caltrans
Class 2 Aggregate Subbase	CY	108	$44.71	$4,844	Per Caltrans
Asphalt Path	SF	1500	$9.55	$14,322	Per recent bid items via Alameda CTC Cost Estimating Tool
Construction Cost Subtotal				**$28,629**	

25% Construction Cost Contingency	$7,157.27	
15% Design Costs	$4,294.36	
10% Engineering Support	$2,862.91	
5% Mobilization	$1,431.45	
5% Traffic Control	$1,431.45	
10% Construction Management	$2,862.91	
5% Utility Contingency	$1,113.18	Only applied to shoulder widening components
5% Drainage Contingency	$1,113.18	Only applied to shoulder widening components
5% Environmental Contingency	$1,113.18	Only applied to shoulder widening components

Total Cost/Mile	**$52,008.95**

Rounded Cost/Mile	**$60,000.00**

Actual costs may vary based on project scope and current market conditions.
Future project costs should be inflated relative to a base year of 2018. Caltrans maintains historical cost indices and forecast at:
http://www.dot.ca.gov/design/pjs/index.html

Class IV Separated Bike Lanes - Buffer+Posts

Assumes a lane width of 6 feet, bike symbol every 200 feet, along with R81(CA) signs with posts every 1000'
Assumes adding a bike lane in **both** directions, on each side of the street, with 3' painted buffer and flex posts at 20' spacing
Assumes bike lanes can be added with no curb work.
Unit prices per recent Bid Items on the Alameda CTC Cost Estimating Tool website and Caltrans Contract Cost Data
All costs adjusted to 2020 dollars

Item	Unit	Quantity	2020 Unit Cost	Total Cost	Assumptions
Remove Existing Channelization Line (8")	LF	10560	$0.53	$5,602	Per Caltrans
Remove Existing Channelization Line (8" - Skip)	LF	3168	$0.53	$1,680	Per Caltrans
Remove Existing Channelization Line (8")	LF	10560	$0.53	$5,602	Per Caltrans
Thermoplastic Bike Lane Line (6")	LF	10560	$2.12	$22,406	Per recent bid items via Alameda CTC Cost Estimating Tool - Vehicle side line
Thermoplastic Bike Lane Line (4")	LF	10560	$1.59	$16,805	Per recent bid items via Alameda CTC Cost Estimating Tool - Bike side line
Channelization Line (8")	LF	1584	$5.30	$8,402	Per recent bid items via Alameda CTC Cost Estimating Tool - Hatching
Channelization Line (8")	LF	10560	$5.30	$56,016	Per recent bid items via Alameda CTC Cost Estimating Tool
Channelization Line (8" - Skip)	LF	2640	$5.30	$14,004	Per recent bid items via Alameda CTC Cost Estimating Tool
Soft Hit Posts	LF	10560	$5.30	$56,016	Per recent bid items via Alameda CTC Cost Estimating Tool
R81(CA) Signs/Posts	EA	10	$477.41	$4,774	Per recent bid items via Alameda CTC Cost Estimating Tool
Thermoplastic Bike Symbol	EA	53	$318.27	$16,805	Per recent bid items via Alameda CTC Cost Estimating Tool
Bike Detection Loops	EA	8	$1,060.90	$8,487	Per recent bid items via Alameda CTC Cost Estimating Tool
Construction Cost Subtotal				**$216,598**	

25% Construction Cost Contingency	$54,149.40
15% Design Costs	$32,489.64
10% Engineering Support	$21,659.76
5% Mobilization	$10,829.88
5% Traffic Control	$10,829.88
10% Construction Management	$21,659.76
0% Utility Contingency	$0.00
0% Drainage Contingency	$0.00
0% Environmental Contingency	$0.00

Total Cost/Mile	**$368,215.90**

Rounded Cost/Mile	**$370,000.00**

Actual costs may vary based on project scope and current market conditions.
Future project costs should be inflated relative to a base year of 2018. Caltrans maintains historical cost indices and forecast at:
http://www.dot.ca.gov/design/pjs/index.html

Class IV Separated Bike Lanes - Concrete Curb and Landscaping

Assumes a lane width of 6 feet, bike symbol every 200 feet, along with R81(CA) signs with posts every 1000'
Assumes adding a bike lane in **both** directions, on each side of the street, with 4' buffer with concrete pre-cast curb and low landscaping
Assumes bike lanes can be added with the need for modifications to existing roadway pavement markings
Assumes bike signals and bike detection may be needed at 4 intersections where turning movements may be greater than 150 vehicles/hour over bike lane.
Assumes ADA curb ramp upgrades on all corners at 8 intersections.
Unit prices per recent Bid Items on the Alameda CTC Cost Estimating Tool website and Caltrans Contract Cost Data
All costs adjusted to 2020 dollars

Item	Unit	Quantity	2020 Unit Cost	Total Cost	Assumptions
Remove Existing Channelization Line (8")	LF	10560	$0.53	$5,602	Per Caltrans
Remove Existing Channelization Line (8" - Skip)	LF	3168	$0.53	$1,680	Per Caltrans
Remove Existing Channelization Line (8")	LF	10560	$0.53	$5,602	Per Caltrans
Roadway Excavation	CY	4693	$17.42	$81,776	Per Caltrans
Concrete Curb & Gutter	LF	21120	$42.44	$896,248	Per recent bid items via Alameda CTC Cost Estimating Tool
R81(CA) Signs/Posts	EA	10	$477.41	$4,774	Per recent bid items via Alameda CTC Cost Estimating Tool
Thermoplastic Bike Symbol	EA	53	$318.27	$16,805	Per recent bid items via Alameda CTC Cost Estimating Tool
Channelization Line (8")	LF	10560	$5.30	$56,016	Per recent bid items via Alameda CTC Cost Estimating Tool
Channelization Line (8" - Skip)	LF	2640	$5.30	$14,004	Per recent bid items via Alameda CTC Cost Estimating Tool
ADA Curb Ramp	EA	32	$2,387.03	$76,385	Per recent bid items via Alameda CTC Cost Estimating Tool
Bike Detection Loops	EA	8	$1,060.90	$8,487	Per recent bid items via Alameda CTC Cost Estimating Tool
Bicycle Signal Head	EA	8	$12,730.80	$101,846	Per recent bid items via Alameda CTC Cost Estimating Tool
Landscaping - Shrubs and Groundcover Only	SF	42240	$12.73	$537,749	Per recent bid items via Alameda CTC Cost Estimating Tool
Construction Cost Subtotal				**$1,806,974**	

25% Construction Cost Contingency	$451,743.38
15% Design Costs	$271,046.03
5% Environmental Contingency	$90,348.68
10% Engineering Support	$180,697.35
5% Mobilization	$90,348.68
5% Traffic Control	$90,348.68
10% Construction Management	$180,697.35
5% Utility Contingency	$90,348.68
5% Drainage Contingency	$90,348.68
Total Cost/Mile	**$3,342,900.99**

Rounded Cost/Mile	**$3,350,000.00**

Actual costs may vary based on project scope and current market conditions.
Future project costs should be inflated relative to a base year of 2018. Caltrans maintains historical cost indices and forecast at:
http://www.dot.ca.gov/design/pjs/index.html

Sidewalk 5-foot (For gap closures on one side of street)

Assumes 5' sidewalk on one side of the street
Assumes spot upgrades to ADA curb ramps and high visibility crossings at 4 intersections per mile
Unit prices per recent Bid Items on the Alameda CTC Cost Estimating Tool website and Caltrans Contract Cost Data
All costs adjusted to 2020 dollars

Item	**Unit**	**Quantity**	**2020 Unit Cost**	**Total Cost**	**Assumptions**
Concrete Curb & Gutter	LF	5280	$42.44	$224,062	Per recent bid items via Alameda CTC Cost Estimating Tool
Concrete Sidewalk	SF	26400	$10.61	$280,078	Per recent bid items via Alameda CTC Cost Estimating Tool
ADA Curb Ramp	EA	8	$2,387.03	$19,096	Per recent bid items via Alameda CTC Cost Estimating Tool
High Visibility Crosswalk	Each	4	$2,121.80	$8,487	Per recent bid items via Alameda CTC Cost Estimating Tool
Construction Cost Subtotal				**$531,723**	

25% Construction Cost Contingency	$132,930.77
15% Design Costs	$79,758.46
5% Environmental Contingency	$26,586.15
10% Engineering Support	$53,172.31
5% Mobilization	$26,586.15
5% Traffic Control	$26,586.15
10% Construction Management	$53,172.31
5% Utility Contingency	$26,586.15
5% Drainage Contingency	$26,586.15

Total Cost/Mile	**$983,687.70**

Rounded Cost/Mile	**$990,000.00**

Actual costs may vary based on project scope and current market conditions.
Future project costs should be inflated relative to a base year of 2018. Caltrans maintains historical cost indices and forecast at:
http://www.dot.ca.gov/design/pjs/index.html