Fresno

LOW STRESS BIKE NETWORK PLAN

PROPOSAL TO CREATE A LOW-STRESS BIKEWAY NETWORK IN THE VICINITY OF THE FRESNO HIGH-SPEED RAIL STATION

CALIFORNIA BICYCLE COALITION

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EXECUTIVE SUMMARY

The arrival of high-speed rail provides a powerful economic development opportunity for Fresno. The neighborhoods within a few miles of the future High-Speed Rail (HSR) station can benefit from increased business activity; more jobs, including resilient jobs in small businesses; more significant investment in public amenities; and healthier and safer streets. This outcome is not guaranteed, however. Measures that support biking and walking to and from the station and in the vicinity of the station are integral to success in meeting these goals.

With the support of a Sustainable Transportation Planning grant, the project team has developed recommendations to maximize biking, walking, and other active or low-impact mobility modes. This proposed plan will effectively support the health and economy of Fresno and other cities in the Central Valley. These recommendations address what is necessary to create safe and comfortable, "low-stress" access between the Fresno High-Speed Rail station and key destinations within three miles from the station.

The recommendations prioritize resident access to the existing and future transit hubs with primary goals of equity, safety, and sustainability. The proposal highlights best practices in accommodating travelers who use bikes and provides recommendations for implementing an attractive, safe, and complete low-stress bicycling network in Fresno.

This proposal includes recommendations for the safety improvements that will most effectively provide a network of routes that most Fresno residents would consider safe enough to bike on. If implemented fully, the recommendations will create transformative opportunities for a wide range of Fresno residents, including seniors and children, as well as the potential bicyclist who is 'interested in biking but concerned' about safety.

IMPLEMENTATION OBJECTIVES

1. Build out Fresno ATP Network Projects deemed low-stress first
2. Ensure all intersections and crossings are also low-stress when building a bike network

3. Build out network quickly using quick-build strategies and implement best practices as funding becomes available
4. Build network out in order of positive impact on the connectivity of the low-stress network
5. Update Fresno General Plan street design guidelines and standards to meet low-stress qualifications to NACTO standards

RECOMMENDED PROJECTS

The current Active Transportation Plan for the City of Fresno is impressively comprehensive. Still, many areas within the city will have limited access to the bicycle network even after it is fully built out. This lack of connectivity is due to high-stress and impassable roads such as major boulevards, highways, and overpasses that serve as barriers to active transit. To give community members the opportunity to enjoy the city's low-stress bike routes, Fresno must lower the barriers to access by providing low-stress connections. After evaluating areas of the city with limited access, this proposal recommends nine new routes to improve the connectivity of the Fresno area:

1. **West Olive Avenue**
2. **Tulare Street**
3. **Martin Luther King Boulevard**
4. **Fruit Avenue**
5. **Fresno Avenue**
6. **Clinton Avenue**
7. **Church Avenue**
8. **Ventura/King Avenue**
9. **Belmont Avenue**

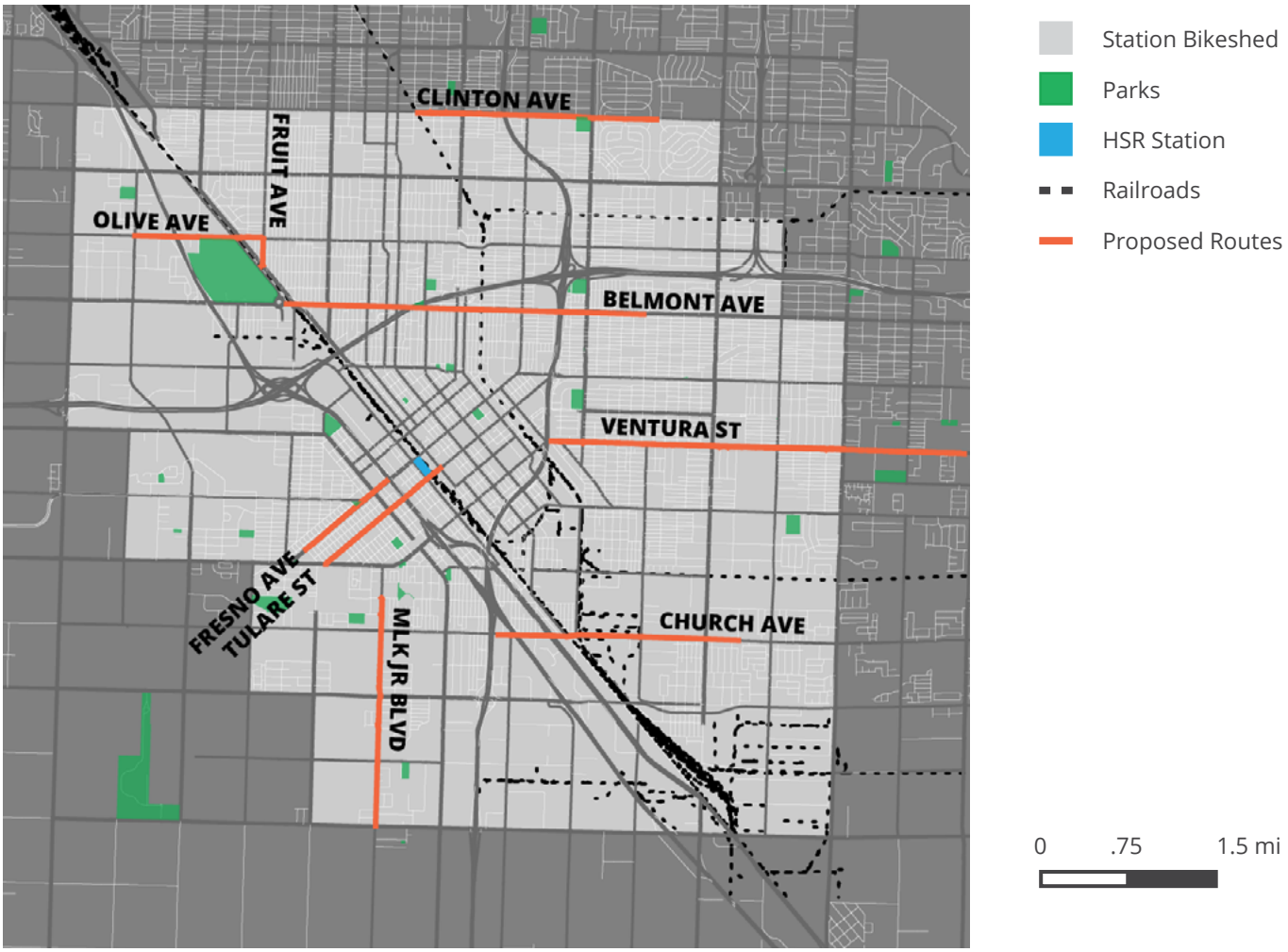

Figure 1. *Map of Proposed Low-Stress Routes in Fresno*

METHODOLOGY

To create this proposal, the project team used a novel and sophisticated method to analyze the effect of specific improvements. The method, called the Bicycle Network Analysis (BNA), relies on the truism that a connection between two points is only as strong as the weakest link.
Existing Conditions

Most Central Valley residents are reliant on single-occupancy vehicles to commute, and the city of Fresno is no exception. The existing street grid prevents bicycle commuting to employment, retail, and shopping centers in the downtown core. The streets around the proposed HSR station lack safe routes for biking and walking. Because of this failure to connect, the existing network is only useful for neighborhood or recreational cycling in peripheral suburban areas.

Weak links in a bicycle network are devastating for safe mobility. The impact of incomplete networks is most significant for disadvantaged populations, who are less likely to own cars due to income, age, or disability. By fixing weak links in low-stress networks, Fresno can create connections that are intuitive and safe for everyone.

The study underlying this report reviews several potential improvements to specific weak links in the low-stress network. The project team used Geographic Information Systems (GIS) to determine which destinations will be newly accessible thanks to each improvement. This analysis illustrates the "network effect." The network effect shows how fixing an intersection in one part of town can make a park or a shopping center, or a school in another part of the city vastly more accessible to people walking, biking, and taking transit.

COMMUNITY OUTREACH

In addition to the GIS analysis, this proposal relied on qualitative analysis of Fresno's street network, relying on hundreds of comments and conversations in an outreach process. Because of the COVID-19 pandemic and shelter-in-place orders, the project team pivoted from face-to-face engagement and moved to primarily digital or online methods for outreach and engagement.

The outreach plan utilized equitable and innovative strategies to engage residents who live, work, and travel within the project area, focusing on residents that are typically underserved and left out of community planning processes. The project team worked to overcome engagement barriers, including language and culture, disability access, connectivity to the internet or digital tools, socioeconomic status, and barriers to in-person outreach resulting from the COVID-19 pandemic.

Residents shared their travel routines, their perceptions of biking in Fresno, and what they needed to make biking a pleasant, safe, and frequent mode of travel. Residents also dropped pins in their top three barriers to biking in the project area on a digital map.

INTRODUCTION

SITE AREA

The project area is the bicycle travel shed (bike shed) around the future High-Speed Rail station in Fresno, California. The project team defines the bike shed as a three-mile radius around the station, or the distance most riders can comfortably ride. The area was then adjusted based on the roadway network, cutting out or extending the three-mile radius to account for major roads and excluding locations to which most riders would not travel.

PROJECT TEAM

The Project Team refers to any combination of the grant applicant (Kern Council of Governments), sub-applicant (California Bicycle Coalition), and contractors described below. This project is funded through the CalTrans Sustainable Transportation Planning Grant.

Kern Council of Governments (Kern COG) is Kern County's Metropolitan Planning Organization (MPO) and is the primary applicant and grant administrator to the sub-applicant.

Fresno Council of Governments (FCOG) is Fresno County's MPO,

California Bicycle Coalition (CalBike) is a statewide nonprofit organization that advocates for equitable, inclusive, and prosperous communities where bicycling enables all Californians to lead healthy and joyful lives. CalBike planners work directly with Kern COG to ensure deliverables are met. CalBike planners contributed GIS analysis, development of educational materials and reports, outreach, and ground-truthing efforts.

Toole Design is the nation's leading planning, engineering, and landscape architecture firm specializing in multi-modal transportation. Toole, along with People for Bikes (a national nonprofit advocacy organization), developed the Bike Network Analysis Tool (BNA). BNA is the methodology from which the proposed networks are derived. Toole's GIS analysts mapped the existing and adopted low-stress network for Bakersfield, Merced, and Fresno and used projections to estimate improvements in BNA scores after adding the proposed network. For the purpose of this report, the adopted network refers to low-

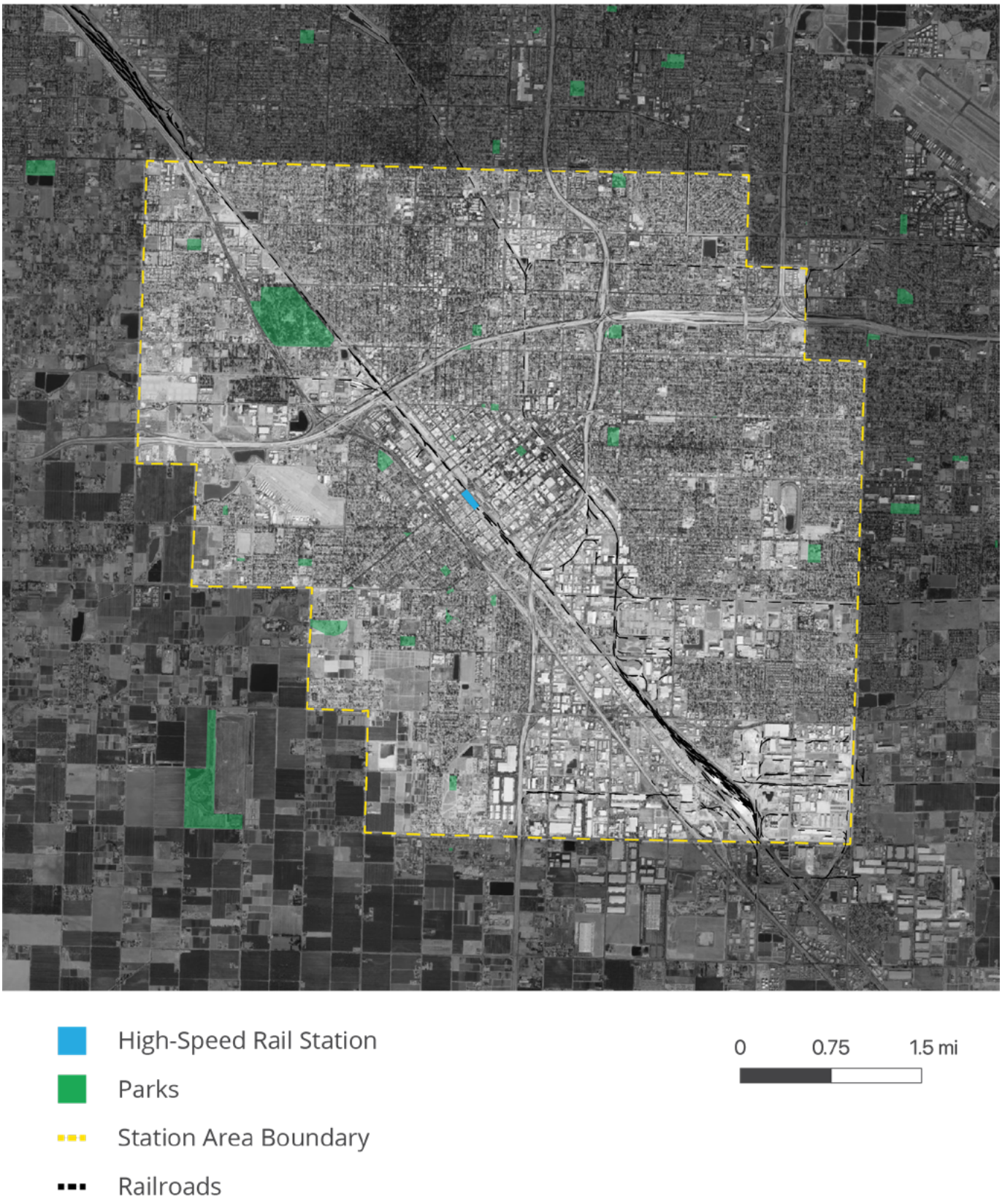

Figure 2. *Site Area and Future High-Speed Rail Station*

stress projects that have been recommended in the ATP and approved by Fresno but have not necessarily been built out yet.

Cultiva La Salud (Cultiva) is a regional program in the San Joaquin Valley counties dedicated to health equity by fostering changes in communities that support healthy eating and active living. Administered through the Public Health Institute, Cultiva is a grassroots community of health educators, service providers, and residents. Cultiva conducted outreach effort and survey administration and documented resident feedback in the Fresno and Merced project areas.

EXISTING CONDITIONS

The California Office of Traffic Safety (OTS) ranks traffic safety in the state's cities and counties each year. Since 2017, Fresno County has fallen at or near the bottom of the OTS rankings. It has one of the highest per-capita rates of total injuries and fatalities, as well as bike and pedestrian injuries and deaths.

For the city OTS rankings in both 2017 and 2018, Fresno had the worst record for pedestrian and bicycle collisions compared to other similarly-sized cities. In those same two years, the Traffic Injury Mapping System (TIMS) recorded 123 total collisions involving pedestrians (97 counted) and cyclists (26), including a total of 67 deaths. Over half of crashes involving pedestrians and cyclists in the City of Fresno involved fatalities.

DEMOGRAPHICS AND MODE SHARE

According to the American Community Survey, 80% of Fresno residents drive alone in single-occupancy vehicles. Less than 0.688% of the population uses cycling as a form of transportation. Low levels of mode shift to active transportation (biking, walking, and public transit) can be attributed to the lack of safe facilities, failure to invest in adequate infrastructure.

Upwards of 20% of the population lives below the poverty line. Life expectancy at birth and well-being index score in Fresno are among the lowest for California cities. At the same time, the average Fresno household owns two fossil fuel-powered vehicles.

According to the Fresno ATP plan, 1.8% of Fresno workers aged 16 years or older commuted to work daily by walking, far below the state average of 2.9%. Only 1.1% of residents reported commuting daily by bicycle.

GOALS

This project will facilitate a safe, equitable, and sustainable low-stress bike network in Fresno. When Fresno completes its low-stress bikeway network, as outlined in this proposal, residents and commuters will be able to access any point in the study area using low-stress bike routes. Investments in cycling network connectivity will increase mode shift towards sustainable forms of transportation, including cycling, walking, and public transit.

Equity

Building a comprehensive low-stress bike network in Fresno will promote equity. High-quality bike infrastructure lowers accessibility barriers for those who may not otherwise feel safe biking, including children and seniors. It increases access to many cost-effective, healthy, and environmentally sustainable transportation, including cycling and mass transit. It will also connect residents, the primary users of the network, to housing, work, recreation, and transit centers. It has the potential to boost the local economy by attracting tourists. Once implemented, this project will safely connect disadvantaged communities to Fresno through a low-stress network.

Safety

The recommended projects in this report will promote safety for active transportation users throughout the Fresno Metropolitan area. Current conditions and data show a serious safety issue with cycling and walking, particularly in the project area. This project aims to enhance public safety for cyclists and pedestrians and reduce the high number of pedestrian and bicyclist-involved collisions in Fresno.

Users from ages 8-80 will feel comfortable and safe riding anywhere within the project area

once the low-stress street designs detailed in this proposal are implemented. These designs include protected crossings and intersections and diverting cyclist traffic away from collector streets and vehicular traffic when possible. Low-stress bicycle networks improve safety and dramatically increase bicycle ridership.

Sustainability
Improving the bicycle network and connecting it to existing and planned transit will help build a sustainable multimodal transportation system. It will also create more livable neighborhoods for Fresno residents. By increasing active transportation trips and reducing automobile trips, the project will also reduce air pollution caused by single-occupancy traffic while also alleviating vehicular traffic congestion. A well-designed bicycle network can also create a sense of place and spur new development, promoting a denser, more vibrant urban core that is not reliant on surface parking and vehicular traffic with a smaller carbon footprint.

PUBLIC HEALTH

According to the 2019 Valley Children's Health Assessment report of Central Valley Counties, Fresno County's 5th-9th-grade students did not meet the state average for aerobic capacity and health fitness zones, indicating a lack of accessibility to healthy and low-cost activities that would benefit physical fitness. Also, the proportion of obese residents in Fresno County is higher than the state average.

Having a Fresno County zip code means a resident is more likely to have poor health outcomes and high mortality. Many individual, societal, and environmental issues contribute to these health issues. Getting more people within a community using bicycles as a form of transportation will address several of the root causes of the problem, including lack of exercise and poor air quality.

Improved public health has provided the impetus for transportation changes across California. Quality-of-life concerns can be addressed through robust investment in low-stress active transportation infrastructure. A public health perspective helps understand and measure the impact of new infrastructure on residents.

According to the Safe Routes Partnership, "Active transportation investments have "the potential to transform individual health, community health, and environmental conditions all at the same time. In other words, in a time of tight budgets, limited resources, declining workforce numbers, and growing health problems creating opportunities for safe bicycling and walking can literally provide public health practitioners with one of the biggest bangs for their already-stretched buck."

Disinvestment in active transportation infrastructure and public transit reduces neighborhood cohesion and negatively impacts health outcomes and mortality for residents throughout the region. The Central Valley is a region where policymakers are quick to invest public dollars into roads and freeways to the detriment of the quality of life in the area. The prioritization of traditional forms of transportation also works against stated goals and policies of local, state, and federal governments, including:

- Greenhouse Gas reductions (GHG)
- Vehicle Miles Traveled reductions (VMT)
- Air quality improvements and mobile-source emissions reductions
- Healthy People 2030 Framework
- Reducing traffic deaths related to biking and walking

Investments in an active transportation network that is safe, usable, multimodal, and well-connected will enable more individuals of diverse abilities and backgrounds to try different modes of transportation. This investment will create a ripple effect in the broader community and the environment. Even a moderate mode shift to more bike riding will provide a measurable impact on individual, societal, and environmental problems. Increasing biking is a single solution to an array of issues Central Valley residents face.

The transportation of the region not only impacts the health outcomes for residents but their economic well being as well. According to TRIP Net's Central Valley Roads Report, "driving on Central Valley roads that

are deteriorated, congested and that lack some desirable safety features costs the average driver $1,765 annually in the form of additional vehicle operating costs (VOC) as a result of driving on rough roads, the cost of lost time and wasted fuel due to congestion, and the financial cost of traffic crashes."

The first step is policy decisions to invest in a robust, low-stress active transportation network. Active transportation gives the biggest bang for each public dollar spent on transportation modernization because it positively impacts individual health outcomes and the economic health outcomes of the community while reducing the cost of maintenance. Bike facilities require less maintenance than traditional roadways, bikeway routes along canals, railroads, and other existing infrastructure can be considered infill development that reduces construction costs, dust, and emissions. Investments in active transportation infrastructure alongside facilities other than traditional roadways can also help preserve fragile ecosystems.

Single-occupancy vehicle traffic is the primary source of mobile emissions in the Central Valley. The best way to remove single-occupancy vehicular traffic is to create active transportation networks that residents want to use. Encouraging residents to opt out of private automobiles for transportation requires engineering a system that optimizes active transportation while determining and prioritizing residents' needs. Engaging residents to eliminate single-occupancy emissions can impact air quality and health outcomes related to pollution. According to Safe Routes to School, "improved air quality—resulting from an increase in cycling modal share—reduced disability-adjusted life years for cardiopulmonary disease caused by poor air quality." Safe Routes to School also found that "the health benefits of shifting from car to bicycle was associated with greater benefits from increased physical activity (3-14 months of life gained) compared with potential effects of inhaled air pollution (0.8-40 days of life lost)."

Regionally-connected active transportation networks hold the potential for transformative health benefits for residents anywhere in the Central Valley. Compared to a disconnected bike lane in one neighborhood, full active transportation networks will encourage more residents of diverse abilities to begin bicycling. Residents also need to be engaged in the planning process. Community-based planning of low-stress networks will create pathways for communicating important information, such as local air quality conditions and construction updates, and greater infrastructure utilization because residents were a part of the process.

If the ride to a destination (work, parks, grocery stores, schools) is too long or not connected through low-stress facilities, residents will opt to drive and miss out on exercise. Therefore, a connected and convenient network is crucial. It is essential to design low-stress bike networks that avoid vehicle traffic when possible and ensure that all crossings of busy streets are safe and comfortable. A well-designed bike network will encourage a mode shift to reduce mobile-emissions pollution sources, including traffic congestion, idling, and parking lot usage. This mode shift will improve the air quality of Central Valley communities.

To tap into cycling's full public health potential, bike networks must be adjacent or connected to destinations like grocery stores, parks, and other community resources, without gaps in the network. These bike networks are among the most effective ways to introduce new riders to safe cycling, foster continuing interest, and build a sense of ownership for users of community spaces while enhancing access to essential services and shopping destinations.

METHODOLOGY

People for Bikes, a non-profit organization, created the Bicycle Network Analysis (BNA) as a public data analysis tool to measure connectivity between places on low-stress bicycle networks. The BNA is derived from four factors: data collection, traffic stress analysis, destination access analysis, and score aggregation. Each of these factors has a unique methodology that, when joined together, produce numerical scores representing the levels of stress for connections between places within a specific boundary.

Data Collection: By utilizing OpenStreetMap and the United States 2010 Census, the BNA gathers information on geographic units of analysis and population and employment data, all of which provide a baseline of data for the rest of the analysis. The BNA is meant for public use. Therefore, it uses publicly available data to ensure that it remains accessible to community stakeholders. These data sources allow the BNA to be easily updated as more data is gathered.

Traffic Stress Analysis: Most bicycle transportation in cities happens on or along existing roads. Each road has a set of characteristics such as the number of lanes, speed limit, frequency of intersections, and type of bicycle facility (buffered lane, buffered lane with parking, sharrow, etc.). Using these street characteristics, BNA evaluates these roads and determines if cycling is considered a low-stress or high-stress experience.

Destination Access Analysis: Access to destinations means determining if those living in a particular area can access opportunities, core services, recreation, retail, transit, and other people along a low-stress route. A score of 0-100 is calculated based on the number of those destinations available.

Score Aggregation: Scores are aggregated on both the individual census block (and census block equivalent) and at the overall city level. For this study, the analysis focuses mostly on census block levels of connectivity.

Term	Definition
Adopted	This document refers to projects and infrastructure adopted through the Fresno Active Transportation Plan (ATP) that qualify as low-stress within the project area, as well as other relevant (funded and unfunded) outside of the ATP that are also deemed low-stress as "adopted." Information on these projects is in the "Background and Planning Context" section.
Bike Boulevards	Bike boulevards follow NACTO design guidance for routes on residential streets that prioritize the safety of active transportation users, particularly at crossings and intersections. Bike boulevard designs are often paired with traffic calming and urban greening. Routes with sharrows can be low-stress if they are implemented in combination with traffic calming treatments. See Design Guidelines for more on bike boulevard and protected bike lane design.
Bike Lanes	A bike lane is a Class II Bikeway that provides a striped, signed, and stenciled lane for one-way travel on a street or highway. Bike lanes typically flow in the same direction as traffic, are bordered by a solid white line (6-8inches wide), and include painted words/symbols at intersections. They require a minimum width of 4 feet of rideable surface with a 5-6 feet minimum lane with paint. Bike lane design should include intersection treatments that easily guide turning motorists and cyclists traveling straight to avoid conflicts.
Bike Paths	A bike path is a Class I Bikeway for travel on a paved right-of-way completely separated from the street where motor vehicles travel. An example of this is the Kern River Parkway. To fully meet low-stress criteria, bike paths must connect to other low-stress facilities in the network and address potential interactions with driveways, motorists, and pedestrians.
Bikeway Classification	Bikeway classifications used in this report are an application of low-stress methodology, best practices guidelines, and the City of Oakland's Bikeway Types to the existing classifications from the Kern Bicycle Master Plan.
Buffered Bike Lane	A buffered bike lane requires at least a 3-foot buffer and minimum 4-foot rideable space, the same as a conventional bike lane. Markings include solid painted lines on the edges of the buffer and bike lane.

Connectivity	A quality of a low-stress path or road is its connectivity to other low-stress routes. This plan uses the BNA Score to quantify connectivity. See definition for low-stress.
Cycle Tracks	Cycle tracks have physical barriers (bollards, medians, raised curbs, etc.) and vibrant paint to prevent encroachment by motorized traffic. They can allow for one- or two-way cycling traffic.
Destination	Destinations are high-value locations of services that residents regularly use, including parks, medical centers, grocery stores, job centers, and schools.
Existing	Infrastructure currently in place that is deemed low-stress by the Bike Network Analysis tool is called "existing" in this plan. Not all current infrastructure in the project area met the criteria for low-stress. (insert map of all existing, with currently low-stress)
Intersection	The mixing zone or junction of two or more paths that serve any form of transportation is an intersection. See Design Guidelines for more on low-stress intersection design.
Low-Stress	A bike route that provides connections between destinations efficiently and comfortably is classified as low-stress. The Mineta Transportation Institute (MTI) and People for Bikes define low-stress bikeways as "providing routes between people's origins and destinations that do not require cyclists to use links that exceed their tolerance for traffic stress, and that do not involve an undue level of detour."
Minor Crossing	Unsignalized, unprotected, or unofficial intersections between the active transportation network and motor vehicle traffic are minor crossings. Minor crossings include unmarked crosswalks and intersections.
Quick-Build	Quick-build is a method for building bike and pedestrian safety projects quickly and inexpensively. Quick-build projects use low-cost materials such as paint and plastic bollards. These projects yield immediate results, increase public support, and safeguard against political changes that could sideline long-term plans. CalBike's Quick-Build Guide lists low-cost, high impact treatments to improve the connectivity of low-stress routes quickly and flexibly.
Recommended	The recommended projects are those that the project team has determined are critical to complete the low-stress network in the Bakersfield project area. These recommended projects include both adopted projects and projects that expand on the adopted projects' low-stress designs.
Shared Use Path	Facilities that give pedestrians and cyclists the exclusive right of way and are physically protected from motor vehicle traffic are shared use paths. FWHA's design guidance on shared use paths is used for the existing, adopted, and recommended routes in this report. See Design Guidelines for more on shared use path design.
Spot Improvement	A targeted improvement to an intersection or crossing that will create or enhance a pedestrian and cyclist facility in a single location is a spot improvement.
Traffic Calming	Traffic calming includes an array of methods to slow the speed of cars, and it is required to create a genuinely low-stress bike boulevard. Speed and traffic volume management using mini traffic circles, greening, speed bumps, traffic diversion, curb extensions, innovative parking placement are all traffic calming measures.

IMPLEMENTATION OBJECTIVES

The project team analyzed current transportation plans applicable to the study area and found overlapping objectives, and adopted projects that already include the development of a complete low-stress network (see Background and Planning Context). This project's vision and goals highlight the existing and adopted low-stress network, thus expanding on local agencies' work and further improving biking and walking conditions.

- **Build out Fresno ATP Network Projects deemed low-stress first**
- **Ensure all intersections and crossings are also low-stress when building a bike network**
- **Build out network quickly using quick-build strategies and implement best practices as funding becomes available**
- **Build network out in order of positive impact on the connectivity of the low-stress network**
- **Update Fresno General Plan street design guidelines and standards to meet low-stress qualifications to NACTO standards**

BEST PRACTICES + DESIGN GUIDELINES

Low-stress guidance in this report is from the National Association of City Transportation Officials' (NACTO) Urban Street Design Guide and Urban Bikeway Design Guide, and Don't Give Up At the Intersection. See the Implementation section for more on design guidance and standards. The Federal Highway Administration's (FHWA) Guidance on Traffic Calming discusses the benefits and strategies for implementing traffic calming measures for low-stress facilities in neighborhoods.

POLICY RECOMMENDATIONS

Involve the Public
Obtain public support for the project before building a complete bicycle network. Make sure to engage traditionally marginalized and underrepresented groups to get input on community needs. Continue to fully engage, not merely reach out to the community throughout the process, raise awareness for the project, and gather ongoing feedback on completed projects to inform future projects.

Implement Quick-Build Strategies
Quick-builds of the entire network yield immediate results, build public support and safeguard against political regime changes that could stall plans. CalBike's Quick-Build Guide 2020 recommends low-cost, high impact treatments to increase bike connectivity quickly and flexibly.

Create Multi-Disciplinary Teams
Ensure that designers work with operations, as operations staff will be the ones who will maintain the system. Involve multiple parties in the planning and implementation process, including designers, operations staff, community stakeholders, and elected officials. However, the City of Fresno should be the primary actor.

Connect Key Destinations
Start the network at the densest core and which already has the most existing bicycle infrastructure. Then connect it outward, taking care to include neighborhoods where the most disenfranchised communities live.

DESIGN GUIDELINES

This report recommends three types of low-

stress bikeways: bicycle boulevards, protected bike lanes, and shared-use paths, as well as the adoption of low-stress intersections for all of these types. As these facility types may vary in quality, this report recommends that the city follow the best practices outlined by the National Association of City Transportation Officials (NACTO) Urban Bikeway Design Guide. The Urban Bikeway Design Guide provides Federal Highway Authority (FHWA) approved design standards and was endorsed by Caltrans in the 2014 memorandum "Design Flexibility in Multimodal Design."

Bicycle Boulevards

Bicycle boulevards have low automobile traffic volume and speeds, and they should be designed to prioritize bicycles over cars. Wayfinding measures such as pavement markings and route signage, traffic calming measures, crossing treatments, and green infrastructure are all methods to prioritize bike traffic. Wayfinding alone is not sufficient to create a low-stress bike boulevard, however. It must be used in conjunction with the other measures mentioned.

Street signs and pavement markings are essential to create safe bicycle boulevards, as they encourage cyclists to use designated routes and let motorists know that they should drive slowly. Street signs are most effective when they have consistent, recognizable branding that provides a visual identity to the bike boulevard. They should be placed roughly every 2-3 blocks throughout the route and at intersections to indicate how to remain on the route. Signs placed near route turns, or junctions with other routes are decision signs, and they should include directional arrows, route or destination names, and distances. They may also include time estimates to destinations. Signs should be used in conjunction with regular pavement markings to let cyclists know where to position themselves and remind motorists that they share the road with cyclists. NACTO recommends that pavement markings be at least 112 inches by 40 inches to ensure that they are visible to all road users.

Traffic calming measures are essential for bicycle boulevards to help manage speed and volume. Posted speed limits should be 25 mph or below and should be combined with targeted enforcement and vertical and horizontal deflection. Vertical deflections are wide, slight pavement elevations, such as 3- to 4-inch speed humps, speed cushions, or raised crosswalks. Horizontal deflections narrow the roadway and include curb extensions or bulb-outs, chicanes, median islands, and traffic circles.

As collisions are most frequent at intersections, it is vital to create protected intersections where bicycle boulevards cross high-traffic roads. For minor intersections between low traffic streets, stop signs should be limited on the bike boulevard and reoriented to the cross streets. Stop signs inhibit cyclists from efficiently traveling because they are inefficient for a cyclist to conserve energy and often create delays for cyclists to enter the intersection. Limiting the use of stop signs may attract more motorists, so this measure must be used in conjunction with traffic calming measures. There should be traffic control elements at every intersection, such as stop signs on cross streets, traffic circles, and pavement markings in the intersection.

When bicycle boulevards intersect with major streets, city planners need to take additional measures to make motorists aware of cyclists and shorten crossing distances for cyclists. Advanced warning signs, intersection crossing markings, raised intersections, and warning beacons increase the visibility of cyclists. Curb extensions, bicycle forward stop bars, refuge islands, and bike boxes decrease crossing distances. At signalized intersections, separate bicycle signal heads can give cyclists a head start. The specific treatments used will vary based on the conditions of the intersection.

Finally, green infrastructure helps enhance bike boulevards. Green infrastructure elements, such as street trees, bioswales, and rain gardens, not only manage stormwater and create a more pleasant environment, but they can also be used in conjunction with traffic calming measures. They can be placed in medians, curb extensions, and traffic circles.

Protected Bike Lanes
Protected bike lanes are one-way bicycle paths at street level separated from traffic by a physical barrier, such as a parking lane, raised concrete curbs, bollards, or planters. The project team does not define bike lanes with painted buffers to be protected, as motorists can easily cross the buffer. Protected bike lanes reduce the risk of collisions with cars, prevent cars from parking in the bike lane, and improve user perceptions of comfort and safety.

Protected bicycle lanes are appropriate for routes that would otherwise be high stress, including streets with high traffic volumes and speeds as well as frequent double parking. The lane should be at least 5-7' wide and clearly marked with street signs and pavement markings. If the barrier is a parking lane, there should be at least a 3' buffer between the parking and bike lanes to prevent collisions with doors, and the combined width of the bike lane and buffer should be at least 11'. There should also not be parking within 30' of intersections, and other barriers, such as concrete islands, should be placed there instead.

Shared Use Paths
Shared use paths provide low-stress bicycle infrastructure suitable for children. They are fully separated from motorized vehicles and are used by pedestrians and non-motorized vehicles such as bicycles, wheelchairs, scooters, and skateboards. They can be built within a highway's right-of-way or inside an independent right-of-way.

Bidirectional paths should be at least 10' and at least 12-14' in high volume areas. Center stripe lines can help organize traffic and improve safety. To ensure accessibility, shared use paths should have a firm, slip-resistant surface and a grade less than 5%.

If shared use paths intersect with roadways, extra measures must be taken to ensure that the facility remains low-stress for all users. Advanced warning signs and pavement markings should alert both path and roadway users of upcoming intersections, and traffic calming measures should be implemented on the roadways to reduce automobile speeds. Crossing distances for path users should be kept as short as possible, and where possible, high-visibility crosswalks with separate bike signals should be used.

Low-stress Intersections
As intersections tend to be high conflict zones, intersection treatments are paramount to creating low-stress bicycle networks. Treatments should increase visibility and delineate a clear right of way. While appropriate treatments will vary depending on the specific conditions of the intersection, NACTO recommends the following: bike boxes, intersection crossing markings, two-stage turn queue boxes, median refuge islands, through bike lanes, and combined bike lane/ turn lane.

Bike boxes are designated bike areas at intersections in front of the traffic lane. They are appropriate at signalized intersections and increase the visibility of cyclists, reduce conflict with right-turning vehicles, and reduce signal delay. Bike boxes should be 10-16 feet deep, clearly marked with pavement markings and colored paint, and have a clear stop line for cars.

Intersection crossing markings are pavement markings that indicate that a bike lane is continued through an intersection. They are typically dotted lines that help cyclists know where to ride, alert motorists to cyclists, and remind right-turners that cyclists have priority. Additional pavement markings, such as bike arrows or paint, increase the visibility of intersection crossing markings.

Two-stage turn queue boxes are similar to bike boxes, but they are placed in areas where cyclists frequently turn across an intersection, either left from a right-side bike lane or right from a left-side bike lane.

Median refuge islands shorten the distance that cyclists need to cross, calm traffic by narrowing the roadway width for motorists, and provide a space for cyclists to wait for gaps in traffic. They are often used at unsignalized intersections but can be supplemented with bicycle signals, hybrid beacons, or active warning beacons.

Through bicycle lanes or bicycle pockets position bicyclists at intersections with turn only lanes. They are used on streets with bike lanes, and the bike lane delineation is dashed in the area where motorists can merge into the lane. Through lanes and bike pockets give both cyclists and motorists a clear travel path. This alerts motorists that bikes may be passing them as they merge and allows all users to avoid conflict. To further highlight the conflict zone and increase visibility, the bicycle pocket may be painted. Combined bike and turn lanes, or mixing zones, are similar, but instead of having a dedicated lane, the turn lane and bike lane are combined. However, there are pavement markings that indicate where the cyclist should position themself. This increases motorist awareness of cyclists and encourages them to give cyclists priority.

Branding, Naming, & Wayfinding
The low-stress bike route should follow consistent design standards. Having consistent branding not only contributes to a sense of place but also improves safety by making the bicycle network more recognizable and easy to follow for both cyclists and motorists.

While the Manual on Uniform Traffic Control Devices (MUTCD) defines wayfinding conventions and required standards, there is some room for creativity. Performing public outreach to determine branding and naming can be an effective way to engage the public and raise awareness for the network.

Route wayfinding includes signage and pavement markings that direct cyclists to and through routes. There are three main types of bike route signage: confirmation signs, turn signs, and decision signs. Confirmation signs let cyclists and motorists know that they are on a designated bike route. They should be placed every 2-3 blocks. Turn signs should be set shortly before turns. Pavement markings are used effectively in conjunction with or instead of confirmation and turn signs. Finally, decision signs are placed at the junctions of two or more bikeways and should include the direction and mileage of each route. (NACTO Urban Bikeway Design Guide, 2012).

BACKGROUND + PLANNING CONTEXT

FRESNO TRANSPORTATION PLANS

Fresno adopted the City of Fresno Active Transportation Plan in 2017 and the Fresno County Regional Active Transportation Plan and Fresno Station District Master Plan in 2018. It also completed the Fresno-Clovis Metropolitan Area Class IV Bikeway Feasibility Study in 2017. The city was also awarded $66.5 million through the Transformative Climate Communities (TCC) grant in 2018, which led to the formation of the Displacement Avoidance Plan in 2019. Finally, the 2020 Fresno County Regional Trails Plan, which will recommend new shared-use paths, is in the development stage.

Plan Objectives

The Bikeway Feasibility Study identifies corridors suitable for Class IV bikeways with the goal of expanding upon existing bicycle infrastructure and supporting a network that is safe and comfortable for people of all ages and abilities.

The Regional ATP identifies potential pedestrian and bicycle projects in the county and assists jurisdictions in securing funding for these projects. The Fresno ATP, which was used for the bulk of the analysis of the adopted network in this report, proposes an expansion of the existing active transportation network through new bikeways, sidewalks, and crossings. It also recommends enhancements to the network through bicycle signal detection, destination signage, end of trip facilities, and maintenance. Finally, it lays out priority projects for the short-term (less than 10 years) as well as more extensive plans for the long-term (timeline not defined). Priority projects are estimated to cost $114.7 million, and long-term projects are estimated to cost $1.3 billion.

The Station Area Plan focuses on the area within a ¼ mile radius of the planned HSR station. It aims to capitalize on investment from the HSR system to revitalize Downtown Fresno through infill redevelopment and reconnection of street networks. In creating an implementable vision for this development, the plan focuses on creating jobs, housing, and a safe and pedestrian-friendly Downtown.

Public Outreach

Outreach was conducted for the regional and city ATPs as well as the Bikeway Feasibility Study.

To draft and finalize the current ATP, the City of Fresno conducted three stakeholder advisory committee (SAC) meetings, two public workshops, and several community meetings, as well as digital outreach efforts through social media and an online interactive map.

Like CalBike, the City of Fresno used the Level of Traffic Stress (LTS) methodology to classify the comfort of riders on different roadways. As the highest proportion of respondents identified as "interested but concerned" riders, the ATP focuses on building a "lower stress" bicycle network. It also determines priority areas based on spatial analysis of income levels, collision data, current usage, and car ownership.

In identifying which corridors were suitable for separated bikeways, the Fresno Council of Governments (COG) conducted an online survey, held a public workshop, and created a steering committee that met several times and went on a site visit.

Main Takeaways

The city ATP focuses on providing equitable access to lower stress bicycle and pedestrian networks. Many of the proposed bicycle lanes are LTS 2, which is defined as "the highest level of stress that the mainstream adult population will tolerate while still feeling safe." While some of the bike lanes will constitute a low-stress bike route, most road stress level changes will be accomplished by building separated bike paths outlined in the Fresno County Regional Trails Plan. Additional separated bike paths may also be developed through the Rails-to-Trails program, which converts former rail lines to multi-use trails. The Bikeway Feasibility Study also identifies separate corridors ideal for separated bikeways.

Both the ATP and Bikeway Feasibility Study provide design guidelines, setting a precedent for quality bicycle infrastructure. The ATP also includes a maintenance plan to ensure that bicycle and pedestrian infrastructure remains safe and comfortable.

The Station Area Plan also has the potential to increase the active transportation network. It creates a hierarchy of prioritized circulation, with pedestrian access at the top, bicycle and public transportation in the middle, and automobile access at the bottom. It also identifies specific streets to reconnect to the grid system as well as intersections to reconfigure.

EXISTING + ADOPTED NETWORK ANALYSIS

In 2017, the City of Fresno adopted their current Active Transportation Plan, a comprehensive guide designed to increase the connectivity of the city. The plan outlines a vastly improved bicycle network, with a commitment from the city as well as the Rails-to-Trails Conservancy, a group dedicated to repurposing railroad rights-of-way. Fresno's impressive number of active and former railroad corridors will allow for an expansive off-road bicycle network.

To evaluate the connectivity of the current ATP, the project team mapped both the existing infrastructure and adopted infrastructure. The team assessed the score of the areas within the High-Speed Rail travelshed. Using the analysis of predicted BNA conditions in this travelshed, the project team proposed routes for further analysis to find the best ways to improve the BNA score.

With a BNA score maximum of 100 points, the project team focused on improving access to those areas with scores of less than 20 points, meaning a significant lack of accessibility and connectivity. Much of the lack of connectivity is due to the number of highways that criss-cross the city, making cycling through these hostile corridors inconvenient and potentially dangerous. The nine proposed routes will improve the overall bicycle infrastructure and increase connectivity throughout the city. These projects are listed in the Recommended Projects section.

Method for Selecting Recommended Routes

The project team also prioritized routes based on the existing road conditions, including whether there was adequate space in the existing roadway or if bikeways would need to be built outside of the existing right of way. The project team and Toole Design used GIS analysis, a ground-truthed assessment of existing conditions, and resident feedback presented in the preliminary survey to rank recommended projects based on their transformative impact on the BNA score.

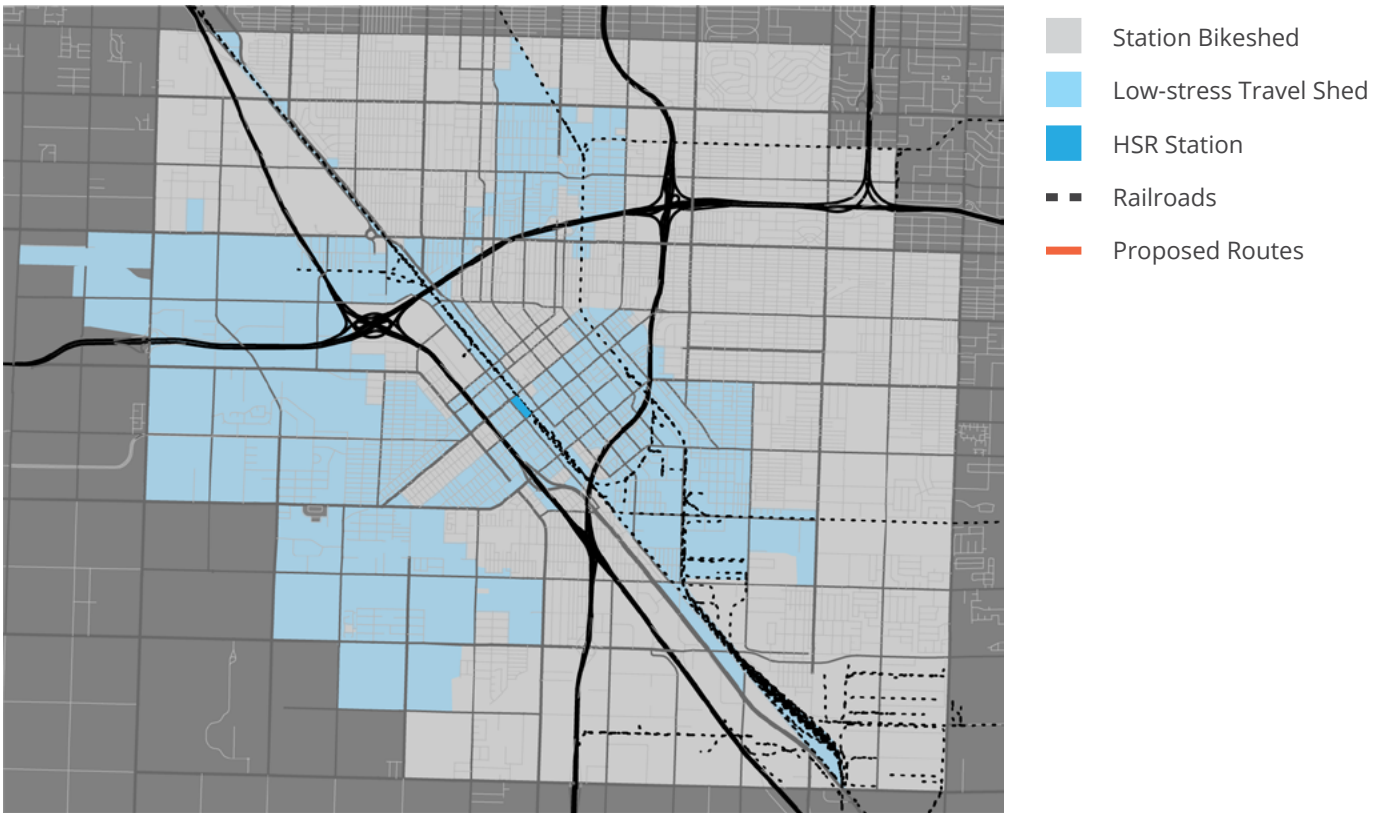

Figure 3. *Low-Stress Travel Shed for Adopted Network*

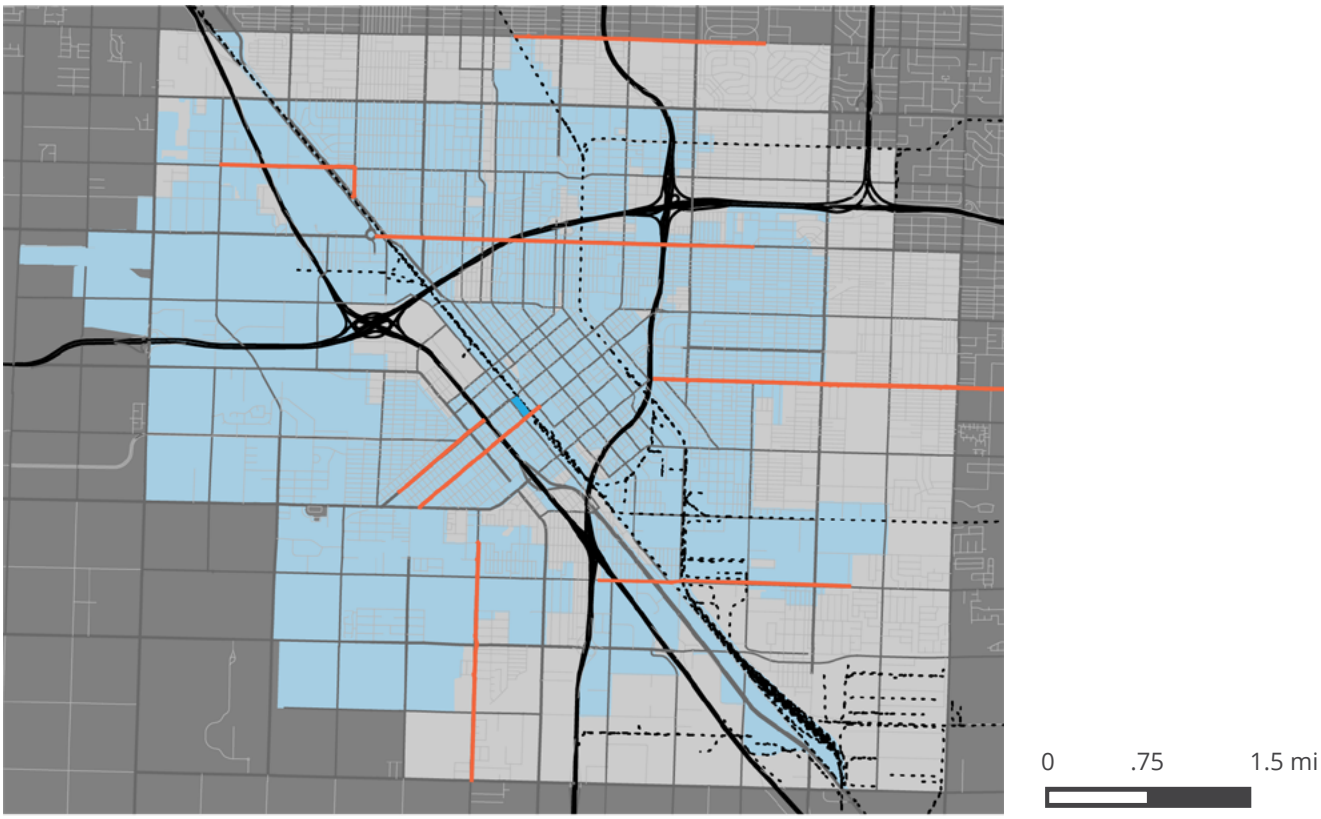

Figure 4. *Low-Stress Travel Shed for Proposed Network*

BIKE NETWORK ANALYSIS OF THE EXISTING LOW-STRESS NETWORK

Fresno's 2017 ATP is a strong foundation for creating a more connected and accessible community bicycle network. Thanks to the work of the Rails-to-Trails Conservancy, many of the city's former and active railroad corridors will have adjacent low-stress cycle routes providing long stretches of an uninterrupted cross-city route for cyclists and pedestrians. However, because the city is divided by multiple highways, not creating passages under or over those high-stress corridors means inevitable strains on connectivity.

The BNA for the planned and existing routes shows a relatively strong low-stress network in the downtown area east of the proposed High-Speed Rail Station and the northeast corridor of the city. Many of the Rails To Trails projects, while extensive, lack frequent connections to other bicycle routes, rendering them difficult to access and therefore inevitably underutilized. The area immediately west of the proposed High-Speed Rail line lacks low-stress connectivity, which contributes to the lack of access in the southwestern corridor of the city. Our proposal will focus on forming access points along existing low-stress routes and developing new routes in areas with low BNA scores.

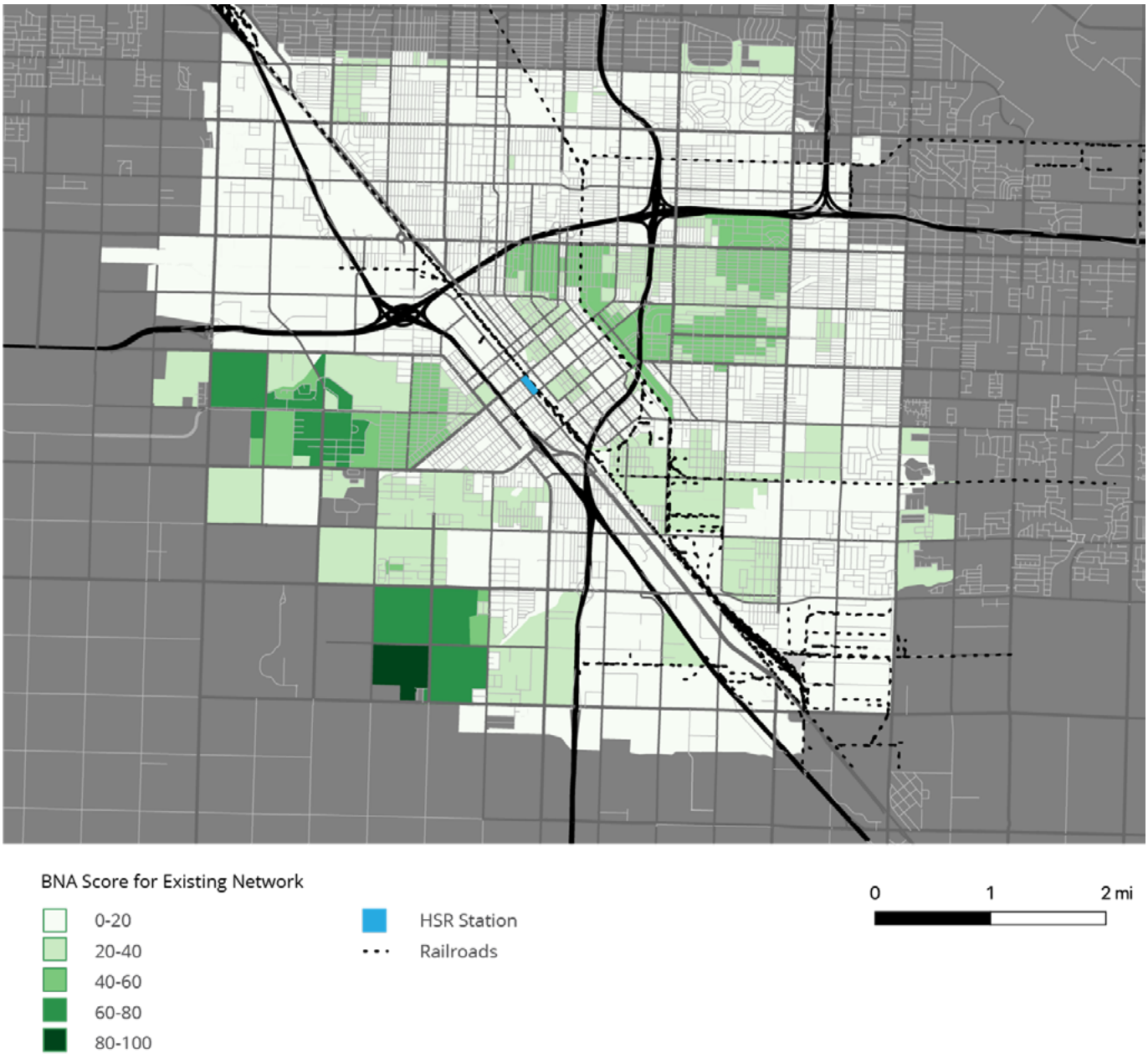

Figure 5. *BNA Scores for Existing Network*

BIKE NETWORK ANALYSIS OF THE ADOPTED LOW-STRESS NETWORK

With the addition of the low-stress networks outlined in the Fresno ATP, the BNA score for the project area improves, particularly in the Downtown area surrounding the future HSR station and around railroad tracks. Major roads still present challenges to low-stress connectivity, particularly in the area directly west of the station as well as the eastern and northern edges of the project area. West Fresno is economically disadvantaged as compared to other areas of the city, and we find, based on the planned network BNA, a slight improvement in connectivity to resources around the city.

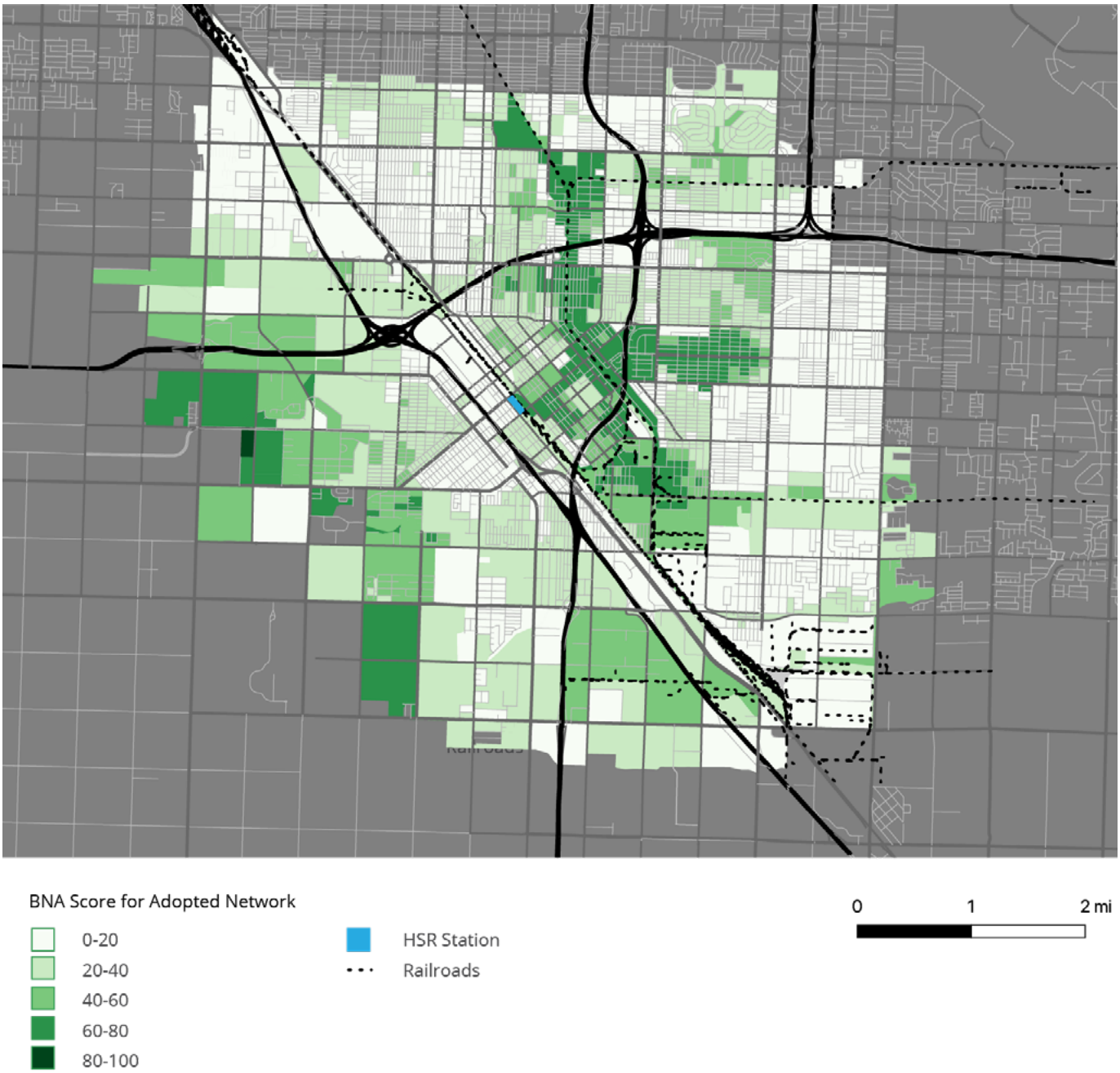

Figure 6. *BNA Scores for Adopted Network*

COMMUNITY OUTREACH

The project team's community survey ran four months from July - October 2020. Given limitations to the COVID-19 pandemic and stay-at-home orders, we primarily used a survey instrument to reach the broader Fresno community. Respondents shared travel routines, perceptions of biking and walking in the project area, and what was needed to make biking a pleasant, safe, and optimal travel mode. Residents located their top three barriers to biking and their top three local travel destinations using any transportation mode.

The project team relied on the expertise of community-based social justice partners, primary Cultiva La Salud, to distribute culturally competent, inclusive stakeholder engagement through a survey. Survey incentives were also administered through Cultiva La Salud's presence in the community.

Many of the target resident groups and organizations were on hiatus due to COVID-19, and lockdown requirements slowed progress temporarily. Instead, the project team switched to online and limited in-person surveys.

220 Fresno community members shared their experience and expertise navigating the local street and existing bike networks. Outreach from this survey created a listserv of 191 residents interested in following up about the project.

SURVEY ANALYSIS

A total of 220 Fresno residents completed the survey. 92% of respondents said they do bike in the study area, while 8% stated that they do not. While this indicates a high percentage of bikers, results may reflect that those who bike are more likely to take the survey.

Of respondents who indicated that they do bike in the study area, 36% said they bike every day, 51.5% said they bike once or twice a week, 10% said they bike a few times each month, and 2.5 said they bike once a month or less. Given the frequency with which people bike, it is vital to create a safe environment to increase the number of people who feel comfortable using bikes for everyday transportation in Fresno.

Do You Bike in the Area Below?

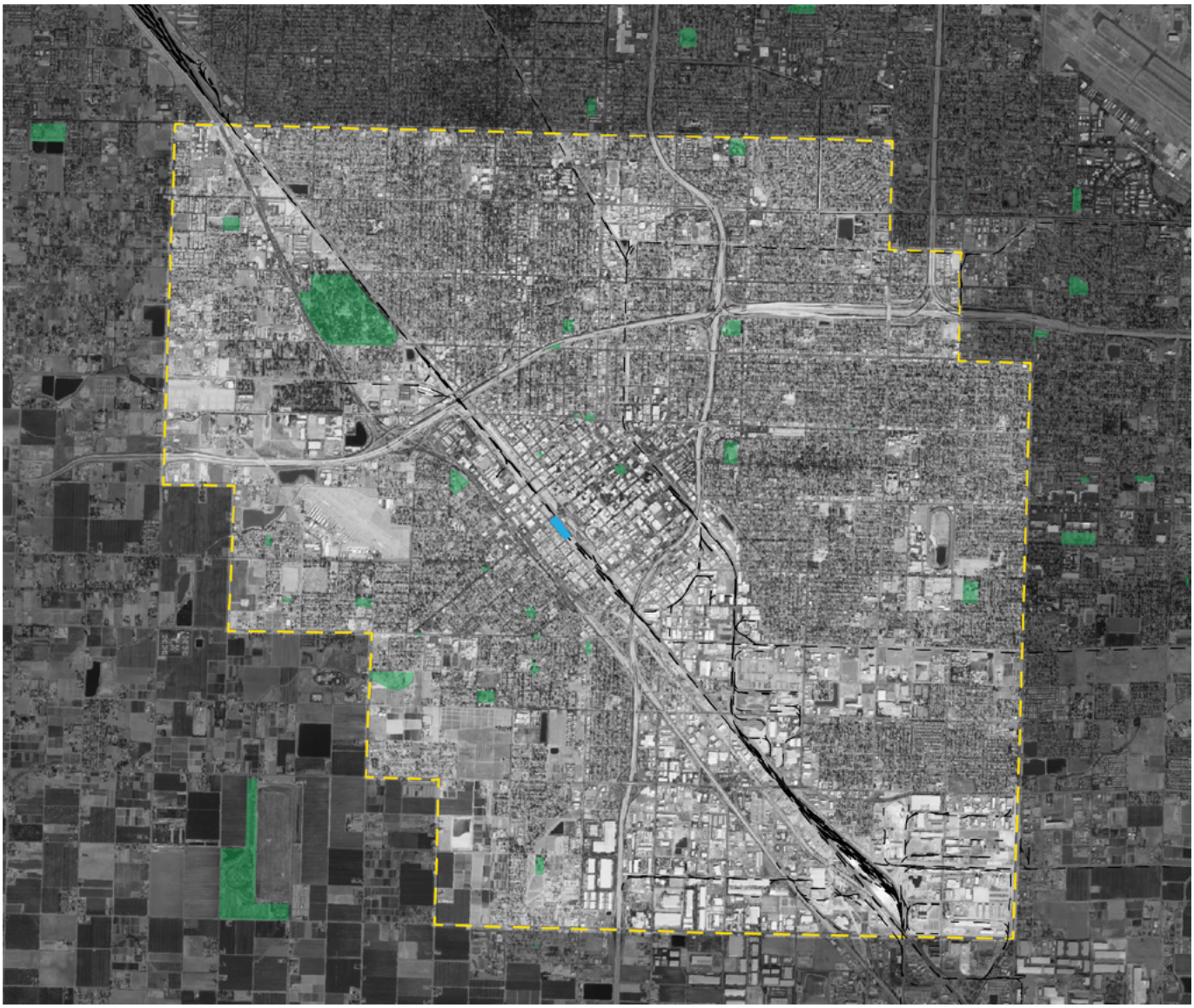

Figure 7. *Site area shown for the question "do you bike in the shaded area below?"*

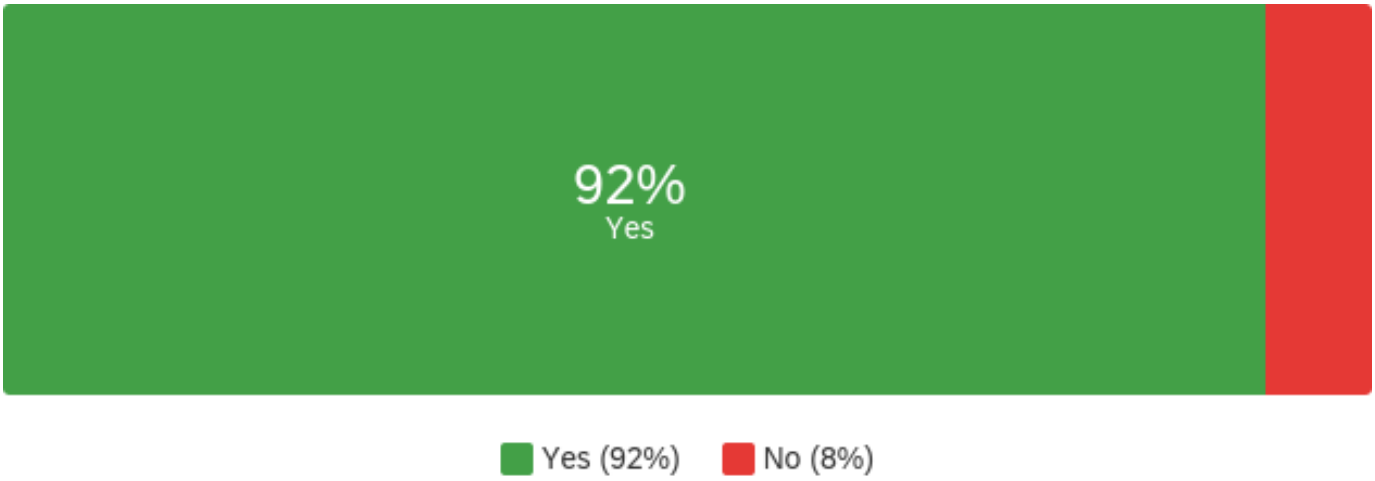

Figure 8. *Response to question "Do you bike in the shaded area below?"*

Destinations and Barriers

When asked what destinations they travel to, respondents disproportionately chose areas near the station within Downtown Fresno. This is not surprising, as the downtown area is denser than other neighborhoods and has a concentration of commercial, civic, and office buildings. However, this area also has a lot of barriers to access. It is bordered by three freeways and two sets of railroad tracks. These physical features present barriers to access for bicyclists and pedestrians. Barriers to access are concentrated in the downtown area, where more people are likely to travel, as well as along freeways and railroad tracks.

Please enter a location or drag the pin to the places you visit often by any mode of transportation:

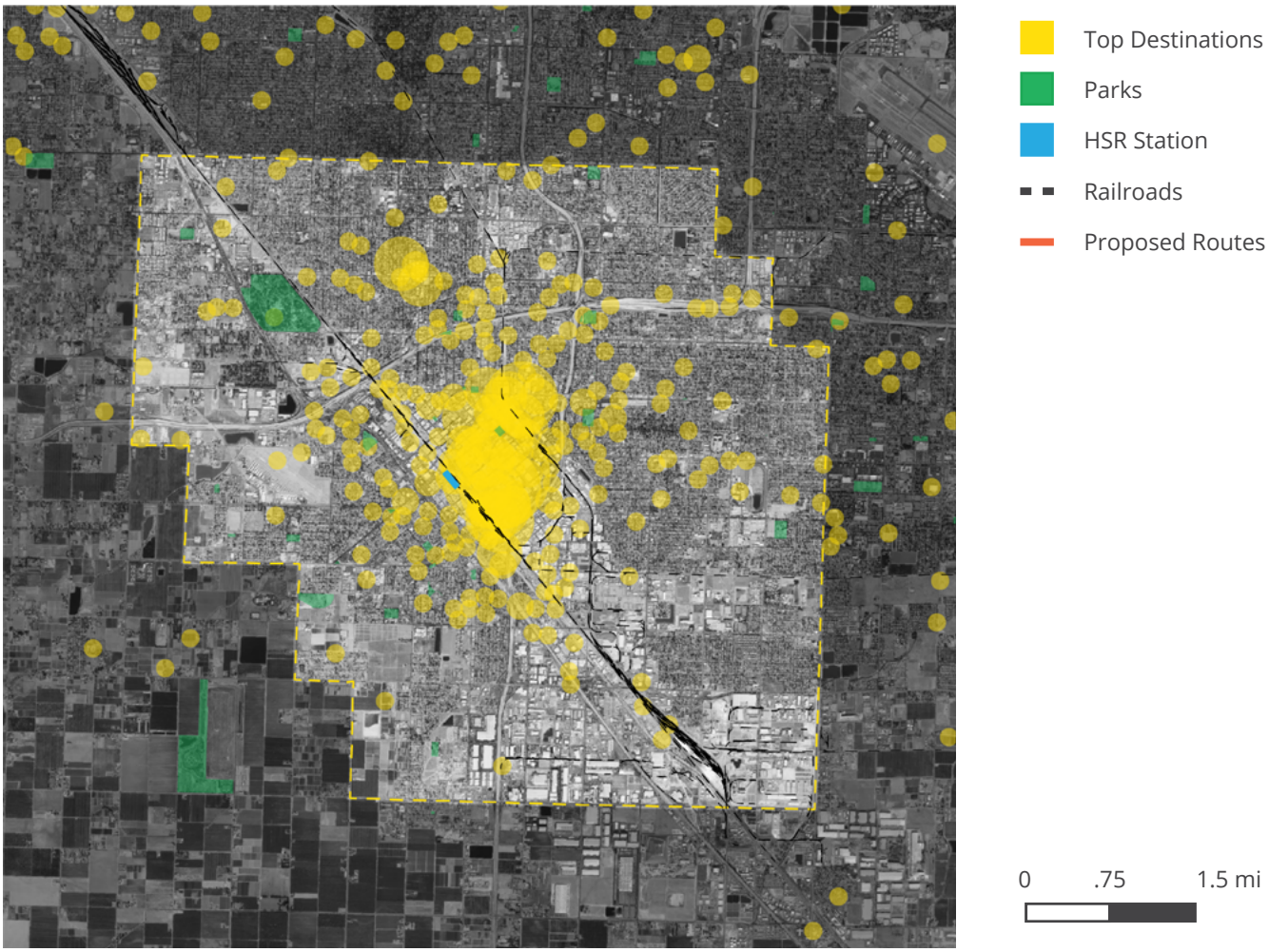

Figure 9. *Top Destinations*

Please enter a location or drag the pin to the top 3 places where you have challenges biking (i.e., a dangerous intersection, no street lighting, high-speed traffic).

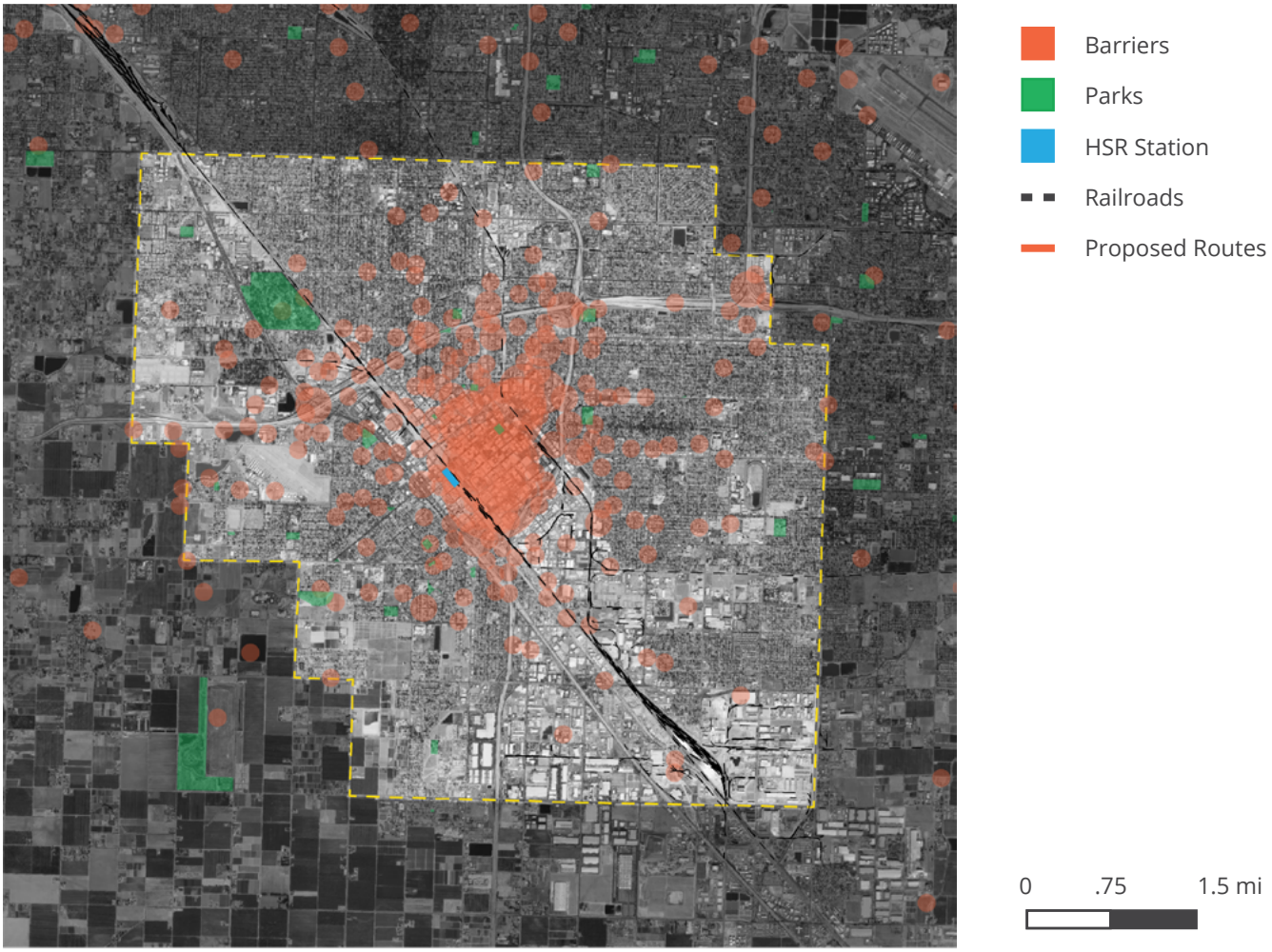

Figure 10. *Barriers to Destinations*

Among respondents who don't bike, the reasons were varied, but the most common was fear of being hit by a car. Of the seven respondents who wrote in their responses, four said that they do not bike in the area because there is a lack of bike lanes.

Figure 11. *Reasons for not Biking*

All respondents who do not bike indicated that they would potentially be interested in biking to their destinations if there was a safe way to do so, with 73% saying yes and 27% saying maybe. This data suggests that were there a comprehensive low-stress network, residents who currently don't bike would use it.

Would you bike to these places if there were a safe way to get there?

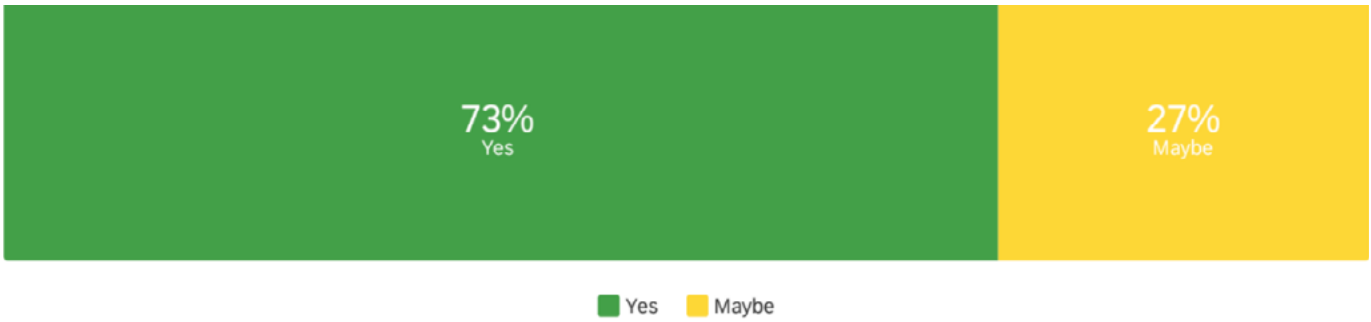

Figure 12. *Non-Bikers' Willingness to Bike with Safe Routes*

Users who do bike generally indicated that they felt safe riding a bicycle, but there is room for growth. 26% agreed with the statement "in general, I feel safe and comfortable while riding a bike," 41% somewhat agreed, 18% neither agreed nor disagreed, 10% somewhat disagreed, and 4% strongly disagreed.

In general, I feel safe and comfortable while riding a bike.

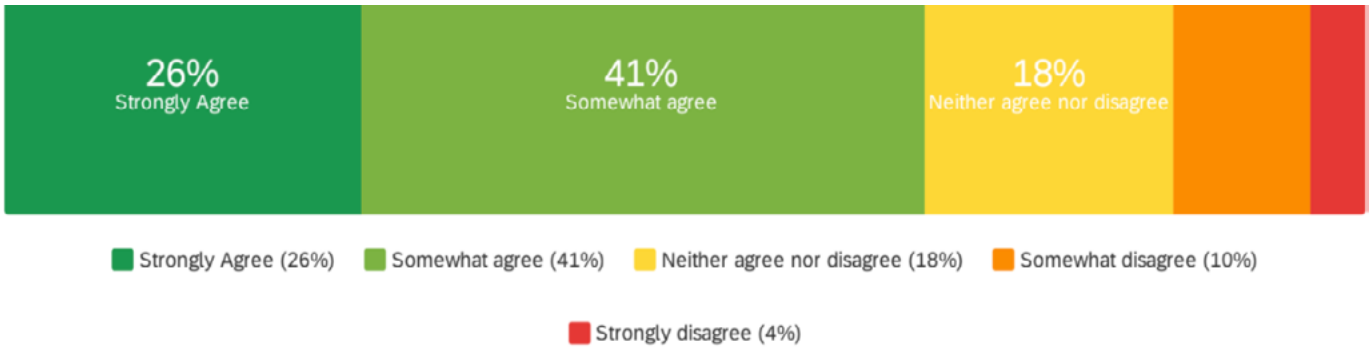

Figure 13. *Bikers' Perceived Safety Riding a Bike*

Respondents offered many suggestions for how to make their biking experience more pleasant. The most heard received response to the question "What would make your biking experience more positive?" was better bike parking at destinations, followed by better signage and safer routes. Of respondents who selected "other," 13 out of 17 wrote bike lanes, 5 of whom specified that they wanted protected bike lanes. As protected bike lanes are generally considered low stress, this response supports the desire for low-stress bike infrastructure.

What would make your biking experience more positive? Please select all that apply.

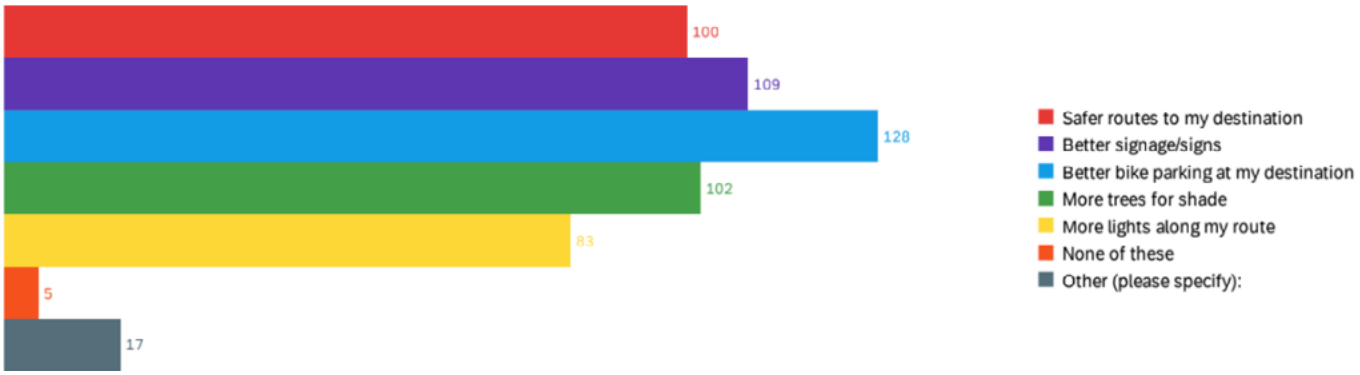

Figure 14. *Requested Improvements to the Bike Network*

User Demographics

The majority of respondents were below the age of 45 and skewed slightly towards males. 39% respondents were white, 27% were black, 19% were Hispanic/Latino/a/x, 8% were Indigenous or Native American, and 5% were Middle Eastern or North African. According to the 2019 US Census Bureau population estimates, 60.5% of Fresno residents are white, 27% are white (not hispanic), 7.4% are black, and 49.6% are Hispanic or Latino. This suggests that the population surveyed for this report represented fewer white people and more black people. Still, it should be noted that the survey provides options for people to select an additional race as well as Hispanic/Latino, whereas the CalBike survey did not. Finally, respondents represented a range of household incomes, but only 6% made under 40k annually, whereas 15% made over 100k. Given that the median household income in Fresno is $50,432, the survey may represent a population with a slightly higher income than average.

What is your age?

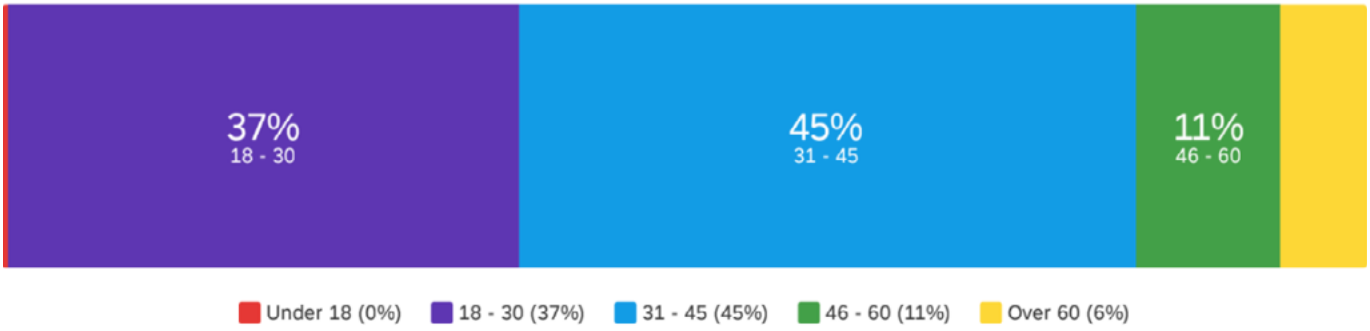

Figure 15. *Ages of Respondents*

What is your gender identity?

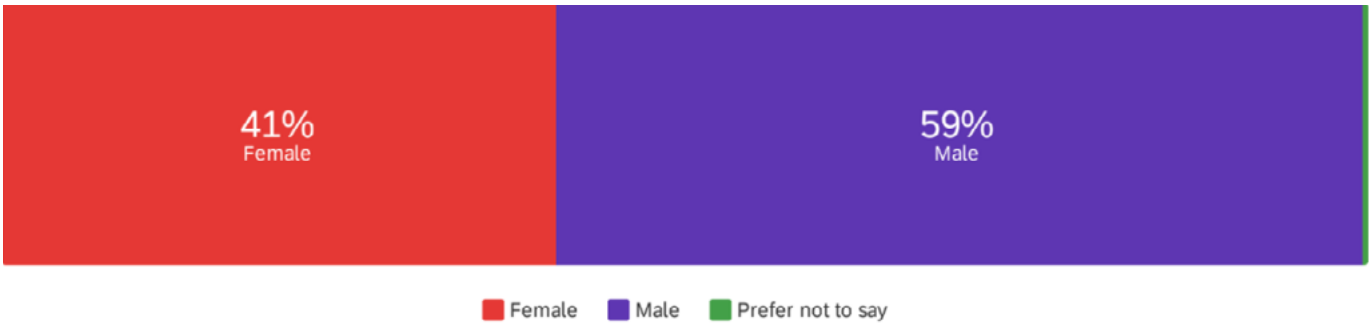

Figure 16. *Gender Identity of Respondents*

What is your race/ ethnicity?

Figure 17. *Race/Ethnicity of Respondents*

What is your annual household income?

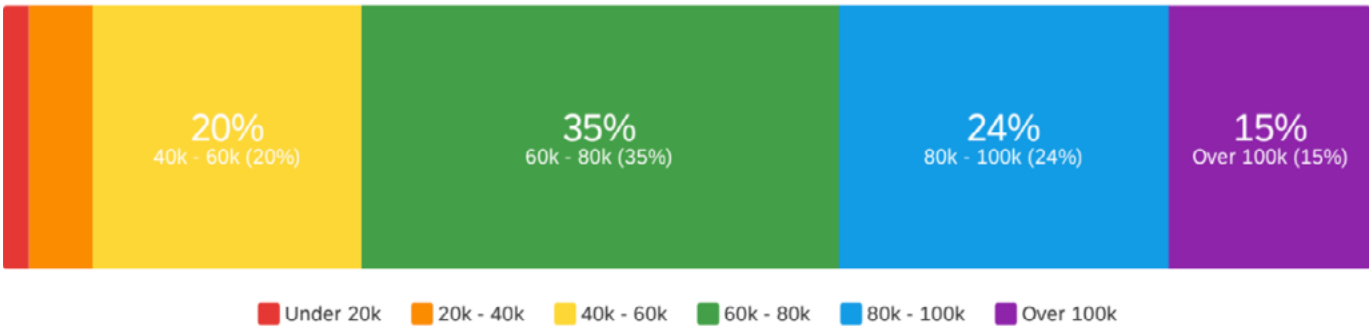

Figure 18. *Income of Respondents*

RECOMMENDED PROJECTS

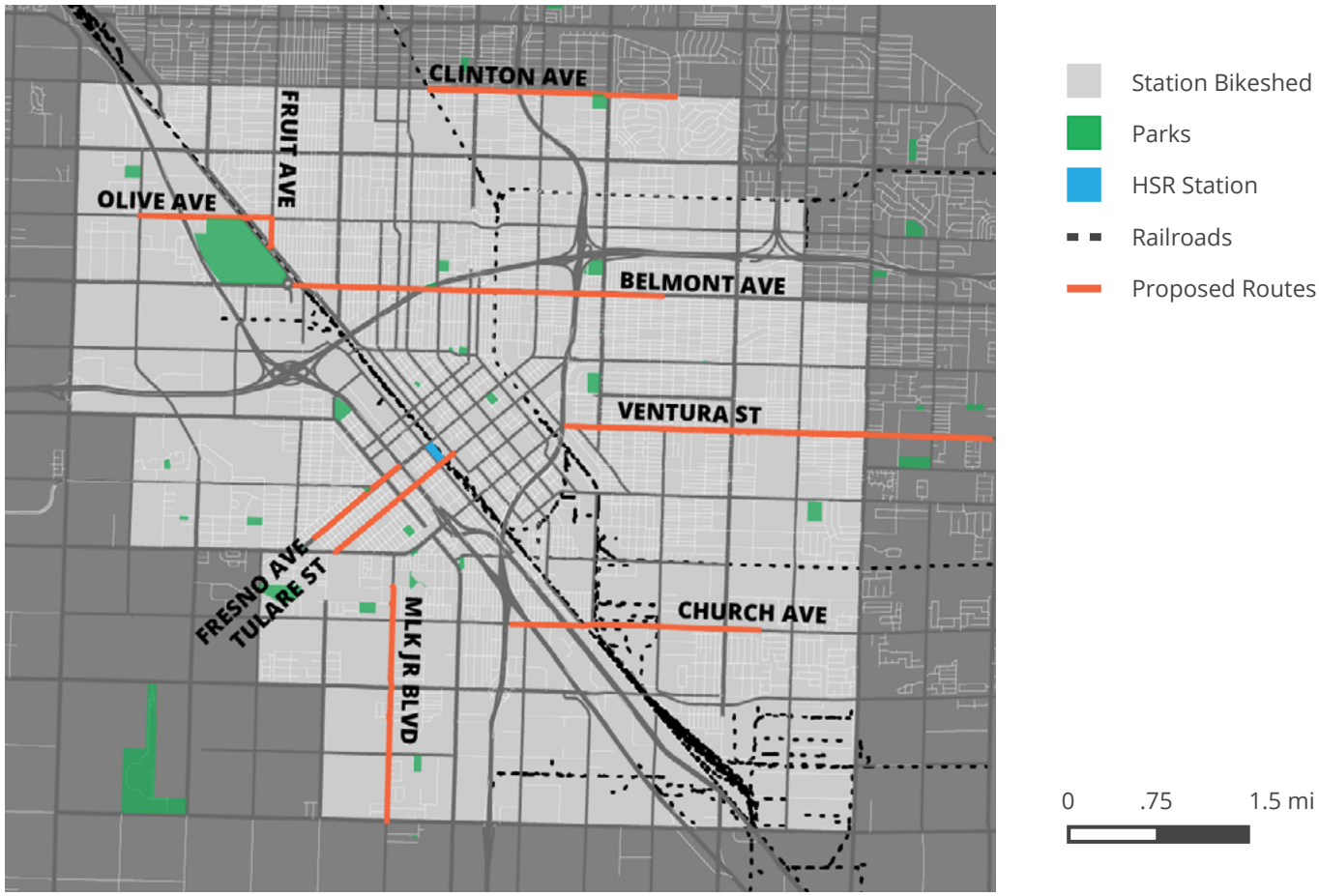

Figure 19. *Map of Proposed Low-Stress Routes in Fresno*

CLINTON AVE

Figure 20. *Map of Proposed Clinton Ave Route*

Clinton Ave runs east-west along the northern border of the Fresno study area. While the northeastern corridor of the city has a decent BNA score, the neighborhoods north of East McKinley Avenue do not. These areas don't have access to the planned Rails-to-Trails project along the Stockton Subdivision railway. That disconnect cuts this area off from the rich bike network adjacent to Fresno City College. The proposed route will run from the railroad corridor in the east to the Herndon Canal in the west. This Class II protected bike lane will run on the adjacent roadway and provide a connection under Highway 41. The BNA measures, among other things, access to services by bicycle. Building the Clinton Ave project means providing a low-stress connection to the Fresno VA Medical Center and better access to Fresno City College.

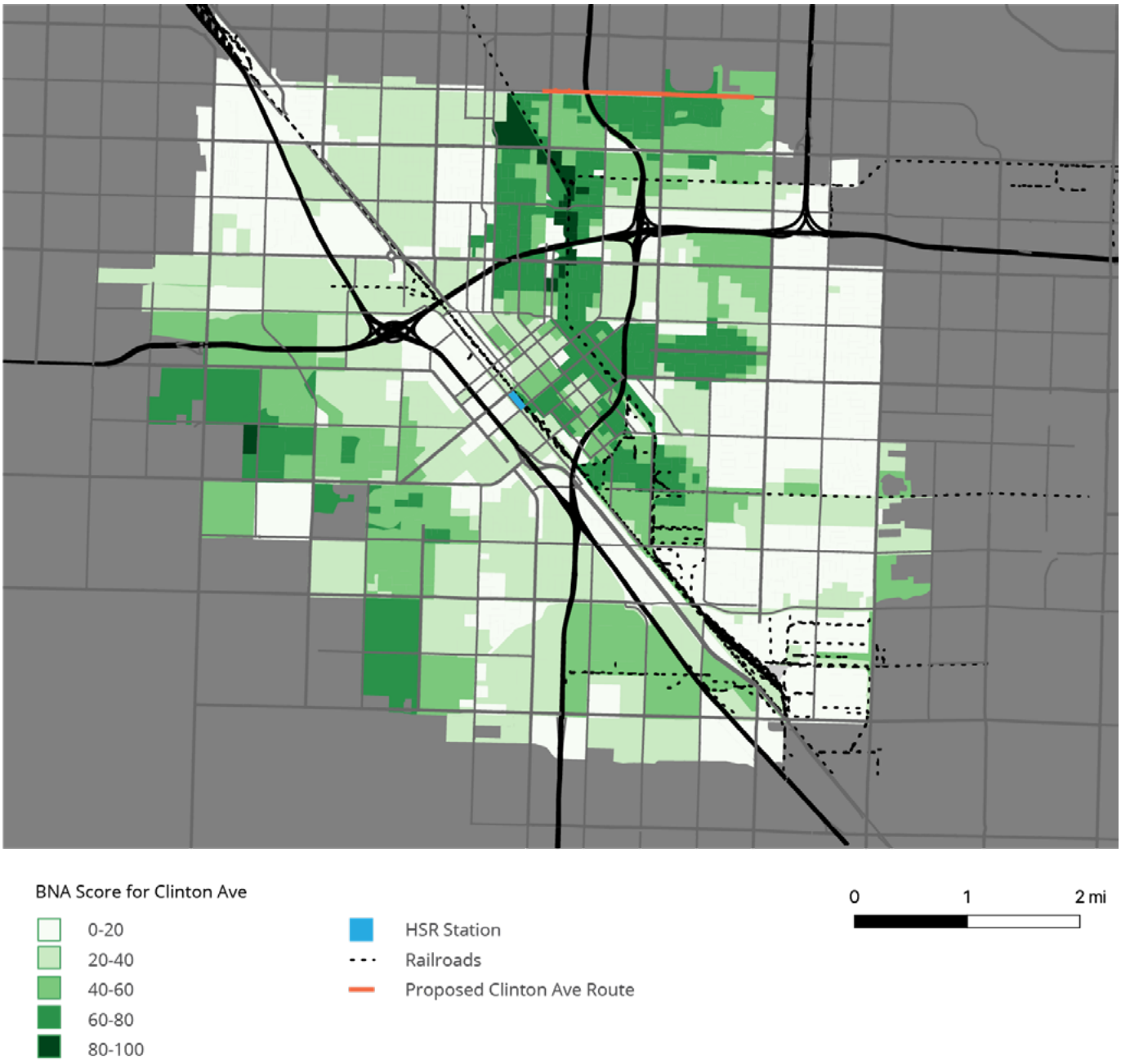

Figure 21. *BNA Scores for Proposed Clinton Ave Route*

EAST BELMONT AVE

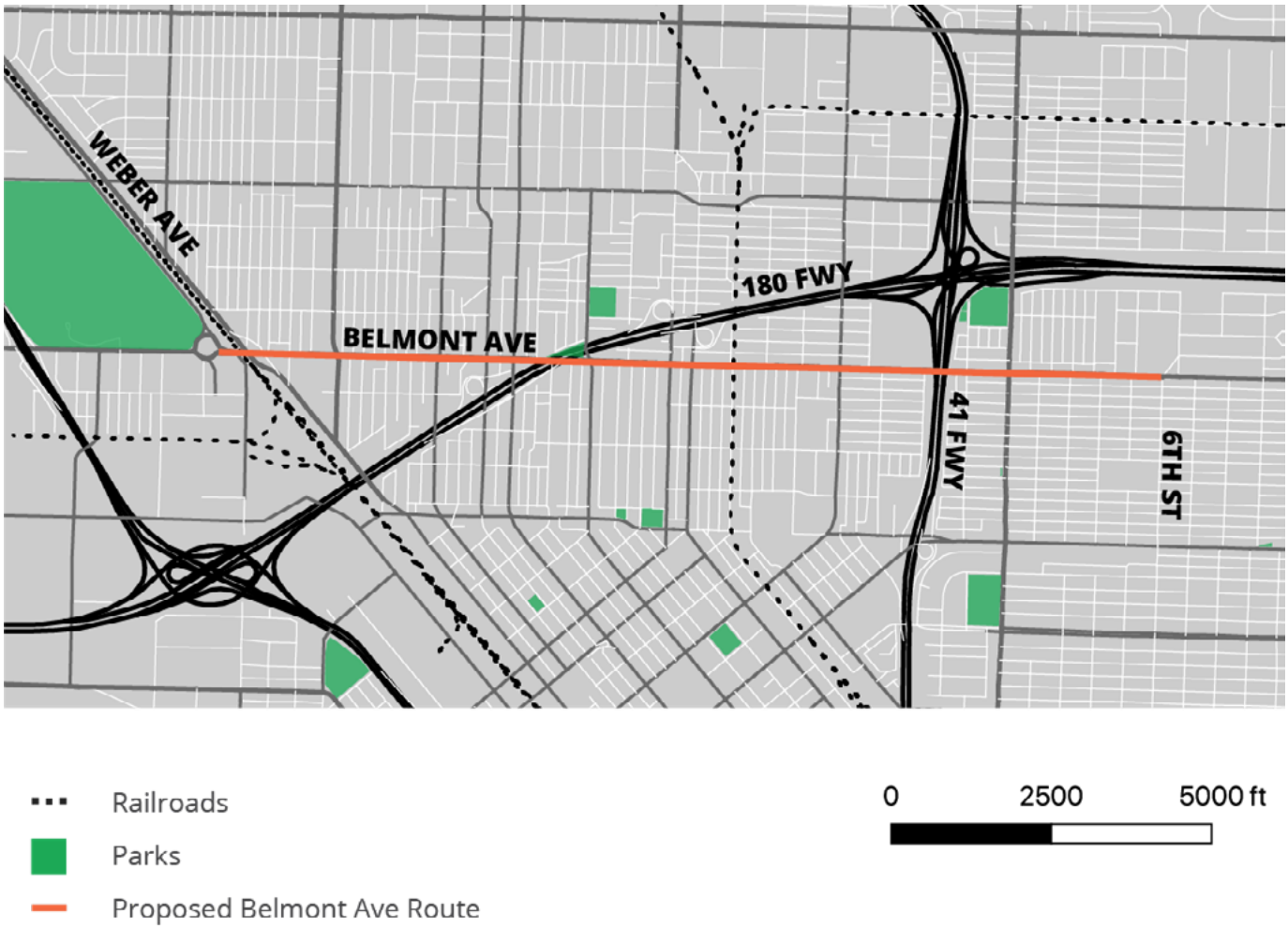

Figure 22. *Map of Proposed Belmont Ave Route*

The East Belmont Ave project is a continuation of the West Belmont Ave project, which is planned to stop before the roundabout just west of the proposed HSR line. By continuing the route to Hidalgo Elementary School, just east of First Street, the project connects with the proposed HSR and Stockton Subdivision corridor Rails-to-Trails projects and provides passage under CA-180 and the CA-180 CA-41 interchange. The proposed route will provide access to Roeding park for residents east of the HSR route.

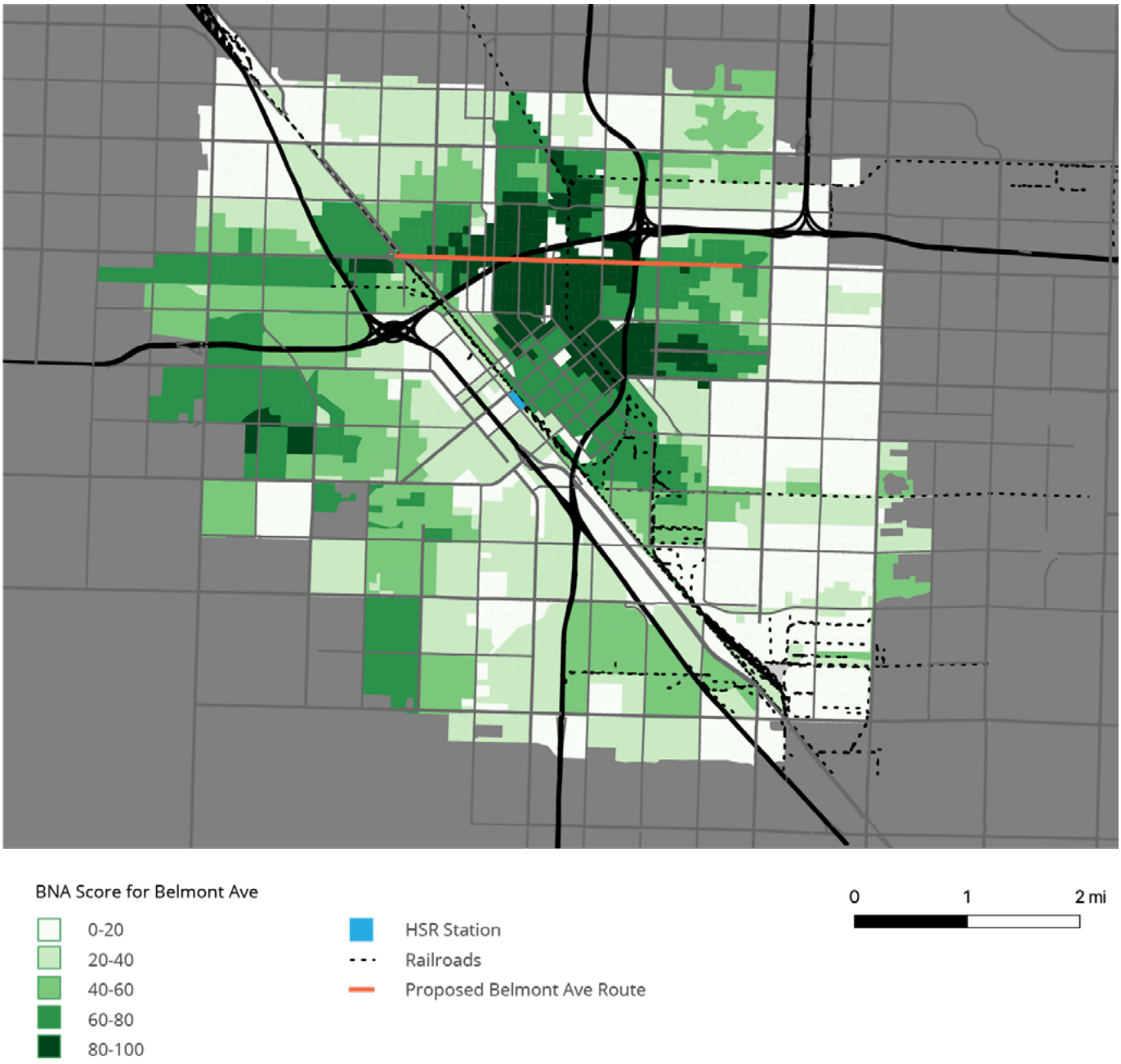

Figure 23. *BNA Scores for Proposed Belmont Ave Route*

FRUIT AVE

Figure 24. *Map of Proposed Fruit Ave Route*

This short project runs north south and connects with the West Olive route in the north and provides another connection to the HSR Rails-to-Trails project in the south.

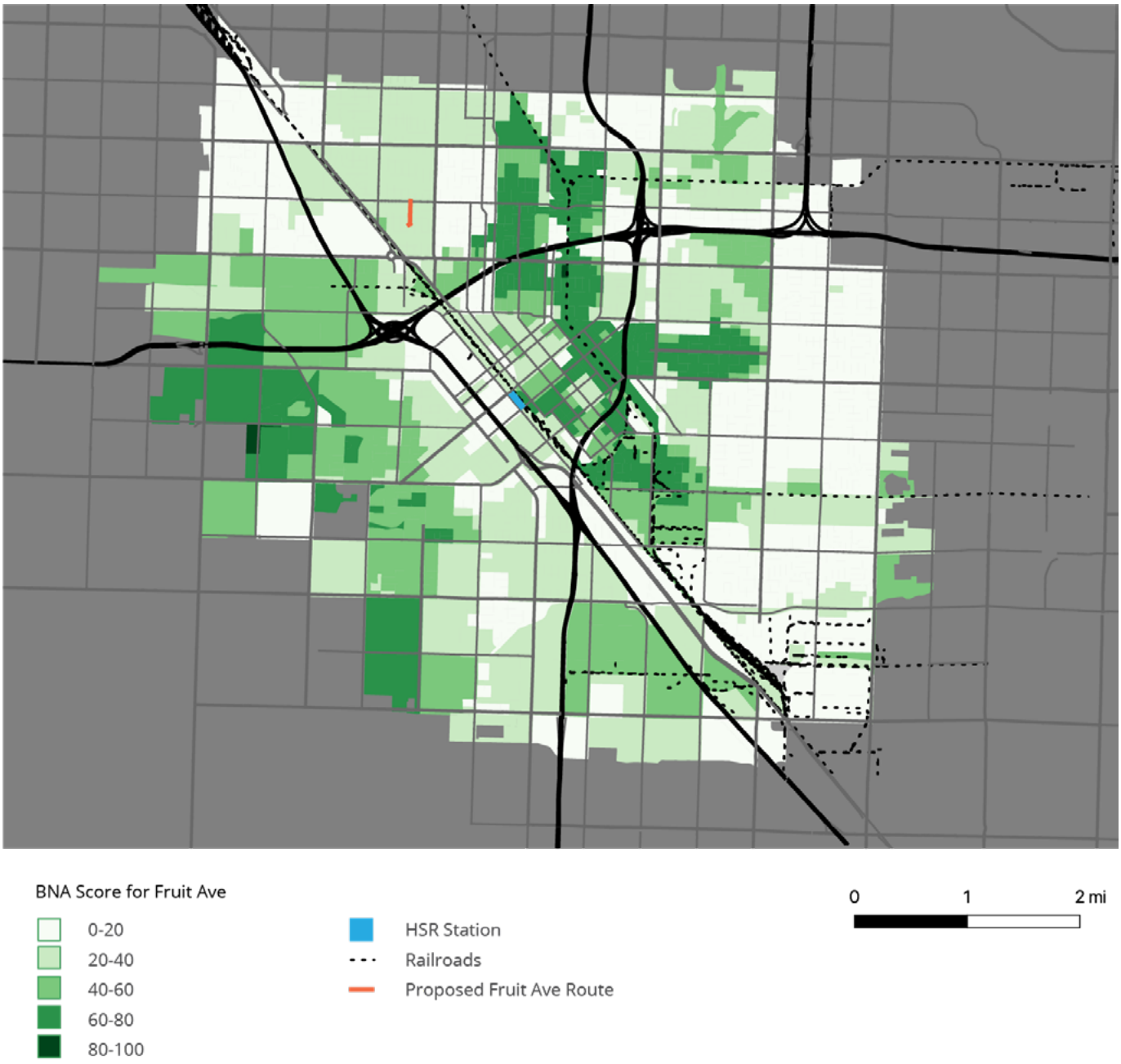

Figure 25. *BNA Scores for Proposed Fruit Ave Route*

WEST OLIVE AVE

Figure 26. *Map of Proposed West Olive Route*

The West Olive route will run from Hughes Avenue to Fruit Avenue. The route is designed to provide access for the northwestern corridor to Roeding Park, the HSR Rails-to-Trails Project and provide a crossing point over CA-99. This project will increase the BNA score of the northwest areas by providing connections to the existing low-stress network consisting in part of the Belmont project and the HSR corridor project.

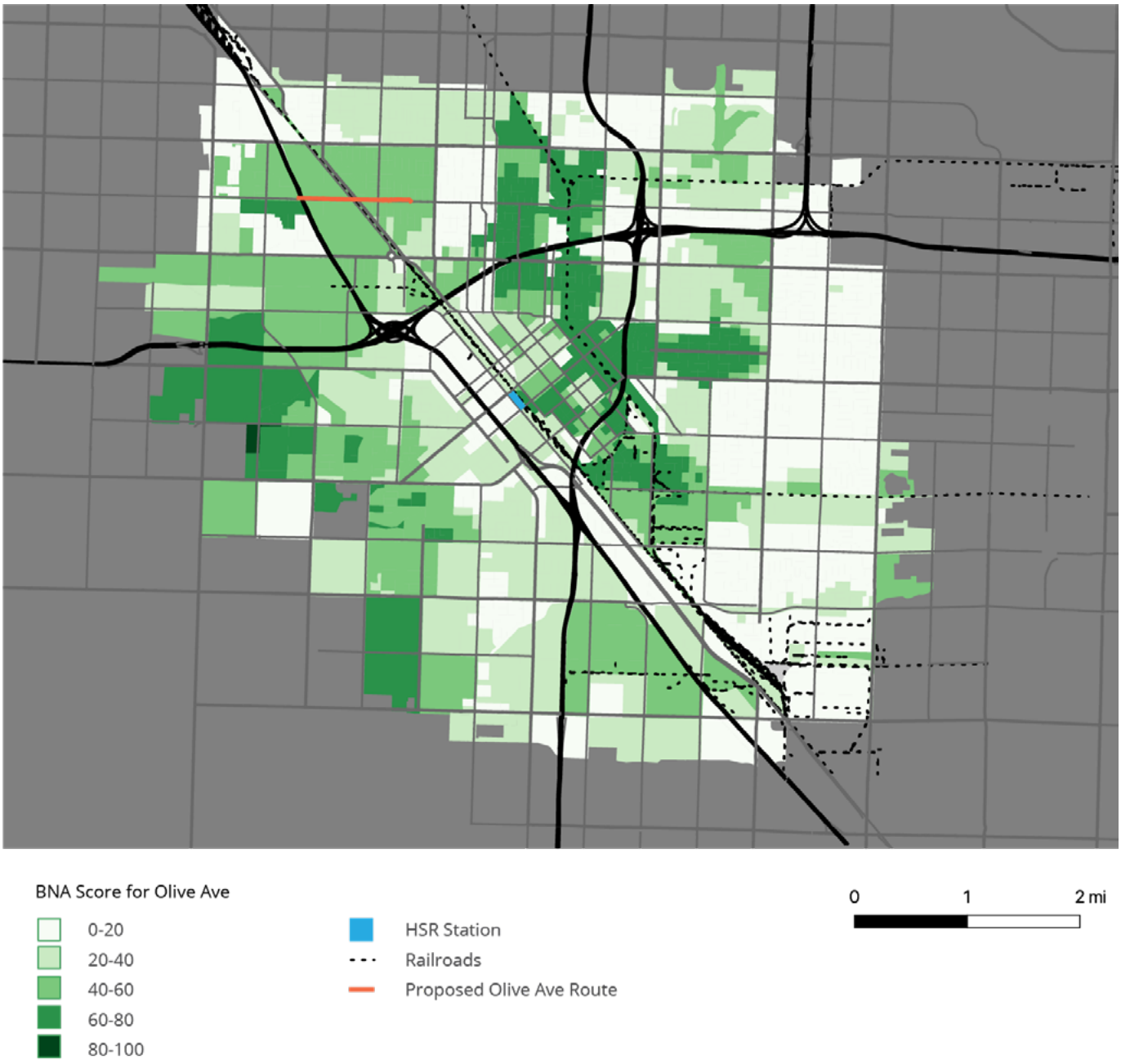

Figure 27. *BNA Scores for West Olive Ave Route*

TULARE ST

Figure 28. *Map of Proposed Tulare St Route*

The area west of CA-99 and between Fresno and Ventura currently has a low BNA score due to a lack of connectivity through high-stress corridors. By running this project from the proposed High-Speed Rail Station to East California Avenue over CA-99, a low-stress connection exists from the west to the HSR Station and the low-stress network in east downtown. This project will also connect with the HSR Rails-to-Trails project.

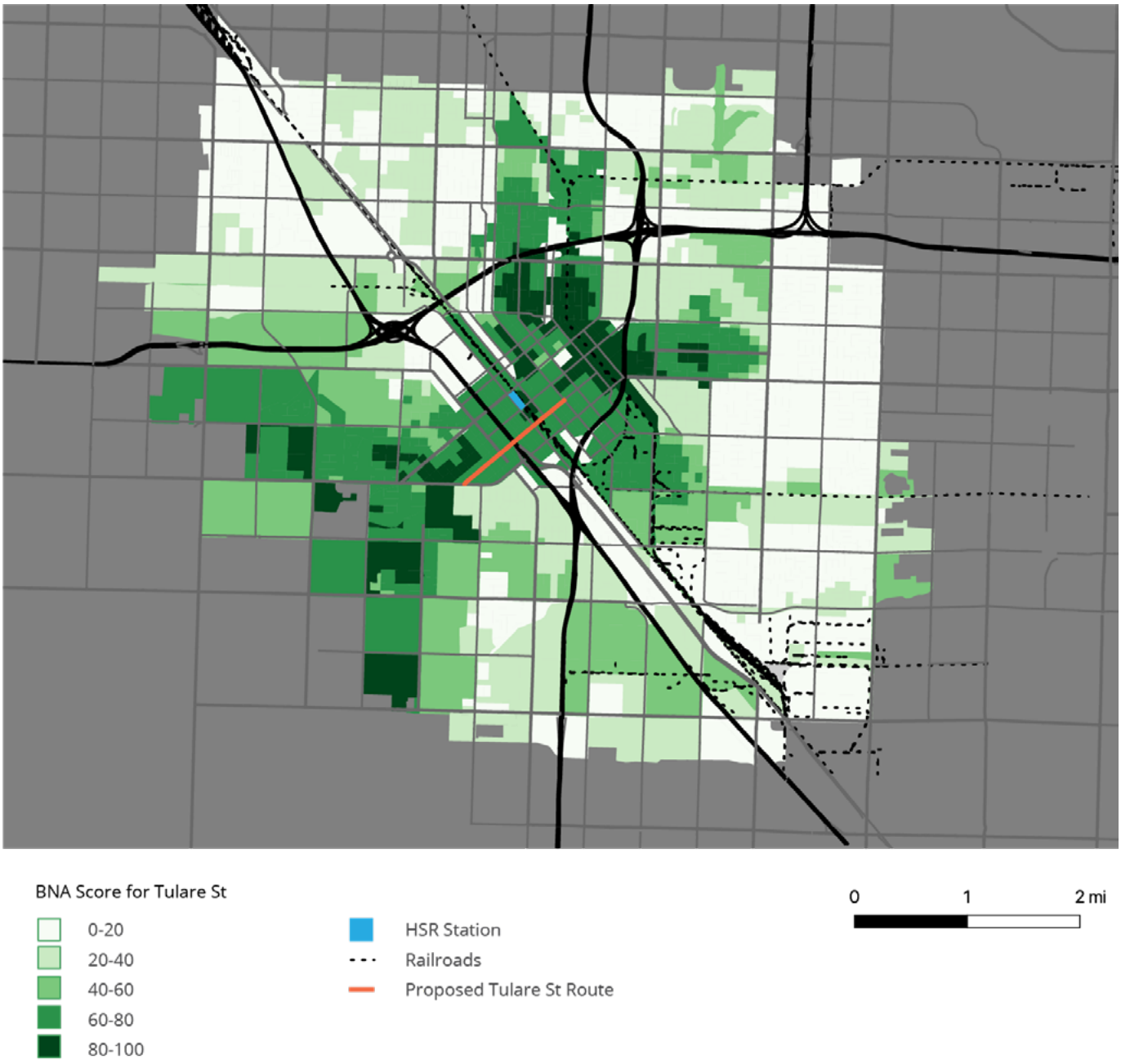

Figure 29. *BNA Scores for Tulare St Route*

FRESNO AVE

Figure 30. *Map of Proposed Fresno Ave Route*

This route will run along Fresno Avenue parallel to the Tulare St project and connect with the existing low-stress Fresno Avenue route that connects to the HSR Rails-to-Trails project.

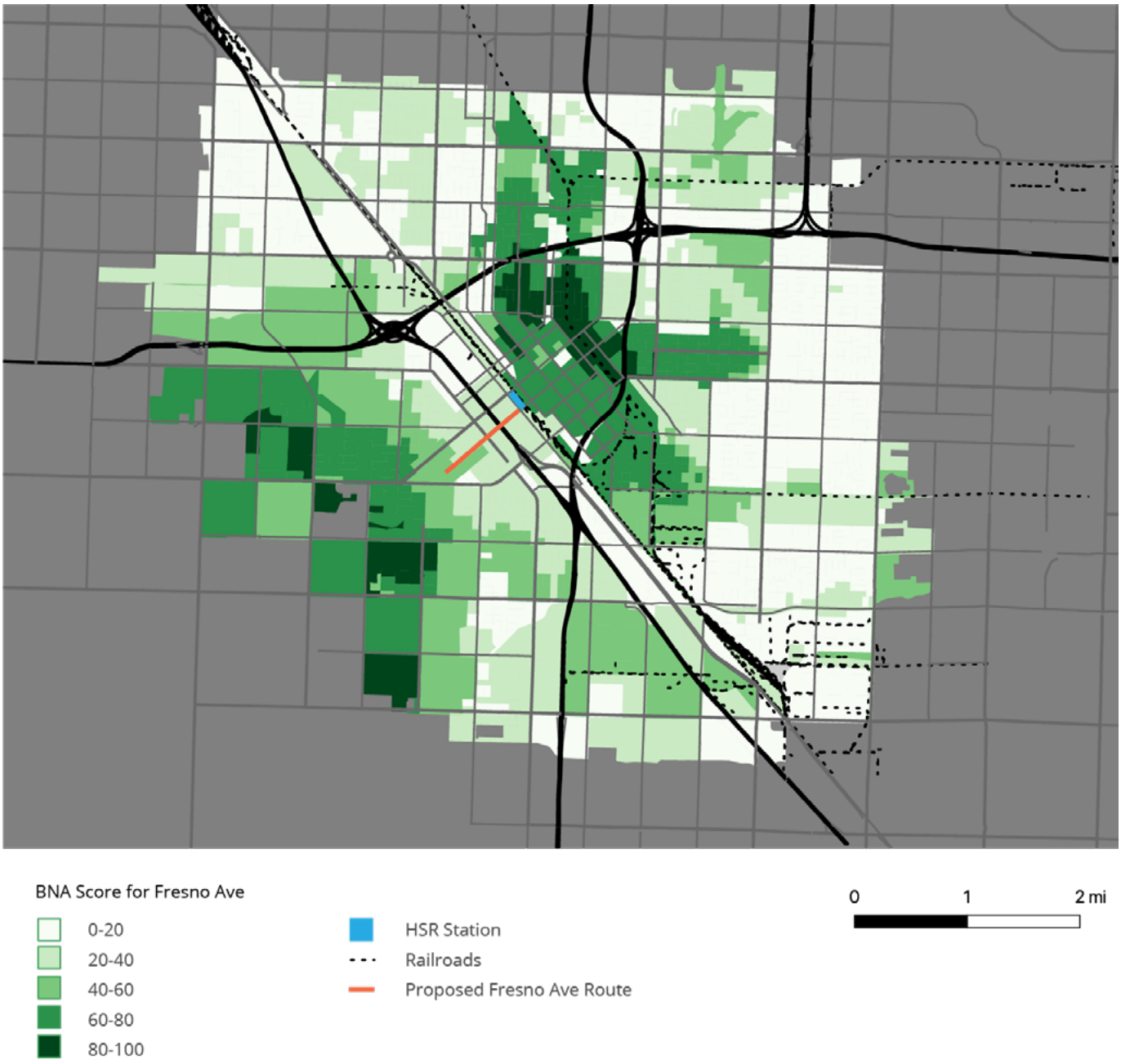

Figure 31. *BNA Scores for Fresno Ave Route*

MLK BLVD

Figure 32. *Map of Proposed MLK JR Blvd Route*

This north-south route will provide a low-stress connection from Florence Ave in the north to North Ave in the south. A middle school and clinic lie along this route. Providing low-stress connections to these services creates a higher BNA score for the southwestern corridor. The residential neighborhoods in the area will have easier access to downtown and Rails-to-Trails projects.

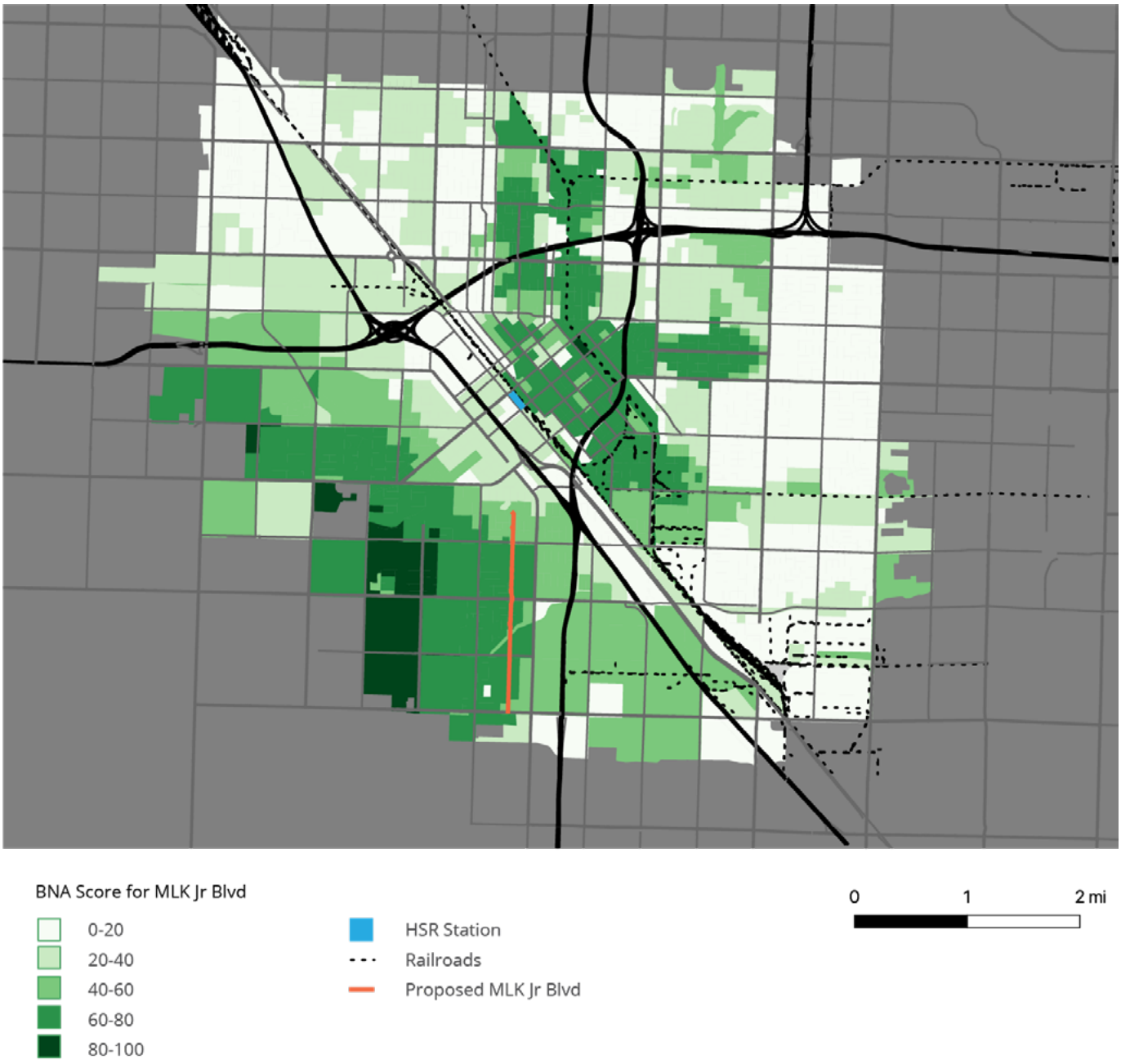

Figure 33. *BNA Scores for MLK Blvd Route*

CHURCH AVE

Figure 34. *Map of Proposed Church Ave Route*

The Church Ave project provides crossing under CA-41, CA-99, and across Golden State Boulevard. It connects with the HSR Rails-to-Trails project and ends at Calwa Park. This east-west connection is crucial for the overall connectivity of the southern portion of the city.

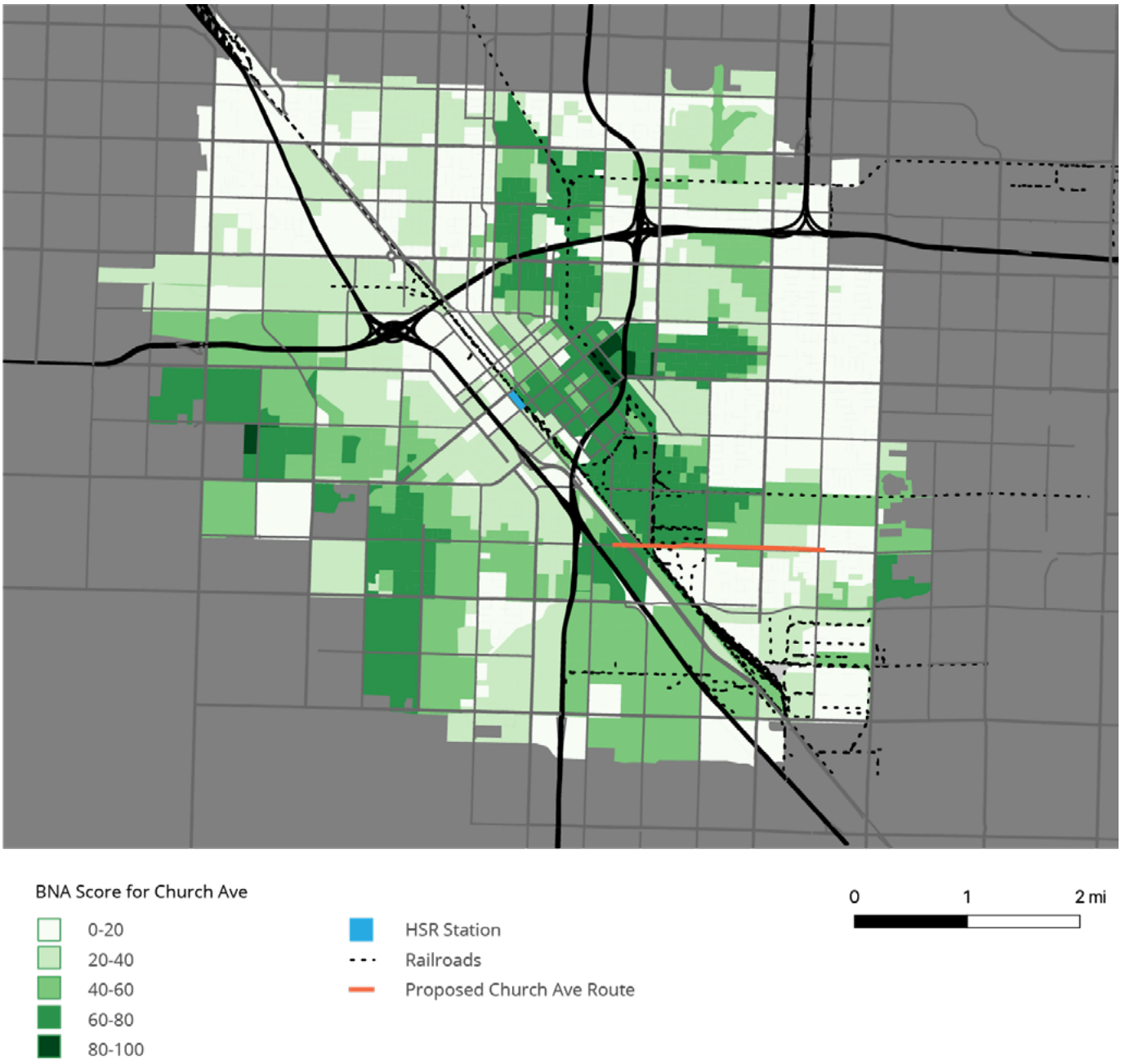

Figure 35. *BNA Scores for Church Ave Route*

VENTURA ST

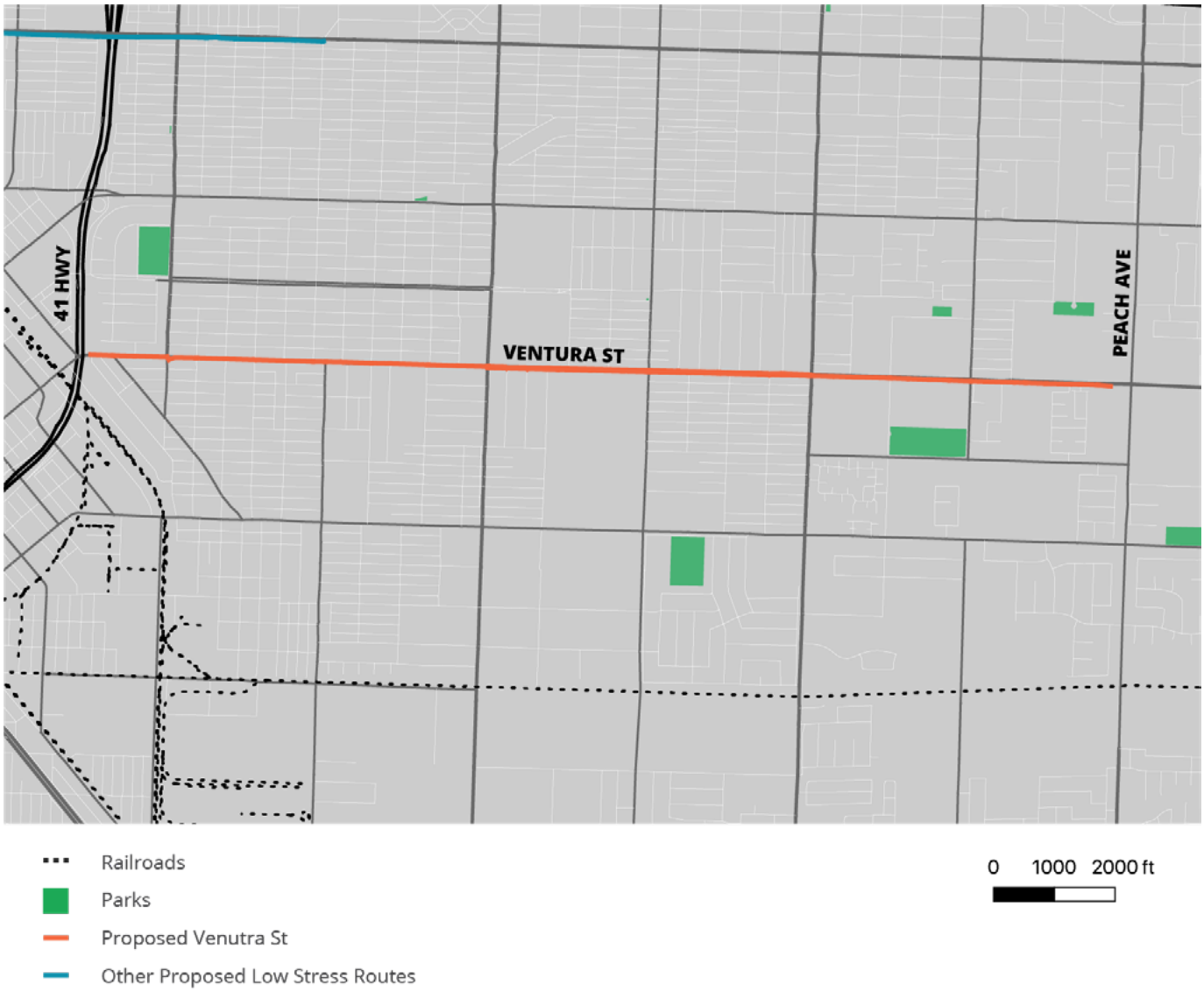

Figure 36. *Map of Proposed Ventura St Route*

This proposal stretches from the planned route along Ventura Street to Peach Avenue in the East. It connects downtown with the southeastern corridor, providing low-stress access to the commercial corridor on Chestnut Ave, an elementary school, and the Fresno county fairgrounds.

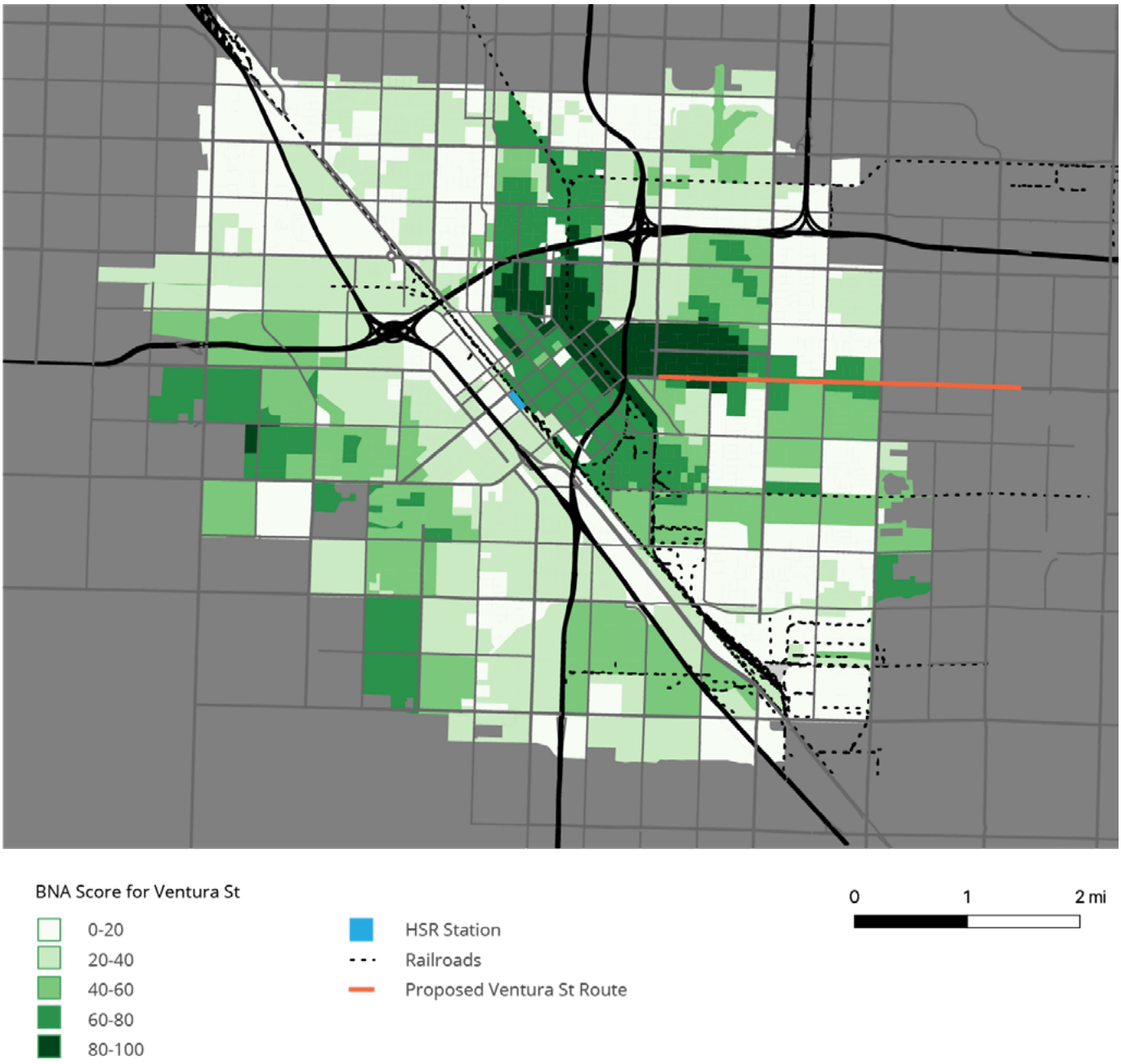

Figure 37. *BNA Scores for Church Ave Route*

IMPLEMENTATION

GENERAL CONSIDERATIONS OF IMPROVEMENTS

Implementing a bike network into an existing major street network is a complicated process. It involves identifying an overall network of connected bicycle improvements and taking action on a project-by-project basis. Specific routes may be more challenging to implement than others because of engineering, politics, or traffic considerations.

One of the most critical aspects of the implementation strategy is ongoing and proactive public involvement. Several core groups should be closely involved in the process:

1. Bicyclists (including casual adult riders and children from all demographics)
2. Non-cyclists, including active transportations users and drivers
3. Property owners whose land may be impacted by changes in channelization (e.g., elimination of parking)

Community engagement, throughout implementation, should be considered the starting point. Community feedback will prove not only vital to the implementation process but also the productive use of such improvements.

Community feedback and guidance throughout the different subparts of the street network should be considered when designing implementation. Major parts include:

- Major urban streets
- Minor urban street traffic
- Minor street/major street crossings
- Bicycle barriers
- Trail networks
- Transit connections
- Roadway bridge modifications
- Railroad crossings
- Traffic signals
- Drainage grates and utility covers
- Rural road shoulders
- Bicycle parking
- Maintenance

IMPLEMENTATION DRIVERS

Within the context of constant public participation and guidance, ensuring that the network, and its accompanying routes, are low-stress is of critical importance. Low-stress design, as noted throughout this document, should be in the driver's seat of the implementation process. Moreover, low-stress improvements must be centered in the implementation of a comprehensive network.

It is imperative, in the planning stages of implementation, that planners consider the projects in this report as part of a connected bike network. Given the existing overall street network in all types of cities, it is easy for project administrators to conform their implementation to "one-off" improvements. Understandably, this is often a reaction to source funding limitations, which only provide capital for piecemeal development. But to plan this way, as described, can prove counterproductive to the implementation of safety improvements. Local and regional agencies need to prepare in the larger part of the whole, no matter limited funding opportunities. Finally, the safest possible option should be installed immediately for the greatest impact.

QUICK AND EFFECTIVE IMPLEMENTATION

Bike projects, not to mention whole networks, can sometimes take years between the planning stage and construction. Several agencies across California are experimenting with ways to speed up the process: planning, design, approval, and environmental review are all run in tandem (where possible) to compress the delivery schedule. Decisions around materials used and flexibility in the initial design can also allow for the speeding up of projects. New state law this year signed by Governor Newsom in October 2020, SB 288, will add several climate-friendly infrastructure projects (mostly bike projects) to the CEQA exemption list. This will help prevent sustainable transportation projects from getting bogged down in labor- and time-intensive environmental review. Local agencies should take note to leverage this new law when feasible.

COST ESTIMATES

Project Name	Total Cost of Route
West Olive Avenue	$546,290.00
Tulare Street	$1,117,540.00
MLK Boulevard	$1,012,000.00
Fruit Avenue	$17,100.00
Fresno Avenue	$477,250.00
Clinton Avenue	$1,075,250.00
Church Avenue	$1,319,500.00
Ventura Street	$1,845,750.00
Belmont Avenue	$1,946,250.00
Total Network Cost	**$9,356,930.00**

POTENTIAL FUNDING SOURCES

The Fresno Active Transportation Plan is helpful in laying the basic foundation for funding sources that may be available for bicycle improvements. Rather than repeat or duplicate this groundwork, what follows is a supplement to it, particularly the ways in which funding may be more broadly accessed and secured for bike improvements.

The Road Repair & Accountability Act

The Road Repair & Accountability Act (2017) makes $5 billion a year available for transportation improvements in California. Many new state funding sources were designed for a variety of new capital transportation uses, including the use of bike improvements/facilities. Increased funding for the ATP is noted, but not for other existing and new transportation programs. For example, the State Highway Operations and Protection Program (SHOPP) and the State Transportation Improvement Program (STIP) are mentioned, but not the major influx of

new funds that will be directed there. The state ATP did receive an additional 100 million per year, but that amount pales compared to the billions in new funding for the STIP and SHOPP. These programs need to be leveraged for bicycle improvements as well.

In addition to existing programs, state transportation programs were also developed to fund local projects. Newly developed programs such as the Local Partnership Program (LPP), Solutions for Congested Corridors (SCCP), among others, are also eligible for bicycle improvements. Most of these programs allow for capital improvements and are flexible for a wide variety of bicycle enhancements.

The new largest state funding sources from this act will go to the SHOPP and Local Streets and Roads (LSR) Program. The latter aims to provide approximately $1.5 billion per year to cities and counties for basic road maintenance, rehabilitation, and critical safety projects on the local streets and roads system. Local jurisdictions should take advantage of opportunities to add bicycle lanes and other markings when resurfacing and repaving streets. The SHOPP and LSR are perfectly set up for local agencies to make financially efficient uses of maintenance funds while simultaneously implementing bicycle capital improvements. For example, state maintenance funds can target the street network in ways that can be leveraged to improve the overall street design.

Potential State Funding Sources

Although the Road Repair & Accountability Act does provide a significant source of all funding intended for transportation projects, there are also many other programs across state government that allow local jurisdictions to use bicycle improvements. Recently, the California Transportation Commission released the below table to help navigate the variety of state funding sources that also allow bicycle improvements.

PROGRAM	ADMINISTERING AGENCY	PURPOSE/DESCRIPTION
Sustainable Communities Planning Grants	Caltrans Division of Transportation Planning	The program includes $29.5 million to encourage local and regional planning that furthers state goals, including, but not limited to, the goals and best practices cited in the Regional Transportation Plan Guidelines adopted by the California Transportation Commission.
Affordable Housing and Sustainable Communities Program (AHSC)	Strategic Growth Council and Department of Housing and Community Development	The Program funds land-use, housing, transportation, and land preservation projects to support infill and compact development that reduce greenhouse gas emissions. The Program included $550M in its latest round. (California Climate Investments)
Urban Greening	California Natural Resources Agency	The Program supports the development of green infrastructure projects that reduce GHG emissions and provide multiple benefits. Must include at least one of the following: • Sequester and store carbon by planting trees • Reduce building energy use by strategically planting trees to shade buildings • Reduce commute vehicle miles traveled by constructing bicycle paths, bicycle lanes or pedestrian facilities that provide safe routes for travel between residences, workplaces, commercial centers, and schools. (California Climate Investments)

PROGRAM	ADMINISTERING AGENCY	PURPOSE/DESCRIPTION
Transformative Climate Communities (TCC)	Strategic Growth Council and Department of Conservation	The Program funds community-led development and infrastructure projects that achieve major environmental, health, and economic benefits in California's most disadvantaged communities. (California Climate Investments)
Office of Traffic Safety Grant Program	Office of Traffic Safety	The Program provides annual funds to prevent serious injury and death resulting from motor vehicle crashes so that all roadway users arrive at their destination safely. Funds can be used for bicycle and pedestrian safety
Clean Mobility Options	Air Resources Board	The Program makes $20 million available for zero emissions shared mobility projects (such as car sharing, bike sharing, and on-demand sharing) in disadvantaged and low-income communities, including some tribal and affordable housing communities (California Climate Investments)
Sustainable Transportation Equity Project (STEP)	Air Resources Board	The Program makes $2 million available for planning and capacity building grants. Funding is intended to help lowincome and disadvantaged communities identify residents' transportation needs and prepare to implement clean transportation and land use projects. The Program makes $20 million available for one to three implementation block grants to fund clean transportation and land use projects in disadvantaged communities. Funded projects will work together to increase community residents' access to key destinations so they can get where they need to go without the use of a personal vehicle (California Climate Investments)
Transit and Intercity Rail Capital Program (TIRCP)	CalSTA and Caltrans Division of Rail and Mass Transportation	The TIRCP provides grants from the Greenhouse Gas Reduction Fund (GGRF) to fund transformative capital improvements that will modernize California's intercity, commuter, and urban rail systems, and bus and ferry transit systems, to significantly reduce emissions of greenhouse gases, vehicle miles traveled, and congestion.
Local Partnership Program (LPP)	California Transportation Commission	The primary objective of this program is to provide funding to counties, cities, districts, and regional transportation agencies in which voters have approved fees or taxes dedicated solely to transportation improvements or that have imposed fees, including uniform developer fees, dedicated solely to transportation improvements. Funding includes $200M/year to improve aging Infrastructure, Road Conditions, Active Transportation, Transit and rail, Health and Safety Benefits

PROGRAM	ADMINISTERING AGENCY	PURPOSE/DESCRIPTION
Local Streets and Roads (LSR) Program	California Transportation Commission	The purpose of the program is to provide approximately $1.5 billion per year to cities and counties for basic road maintenance, rehabilitation, and critical safety projects on the local streets and roads system.
Solutions for Congested Corridors (SCCP)	California Transportation Commission	The purpose of the program is to provide funding to achieve a balanced set of transportation, environmental, and community access improvements to reduce congestion throughout the state. This statewide, competitive program makes $250 million available annually for projects that implement specific transportation performance improvements and are part of a comprehensive corridor plan by providing more transportation choices while preserving the character of local communities and creating opportunities for neighborhood enhancement.
Highway Safety Improvement Program (HSIP)	Caltrans Local Assistance/ FHWA	The Program funds work on any public road or publicly owned bicycle or pedestrian pathway or trail, or on tribal lands for general use of tribal members, that improves the safety for its users. Project maximum funding- $10M. Solicitation varies from annually to semi-annually.
State Highway Operations and Protection Program (SHOPP)	Caltrans Office of SHOPP Management	The Office of SHOPP Management is responsible for planning, developing, managing and reporting the fouryear SHOPP portfolio of projects. The Program is the State Highway System's "fix it first" program that funds repairs and preservation, emergency repairs, safety improvements, and some highway operational improvements on the State Highway System.
State Transportation Improvement Program (STIP)	California Transportation Commission	The STIP is the biennial five-year plan adopted by the Commission for future allocations of certain state transportation funds for state highway improvements, intercity rail, and regional highway and transit improvements. Local agencies should work through their Regional Transportation Planning Agency (RTPA), County Transportation Commission, or Metropolitan Planning Organization (MPO), as appropriate, to nominate projects for inclusion in the STIP.
Congestion Mitigation and Air Quality Improvement (CMAQ) Program	FHWA	The purpose of the CMAQ program is to provide a flexible funding source to State and local governments for transportation projects and programs to help meet the requirements of the Clean Air Act. The program supports surface transportation projects and other related efforts that contribute air quality improvement and provide congestion relief.

Figure 38. *Potential state funding sources from CATC's table "FUNDING PROGRAMS THAT MAY INCLUDE ACTIVE TRANSPORTATION ELEMENTS" See link for more details*

POTENTIAL LOCAL FUNDING SOURCES

City General Funds
Cities and counties may spend general funds as they see fit. Any bicycle, pedestrian, or trails project could be funded through general funds and then matched with other funds.

Business Improvement Districts
Bicycle and pedestrian improvements can often be included as part of business improvement and retail district beautification. Similar to benefit assessments, Business Improvement Districts (BIDs) collect levies on businesses to fund area-wide improvements that help businesses and improve customer access. These districts may include provisions for bicycle improvements such as bicycle parking or shower and clothing locker amenities, sidewalk improvements, and pedestrian crossing enhancements.

Benefit Assessment Districts
Bike paths, bicycle lanes, bicycle parking, and related facilities can be funded as part of a local benefit assessment district. However, defining the benefit district's boundaries may be difficult since the bikeways will have citywide or regional benefit. Sidewalks, trails, intersection crossings, and other pedestrian improvements can also be funded through benefit assessments.

Property Taxes and Bonds
Cities and counties can sell bonds to pay for bikeways, pedestrian facilities, and any amenities related to these facilities. A supermajority of two-thirds of voters in that jurisdiction must vote to levy property taxes to repay the bonds.

APPENDIX

Project Name	Length (mi)	Route Type	Cost Per Mile	Bridges	Quantity	Cost	At Grade Crossings	Quantity	Cost	Total Route Cost
West Olive Avenue	1.00	Class II	$90,000.00	Bridge, highway	1	206,290	At grade, railroad	1	250,000	$546,290.00
Tulare Street	1.15	Class III	$575,000.00	Bridge, highway	1	206,290	At grade, railroad	1	250,000	$1,117,540.00
MLK Boulevard	1.76	Class III	$575,000.00		0	206,290		0	250,000	$1,012,000.00
Fruit Avenue	0.19	Class II	$90,000.00		0	206,290		0	250,000	$17,100.00
Fresno Avenue	0.83	Class III	$575,000.00		0	206,290		0	250,000	$477,250.00
Clinton Avenue	1.87	Class III	$575,000.00		0	206,290		0	250,000	$1,075,250.00
Church Avenue	1.86	Class III	$575,000.00		0	206,290	At grade, railroad	1	250,000	$1,319,500.00
Ventura Street	3.21	Class III	$575,000.00		0	206,290		0	250,000	$1,845,750.00
Belmont Avenue	2.95	Class III	$575,000.00		0	206,290	At grade, railroad	1	250,000	$1,946,250.00
										$9,356,930.00