Caltrans Bay Area
Bike Plan Update 2025

Caltrans

District 4

Director's Message

Caltrans is pleased to present the *Caltrans Bay Area Bike Plan Update* for District 4. This update builds on the 2018 Caltrans District 4 Bike Plan, the first-of-its-kind for Caltrans to identify and prioritize bicycling needs on and across the State Transportation Network. Our Bike Plan aligns with our four core principles of safety, equity, climate action, and prosperity while advancing Caltrans Director's Policy 37 on Complete Streets, which states that all transportation projects funded or overseen by Caltrans will provide comfortable, convenient, and connected complete streets facilities.

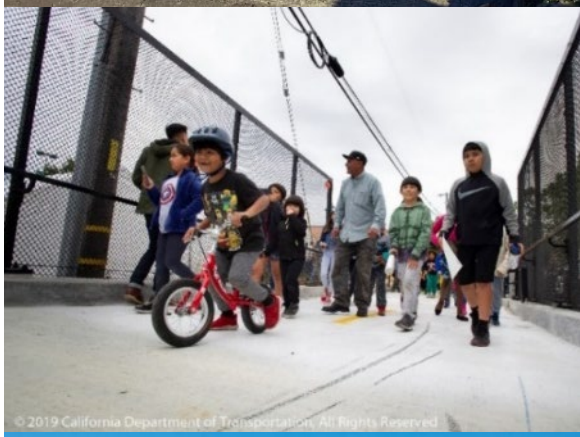
Since the adoption of our Bike Plan, collaborative efforts between Caltrans District 4 and regional partners have led to significant enhancements in the area's bicycle infrastructure. These developments have not only improved safety and accessibility but have also promoted a more connected network in the region. Despite these advancements, challenges still remain in this space. Many neighborhoods still experience disconnection, and certain State Highways continue to act as barriers rather than conduits for community interaction. To address these issues, our ongoing commitment focuses on reimagining these roadways as integral parts of the community fabric. By doing so we aim to transform them into assets that promote equity, accessibility, and integration within the regional bike network.

The updated Bike Plan represents a collaborative effort involving local and regional agencies, stakeholders and community members. We look forward to continuing this partnership to create a healthier and more sustainable Bay Area where everyone, of all ages and abilities, can bike comfortably and conveniently for their everyday needs.

DINA A. EL-TAWANSY
District 4 Director

Table of Contents

1. Purpose and Overview of Plan



Statewide Context

The Caltrans Bay Area Bike Plan implements and builds on the vision statement and goals in *Toward an Active California*, the statewide bicycle and pedestrian plan, as well as Directors Policy 37, which directs all projects funded or overseen by Caltrans to provide comfortable, convenient, and connected complete streets facilities. The Plan will be used by Caltrans, as well as regional and local agency partners, to identify and prioritize bicycling needs along and across the State Highway System to create a Bay Area where people of all ages, abilities and incomes can safely, conveniently, and comfortably bike for their transportation needs.

Purpose

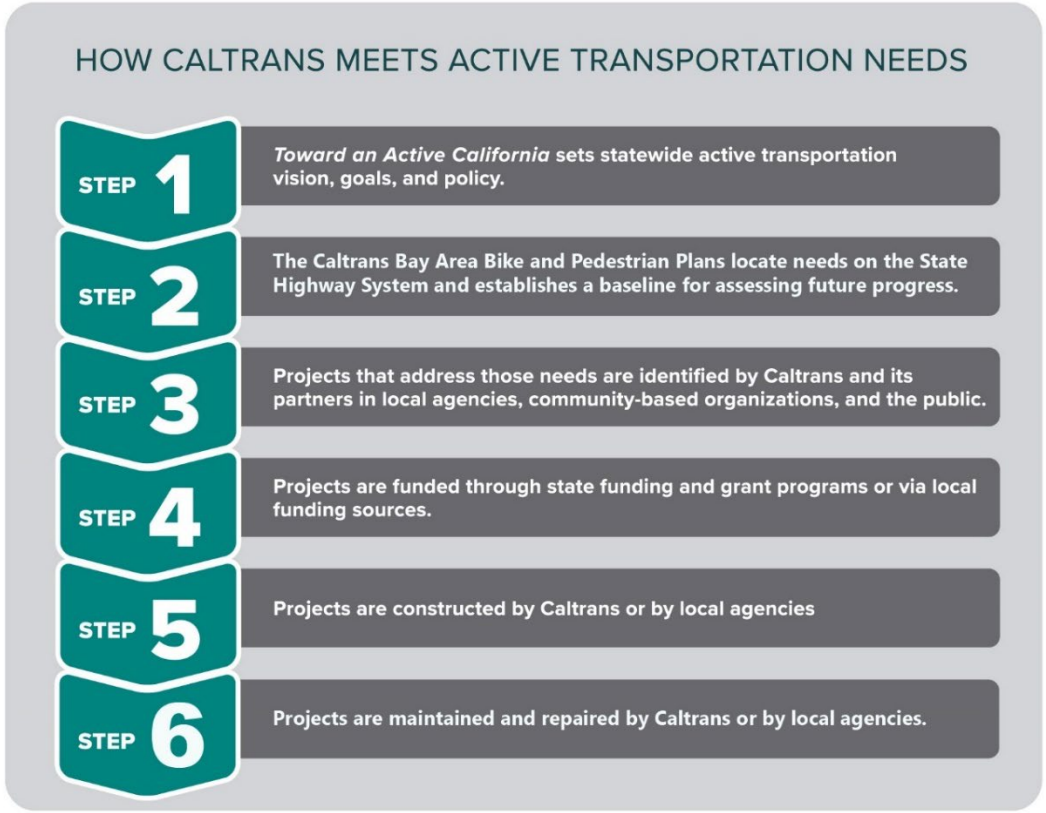
While most bicycle travel in the Bay Area takes place on local roads and trails, many biking trips require crossing or biking along the State Highway System. Historically, much of the State Highway System was designed primarily for motor vehicle throughput during peak demand, resulting in overbuilt and high speed roadways. The State Highway System often acts as a barrier to bicycling. With roughly 1,400 centerline miles of State highways throughout the Bay Area, Caltrans plays an important role in connecting and expanding the regional bicycle network and removing these barriers.

The State Transportation Network includes State highways, multimodal streets, frontage roads, bikeways, sidewalks, busways, park-and-ride lots, and other facilities owned and operated by Caltrans. They serve as main streets, provide access to destinations people visit every day, and are often the primary routes connecting communities. This Plan identifies challenges and needs related to biking along and across these facilities. It recognizes that people of color, people with lower incomes, people with disabilities, and older people all experience disproportionately higher crash risks than other groups do (Sanchez, Stolz, 2003). This Plan also recognizes Caltrans' role in eliminating traffic fatalities. This Plan seeks to make the Bay Area biking network more comfortable, convenient, and connected, making it possible for everyone, of all ages and abilities, to bike more often by identifying needs and priorities for future investments. When more people are able and encouraged to bike, especially for short trips and to access transit, our communities experience improved air quality, health benefits, equity, quality of life, and economic vitality.

Summary

The Bay Area Bike Plan is comprised of three elements:

- This Report provides an overview of conditions for people biking on Caltrans roadways today, a look at locations in the Bay Area where significant needs exist for people biking and recommendations for interim and preferred long-term improvement types for each location-based need. A description of the methodology for the planning analysis is currently in revision and will be made available on the District 4 page of the Caltrans Active Transportation Plan website upon completion.
- A companion online Story Map provides an opportunity to view and interact with a series of District 4 maps that highlight the bicycle issues and opportunities described in this report. The Story Map is available at the Story Map website.
- A supplementary Appendix that includes a summary of best practices, a full list of location-based needs, and other supplemental material.



2. Terms and Definitions

The list below defines key terms used throughout the Caltrans Bay Area Bike Plan

Freeway: Highways with full access control, interchanges providing connections to other routes, and two or more motor vehicle lanes in each direction.

Highway: A State Highway System (SHS) route which may be comprised of roads, streets, parkways, and connected infrastructure elements such as on- and off-ramps, bridges, and tunnels.

State Highway System: State owned and legislatively designated highway network that supports the movement of people and goods across California. The California SHS includes a variety of highway infrastructure assets, including but not limited to pavement lane miles, bridges, tunnels, and culverts.

State Transportation Network: includes the network of multimodal roads and highways, parallel paths, frontage roads, bike lanes, sidewalks, park & ride lots, and other facilities not directly on a SHS mainline that Caltrans owns and operates.

Interchange: A traffic interchange is a combination of ramps and grade separations at the junction of two or more highways for the purpose of reducing or eliminating traffic conflicts and increasing traffic capacity.

Bicyclist: This document uses the term bicyclist broadly to include people riding traditional bicycles and a wide variety of other human powered devices that use typical bicycle facilities. These include electric-assisted bicycles, recumbent bicycles, bicycles or tricycles adapted for use by people with disabilities, and many others, such as scooters.

Pedestrian: In this document, the terms pedestrian and walk are applied broadly to travel by all users of sidewalks, including people walking or rolling using a mobility assistance device such as a walker, stroller, or wheelchair.

Class I Multi Use Path: A bicycle and pedestrian facility in a completely separated right of way from the roadway with crossflow by motorists minimized.

Class II Bike Lane: Provides a striped lane for one-way bike travel on a street or highway.

Class III Bike Route: A right of way that is shared with motorists which may include a shared travel lane, a shoulder, or even a shared sidewalk.

Class IV Separated Bikeway: A Class IV bikeway (separated bikeway) is a bikeway for the exclusive use of bicycles and includes a vertical separation required between the separated bikeway and the through vehicular traffic.

3. Vision and Goals

In alignment with the vision in the statewide plan, Toward an Active California, and with Caltrans' Director's Policy 37, this Plan establishes methods for identifying and evaluating bicycle needs on and across the State Highway System. It focuses on increasing safety, mobility and equity.

The Bay Area Bike Plan Update represents an important next step in delivering active transportation infrastructure across the region. A statewide effort has established common data and methods for identifying and evaluating pedestrian and bicycle needs along, across, and parallel to the State Highway System. Each Caltrans district has completed its own active transportation plan, using a statewide methodology while also tailoring data, analysis, and priorities to reflect its unique context and values. For each of these plans, District staff charted a public process that focused on increasing equity, strengthening community partnerships, and improving connections between the state and local networks. Caltrans Bay Area is the first to update one of these plans, presenting an opportunity to track implementation, engage stakeholders, identify areas of improvement, and explore new paths for implementation. This Update builds on the original Bike Plan, while also evaluating the District's performance in implementing priorities identified in the 2018 plan. This Plan not only evaluates where the District has been successful, but also where the District needs to improve.

Goals

Toward an Active California sets a policy framework around broad goals, which guided the development of this Plan. This Plan modified these goals, which are detailed below, to be consistent with recently adopted Caltrans Policy, including Director's Policy 37, Director's Policy 36, and Caltrans' Equity Statement.

Toward an Active California Vision Statement

By 2040, people in California of all ages, abilities, and incomes can safely, conveniently, and comfortably bike for their everyday transportation needs.

Director's Policy 37

All transportation project funded or overseen by Caltrans will provide comfortable, convenient, and connected complete streets facilities for people walking, biking and taking transit or passenger rail.

SAFETY

Prioritize the elimination of fatal and severe bicycle involved collisions

MOBILITY

Increase biking by providing comfortable, convenient, and connected bikeways

EQUITY

Eliminate barriers to biking, so that everyone has access to high quality biking infrastructure no matter their race, socioeconomic status, identity or where they live

4. Progress Report

This section provides an overview of the Bay Area's implementation progress made between 2018 and 2023 as part of Caltrans District 4's 2018 Bike Plan. The 2018 Bike Plan was the first Caltrans District-wide bike plan to evaluate bicycle needs on and across the Bay Area's State Transportation Network. In the past 5 years, Caltrans has made progress through policy, performance metrics, planning, and infrastructure developments. While the District has made considerable headway, challenges impede progress in developing more bicycle improvement projects.

Policy

Policies that support complete street design are critical to implementing a comfortable bike network for all ages and abilities. In the past 5 years, Caltrans has made some critical progress to make sure policy and design guidance align with statewide goals. These efforts are summarized below.

Director's Policy 37

In December 2021, Caltrans announced its new Director's Policy on Complete Streets (DP-37). The policy directs all transportation projects funded or overseen by Caltrans to provide comfortable, convenient and connected facilities for people walking, biking and taking transit. This policy is a key step to advancing Caltrans' commitment to Complete Streets. The policy differs from Deputy Directive 64, which it superseded, by requiring projects to include complete street elements unless it can justify their exclusion.

DIB 89-02

Originally issued in 2015 and updated in 2022, Class IV Bikeways Guidance Design Information Bulletin number 89-02 (DIB 89-02) is Caltrans internal guidelines on designing Class IV bikeways, that supplements the Highway Design Manual biking design guidance to include Class IVs. The 2022 update expanded guidance for separated bikeway design considerations.

DIB 94

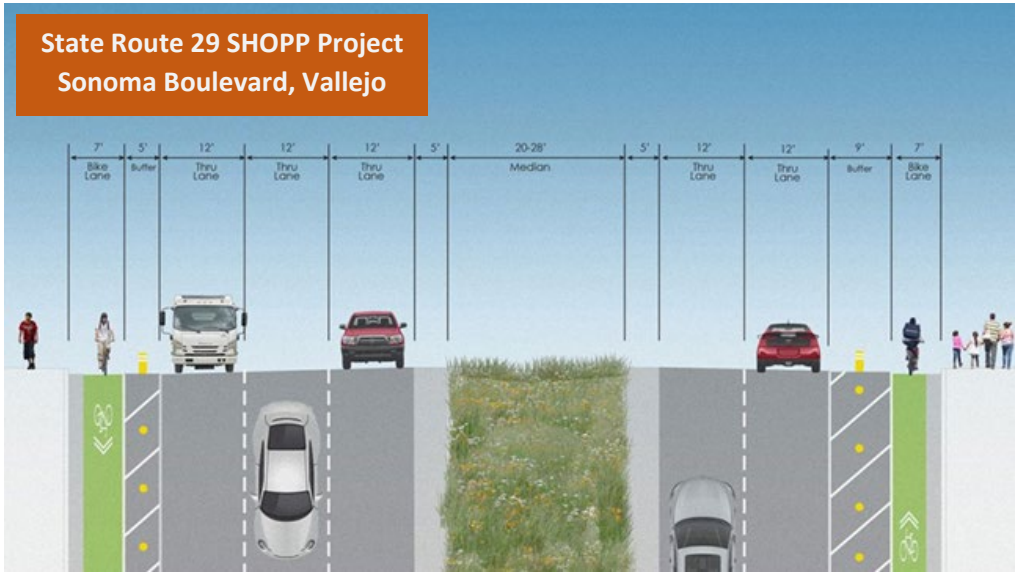
In January 2024, Caltrans issued Design Information Bulletin number 94 (DIB 94). This Complete Streets Design Guidance supplements the Highway Design Manual by allowing for revised standards in certain projects (depending on place and facility type), which may include narrower

lane widths and shoulder widths without needing to go through the Design Standard Decision Document Process. The policy may speed up complete street projects and allow more bike lanes and separated bike lanes to be built on the State Highway System. While this bulletin was adopted recently, it has already been implemented on key projects. A repaving project in Mountain View and Palo Alto on El Camino Real will use this policy to increase the width of the bikeway and reduce adjacent travel lane width.

Performance Metrics

The State Highway System Management Plan (SHSMP) lays out a performance-driven and integrated management plan for California's State Highway System. The SHSMP serves as a logical extension to the California Transportation Asset Management Plan (TAMP), establishing asset classes, performance measures and targets pursuant to California Senate Bill (SB) 486 as adopted by the California Transportation Commission. Starting in 2021, bicycle and pedestrian location-based needs identified in Caltrans District Active Transportation Plans were incorporated as complete streets performance targets in the SHSMP.

New and existing multimodal facilities identified in the Bike Plan include Class I multi-use paths, Class II bike lanes, Class II buffered bike lanes, and Class IV separated bikeways, as well as facilities that address the need to cross the State Highway System. These performance targets are assets identified for development, not assets built. The 2024 State Highway Operations and Protection Program (SHOPP), Caltrans' fix it first program has identified 79 miles of bikeways to be built in District 4, the most bikeways the District will have ever built in a SHOPP cycle. Bikeways are planned in the 2024 SHOPP for many improvements identified as top-tier priorities, including portions of Mission Blvd (SR 238), Tiburon Blvd (SR 131), Rio Vista's SR 12 and Calaveras Blvd (SR 237). These bikeways will close key gaps in the regional bikeway network.



2022 SHOPP "Build New" for District 4

205,128 ft Class II Bike Lanes
24,710 ft Class IV Separated Bikeways
5,977 Linear Feet Sidewalks
27 (each) Crosswalks

2024 SHOPP "Build New" for District 4

2,640 ft Class I Multi Use Path
146,799 ft Class II Bike Lanes
115,805 ft Class IV Separated Bikeways
8,052 Linear Feet Sidewalks
33,196 Linear Feet Crosswalks

SHOPP numbers as of initial program development

Coordination

Caltrans Planning staff regularly coordinate with Project Management, Transportation Safety and other Caltrans functional units to ensure bicycle needs are incorporated into every project possible, including repaving projects. Projects are tracked, from project scoping through 100% Design. Pedestrian and Bicycle Branch staff regularly review project submittals and attend project development meetings to ensure robust bike improvements are included in projects and to provide design guidance on bicycle needs. These staff are critical to ensuring high-quality bikeway projects are included in all Caltrans projects.

Complete Streets Decision Document

The Complete Streets Decision Document (CSDD) was implemented in February 2021 to record key decisions to incorporate complete streets facilities in projects on the State highway system. Complete Streets Decision Documents are required for most SHOPP and oversight projects.

Development

The 2018 District 4 Bike Plan identified 587 bicycle location-based needs. Progress has been made on 316 of these 587 needs, including planning, project development, or construction. A plurality of these projects was funded by the SHOPP. Of the 587 needs, 81 involve projects that have been completed. These 81 projects include interim improvements (i.e., lower cost or quick-build version of a planned facility), partial implementation (i.e., buildout of a facility through a segment of a prioritized corridor only), as well as full project implementation.

Bikeways Built

From 2018-2024, Caltrans and partner agencies installed approximately 18.7 miles of bikeways on or across the State Highway System. In addition to bikeways, 7 bicycle/pedestrian overcrossings or undercrossings, 3 temporary demonstration "pop-up" bike lanes were completed and 4 "road diet" projects (the repurposing of excess road width for bicycle facilities) were installed on or across the State Highway System. A map highlighting a selected summary of these bikeways is shown in Figure 2.

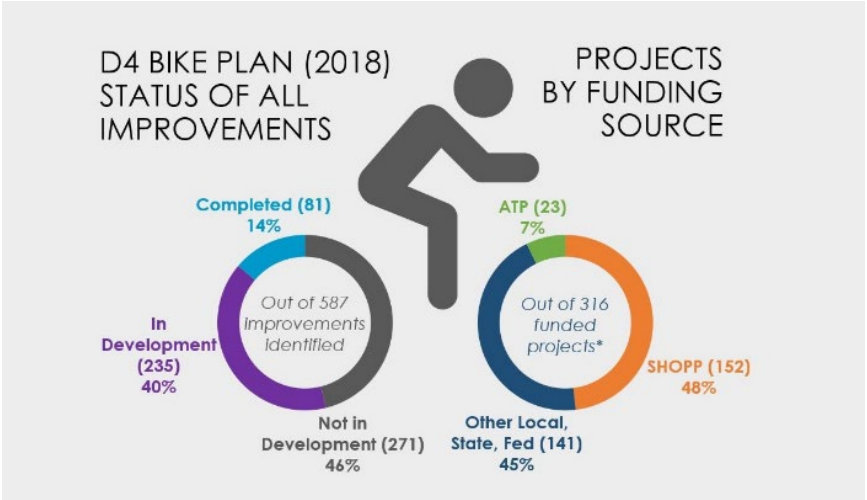
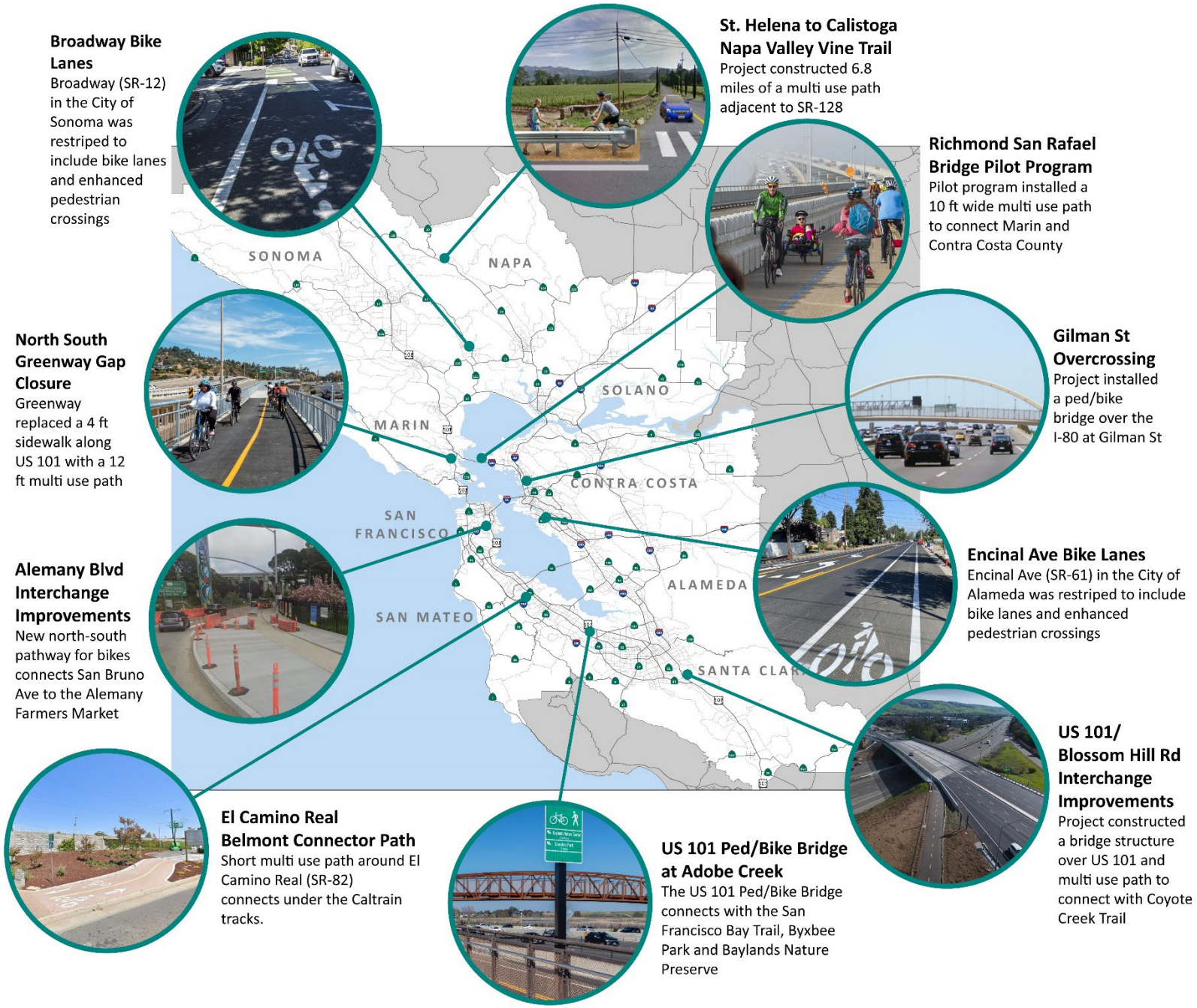


Figure 1: D4 Bike Plan (2018) Status of All Improvements

Figure 2. Selected summary of Bikeways built or under construction since 2018



Bikeways Built on and across the State Highway System since 2018

7 Overcrossings or Undercrossings

11.0 miles of Class I paths

6.0 miles of Class II Bike Lanes

1.7 miles of Class IV Separated Bikeways

4 Road Diets

3 "Pop Up" Bikeways

Achievements

Caltrans has made some critical progress in implementing new bikeways in the Bay Area, building out the bike network and implementing needs identified in the 2018 Bike Plan. Caltrans has made this progress utilizing a number of different techniques that have been critical to recent bike network growth, these methods are summarized below.

Utilizing SHOPP

Caltrans has been successful in incorporating bikeways with repaving project through the SHOPP. More Class II and Class IV bikeways than ever before are included in upcoming SHOPP projects, including new bikeways on Mission Blvd (SR 238), Tiburon Blvd (SR 131), Rio Vista's Hwy 12 (SR 12) and Calaveras Blvd (SR 237). Repaving roadways is done every 10 -25 years, depending on the roadway volumes and funding availability. This provides a consistent process for incorporating bikeways throughout the region.

Repurposing Travel Lanes or On-street Parking

Caltrans has also been successful in repurposing excess road width for bicycle facilities, also called "road diet" projects. For example, since 2018, Caltrans has implemented Class II bike lanes via road diets on Encinal Avenue (SR 61) in Alameda County and Petaluma Avenue (SR 116) in Sonoma County. Repurposing vehicle travel lanes to bike facilities is challenging, in that it often requires detailed analysis which needs to be identified early on in project development process. Caltrans has also recently incorporated bikeways on El Camino Real (SR-82), a critical north-south corridor, by repurposing parking. This process takes extensive coordination with local jurisdictions and stakeholders.

Solutions for Congested Corridors

Caltrans has also been successful in implementing bikeways through the Solutions for Congested Corridors Grant. The Solutions for Congested Corridors Program (SCCP) is a statewide, competitive program that provides funding to reduce congestion throughout the state. Since its inception in 2018, the program has shifted from funding primarily freeway projects with no bicycle, pedestrian or transit elements, to primarily funding transit, bicycle and pedestrian projects. The latest cycle funded the East Bay Greenway, a critical bikeway that will connect communities and transit in the East Bay.

Caltrans Led Reactive Safety Project

Caltrans has begun initiating Bike Reactive Safety Project to build critical bikeways with identified collisions. The Biking Safety Monitoring Program was critical in the development of bikeways on El Camino Real in the City of Palo Alto. This program has also been used in initiating bikeways on El Camino Real in the City of Santa Clara. These bikeways represent a key step in Caltrans initiating bikeways and addressing bicycle-involved collisions on and across the State Highway System.

El Camino Real (SR 82), Palo Alto

Implementation Challenges

While Caltrans has made critical progress in policy and bikeway implementation, key challenges remain. A summary of these challenge areas are detailed below. These areas were identified through stakeholder feedback, staff insights, and an analysis of existing bikeway conditions, including a collision analysis and level of stress analysis, detailed in sections 6 and 7 of this report.

Rise in Traffic Collisions

California and the rest of the nation are seeing an increase in fatalities and serious injuries on their roadways, especially bicycle and pedestrian collisions. While Caltrans is committed to reducing collisions, implementing the safe systems approach across over 1,200 lane miles of the State Highway System in the Bay Area is a long process.

Design Standards

Design standards can be a barrier to robust bicycle improvements. While Design Information Bulletin number 94 (DIB 94) is an important step, interchange design standards restrict shoulder conversions to Class IV bikeways or require completing a Design Standard Decision Document (DSDD), which is often a long process. This process adds uncertainty to project timelines and can escalate costs.

Oversight Projects

The Caltrans oversight process adds time and costs to projects initiated by local jurisdictions. The Design Standard Decision Document (DSDD) and the permit process can be long, especially for quick-build safety projects. Smaller jurisdictions may not have the staff capacity to navigate the oversight process which can add uncertainty to project timelines.

Public Engagement

Public engagement for Caltrans led projects tends to not be as robust as partner agency projects. Caltrans tends to start outreach during the environmental phase, while starting engagement efforts during the project initiation phase may provide more robust opportunity for feedback. Caltrans also tends to not have as much information about upcoming projects available on their website, specifically SHOPP projects, including what bicycle and pedestrian improvements are included in each project. Engagement also tends to be inconsistent, with some Caltrans led projects completing more extensive engagement than others.

Standalone Bike Mobility Projects

Limited dedicated bike projects are initiated by Caltrans. Bike/ped improvements are mostly added on to projects initiated for highway and motor vehicle improvements or maintenance. This leads to key gaps in the bicycle and pedestrian transportation network that could increase mobility.

Maintenance Issues

Stakeholders and the public have voiced their concern that maintenance on Caltrans right of way can be challenging. Caltrans sometimes delegates its maintenance for bicycle and pedestrian facilities to local agencies who may not have the capacity to upkeep facilities. The contents of maintenance agreements aren't well known to public jurisdiction staff. Maintenance also has challenges related to not having the right equipment to sweep Class IV bikeways, which require smaller vehicles than standard street sweepers. Maintenance concerns are sometimes rushed at the end of the design phase, when discussion and engagement on maintainability and longevity may be better resolved in the early stages of planning.

Operational Demands

State right of way is constrained by existing development and/or environmental sensitivities, so it's often necessary to remove existing motor vehicle lanes in order to add in dedicated, low-stress bikeways. The lack of clear, objective documentation for how Caltrans will determine what level of traffic delay to accept if it improves active transportation mobility results in some bicycle improvements being delayed or canceled based on operational speculation or staff-level objections.

Robust Biking Improvements in SHOPP Projects

While State Highway Operations and Protection Program (SHOPP) has provided an important funding source to providing bicycle infrastructure it has also seen major challenges. Caltrans implementation of complete streets tends to be piecemeal and opportunistic. Robust intersection improvements are lacking. Funding constraints in the SHOPP restrict materials used to lower quality. Constrained budgets, timelines, and value engineering may remove complete streets elements from scope as a way to reduce costs and time.

Other Funding Constraints

Limited dedicated funding sources for bike and pedestrian projects lead to key gaps in the active transportation network. Closing many key bike and pedestrian gaps will require an extensive investment in quality infrastructure. As project costs escalate, complete streets elements are sometimes reduced to keep projects on budget. Funding constraints also prioritize incremental improvements, when fulfilling Caltrans' vision of a convenient and comfortable bike network would require a comprehensive infrastructure investment. Additionally, a key bicycle and pedestrian source of funding, the ATP (Active Transportation Program), saw a significant reduction in funding during the 2025 cycle. This program is already oversubscribed, funding less than 10% of the projects submitted.

5. Public Engagement

The Caltrans Bay Area Bike Plan Update was guided and informed by input received through public and stakeholder engagement process with the goal of collecting input from a broad cross-section of Bay Area residents and local partners.

Public and stakeholder engagement was integrated into the plan and informed the development of the plan by:

- Confirming the vision, goals, and purpose of the Bike Plan.
- Gathering information about bike riding habits.
- Educating the public and stakeholders about existing conditions, progress made to date on Bay Area bicycle facilities, projects in development, preferred bicycle treatments, and ways to get involved in developing the plan.
- Gathering information from the public and stakeholders regarding desired bikeway locations, infrastructure designs, and current barriers to biking.
- Reaching consensus on needs, prioritization methodology and bikeway design preferences with advocacy groups and county agencies.

Caltrans used a variety of tools, venues, and platforms to conduct education and information sharing, gather input, and publicize the planning effort. Caltrans reached out to three primary groups for input on the development of the Bike Plan Update: the public, partner agencies and other stakeholders, and internal Caltrans divisions. The methods Caltrans used are summarized in the next page.

How the Engagement Was Conducted

Technical Advisory Committee

The Bike Plan Update Technical Advisory Committee was composed of County Transportation Agency, MTC staff, bike advocates, and key Caltrans staff. The Working Group guided development of the Plan and provided input and support for public engagement. This group also ensured the Bike Plan's recommendations aligned with local plans and aided coordination efforts.

Online Engagement

An online survey was posted that solicited over 1,800 responses, from Spring -Fall 2023. The survey was posted on Caltrans D4 Twitter, Instagram, and the BABike subreddit as well as included on a postcard handed out in over 6,000 Bike to Work Day bags. The online survey gathered info on local cyclists' habits and where they would like to see improvements prioritized.

In Person Outreach

District staff tabled at 10 different events to solicit public feedback including Bike to Work Day events, Rich City Rides bike ride, San Jose Calle SJ, Niles Canyon Stroll and Roll, Bike the Bridges and the Napa Bike Fest. Engaging with local cyclists about their local needs brought insight to the plan's recommendations and issues cyclists have with the State Highway System.

Stakeholder Engagement

District staff also presented to standing active transportation committees at the regional, county, and local levels throughout the Bay Area to provide updates and receive input from local agency partners and advocates. Sixteen presentations were completed as part of this plan update.

What We Heard

Over 1,800 responses were collected on the public survey as well as additional comments from the public at in-person events and stakeholders at public meetings. The web map, survey, and other events provided interactive opportunities for the public to weigh in on key issues or bicycling preferences. Common themes across outreach platforms include:

- **Safety.** A clear theme from the outreach was that safety is a priority. Both traveling along the State Highway System and crossing were reported as challenging.
- **Connectivity**. Connecting to facilities across the State Highway System was important to surveyed bicyclists.
- **More separation from traffic.** The public made it clear that bikeways separated from traffic are the preferred bikeway type, such as the bridge bike paths and the Napa Valley Vine Trail.

Sample Comments

"Bike infrastructure should be more convenient."

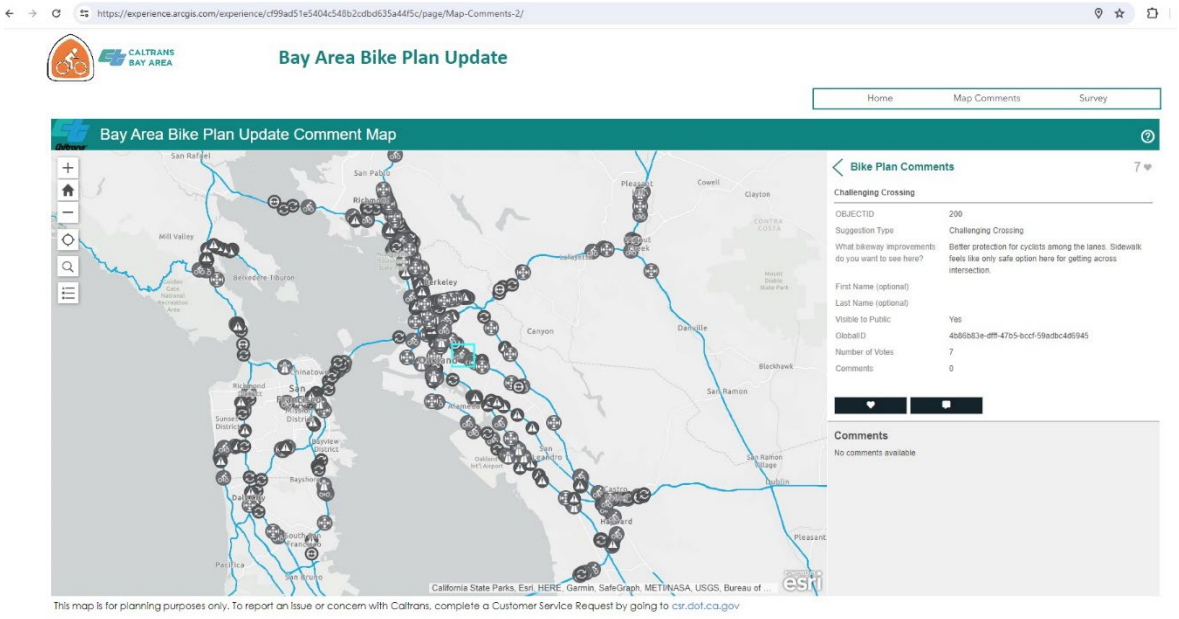
"Would like separated lanes, want to avoid biking on streets with cars to avoid fumes, hitting car doors, and inattentive drivers."

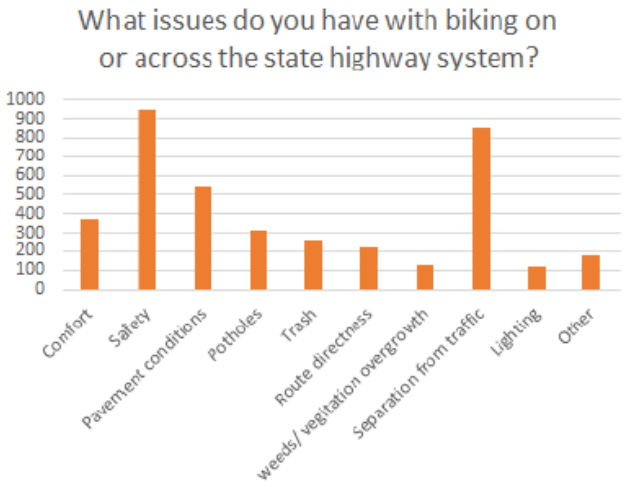
"These roads are far too scary to bike along, but many are also very difficult to cross."

"Low number of freeway crossings"

"Not enough shoulder for bikes to be away from cars"

"My largest challenge with cycling on and around the Caltrans roadways is connectivity with the surrounding trails and bike paths."





6. Existing Conditions

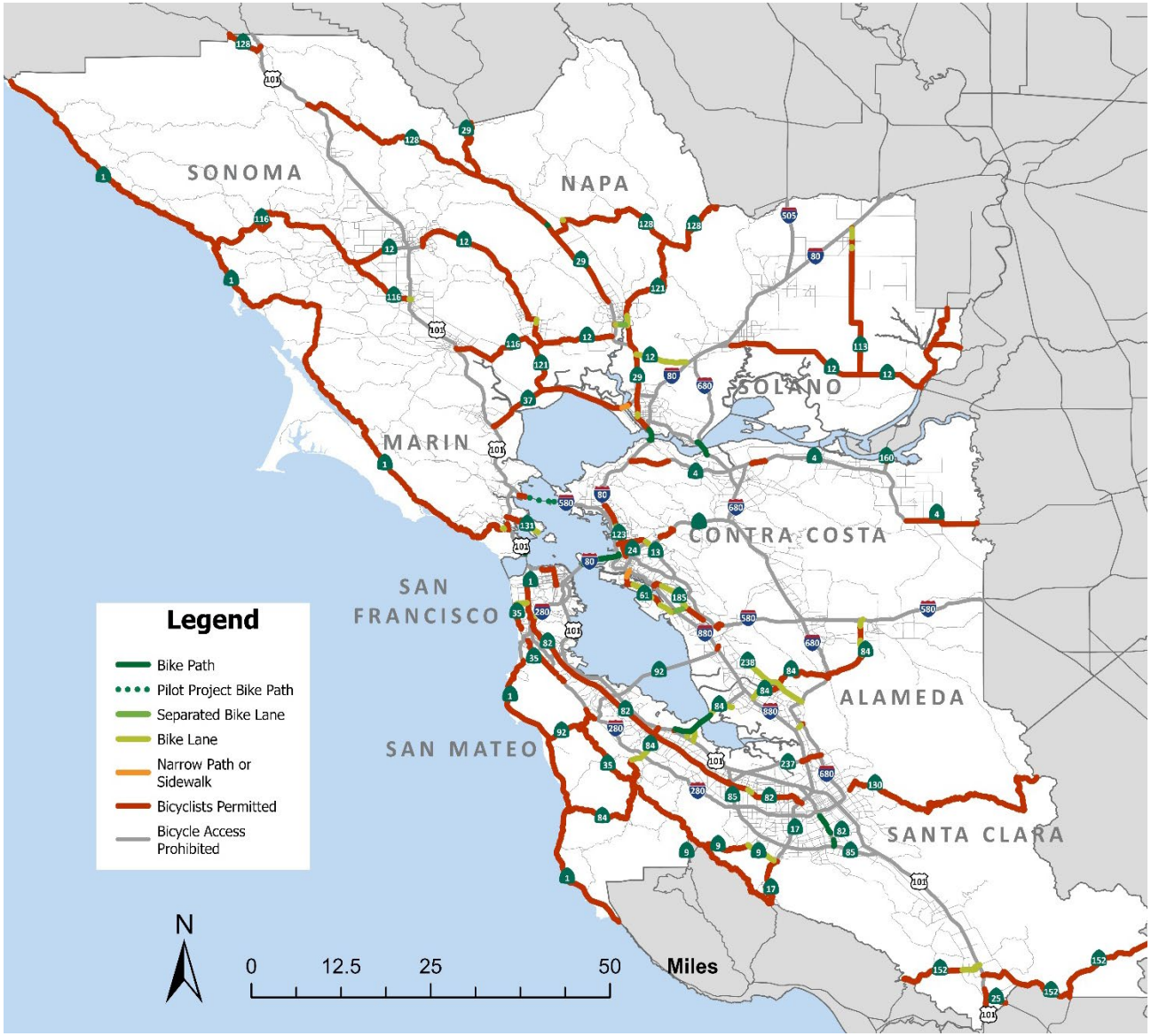
This section details the existing state of bicycle infrastructure on the State Highway System in the nine-county Bay Area. Figures 3 and 4 detail the exiting bicycle network with total miles of classification as well as a map that details their locations. The needs of people bicycling within the Bay Area are diverse and dependent on an individual's level of experience, comfort, and confidence. To understand the needs of people bicycling in the Bay Area, this section examines several data sources including a Level of Traffic Stress analysis to identify locations within the existing street network that may attract or deter people from riding bicycles (further detail outlined below), community input on challenges to bicycling on the State Highway System gathered from public outreach events and the project website and collision data as described in the section 7.

Figure 4 Existing Bikeways by Length

Facility Type	Length in Miles
Bike Path	18.5
Pilot Project Bike Path	4.3
Separated Bikeway	2.0
Bike Lane	46.2
Narrow Path or Sidewalk	1.6
Bicyclists Permitted	746.9
Bicycle Access Prohibited	673.2

Note: Length in centerline miles

Figure 3 Existing Bikeways on the State Highway System



Note: The above map only includes bicycle facilities on the State Highway System, and that are owned and operated by Caltrans. Parallel facilities that are owned and operated by a local agency are not included.

Physical Challenges and Barriers

Below outlines the main categories of bikeway challenges and barriers on and across the State Highway System.

High-Stress Bicycle Routes

Many roads on the State Highway System are high-speed, high-volume, and high-stress routes. This limits potential bicyclists to experienced and fearless riders who are comfortable riding alongside high volumes of fast-moving vehicles. Most conventional routes lack any bikeway infrastructure, some with limited or no shoulder. Cyclists riding with limited or no shoulder may experience hazards such as potholes, driveway conflict, or non bicycle friendly drainage grates.

Stressful Conventional Route Crossings

Many intersections on conventional highways (non-freeways or expressways) lack dedicated bicycle infrastructure and may be stressful for cyclists to cross. As local agencies have built out their comfortable bicycle networks, these bike routes may cross Caltrans facilities, which are often higher stress and create barriers. A collision analysis, detailed in the next sections, showed that intersections are the most common locations for collisions, suggesting a need for more bicycle infrastructure at intersections crossing the State Highway System.

Interchange Crossing Needs

Crossing freeway interchanges can be uncomfortable and stressful, forcing cyclists to cross multiple streams of high-volume and high-speed traffic at uncontrolled crossings. Often interchanges either have no bicycle infrastructure, painted shared-lane markings (sharrows), or Class II bike lanes that expose cyclists to high levels of traffic stress.

Freeway Separated Crossing Needs

Freeways often cut through urban areas, creating discontinuous local bike networks. Freeways often have long stretches without an available crossing, some more than a mile apart, which increases out-of-directional travel. These locations would benefit from new connections, such as bike/pedestrian overcrossings, or undercrossings. Existing older separated crossing are often designed for pedestrians only, or may contain numerous switchbacks that discourage bicycle usage.

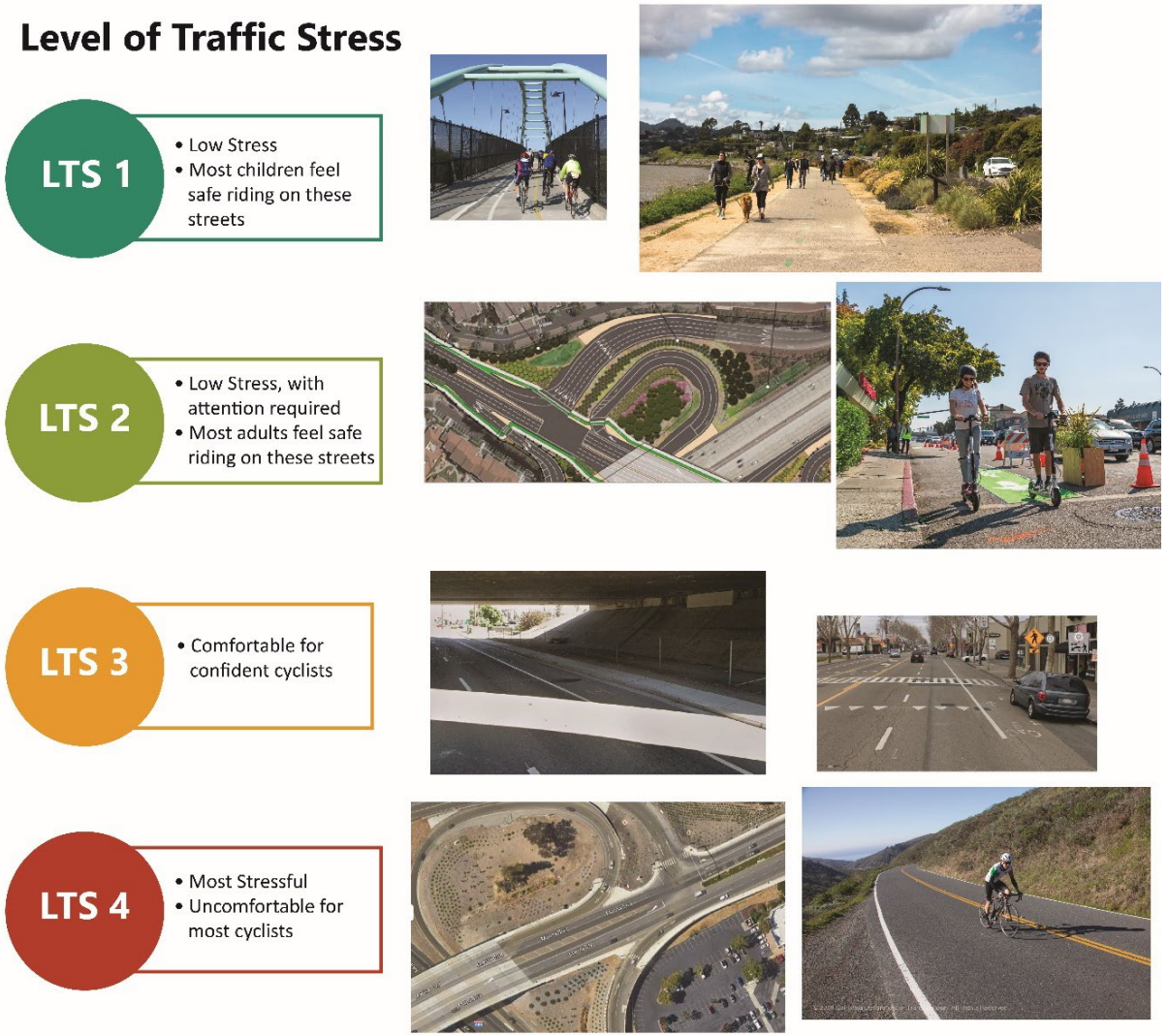
An inventory of challenges and barriers to biking in the Bay Area was used as the basis for identifying location-based needs on the State Highway System, see Section 7 and the D4 Bike Plan Update Storymap.

Level of Traffic Stress

Level of Traffic Stress (LTS) is an approach that quantifies the amount of discomfort that people feel when they bicycle close to traffic. The LTS methodology was developed in 2012 and first published in a report by the Mineta Transportation Institute at San José State University.

The LTS methodology assigns a numeric stress level to streets and trails based on attributes such as traffic speed, traffic volume, number of lanes, frequency of parking turnover, ease of intersection crossings and others. The most desirable bicycling score, LTS 1, is assigned to facilities that would be suitable for most children to ride or inexperienced adults riding bicycles. LTS 1 also typically applies to multi-use paths that are separated from motorized traffic. LTS 2 are roads that could be comfortably ridden by the general adult population. The higher levels of traffic stress, LTS 3 and LTS 4, correspond to facilities with high speeds, high traffic volumes with low separation for bicyclists. These facilities are uncomfortable for the majority of the population, and indicate a need for higher quality biking infrastructure to make it a place where more people will feel comfortable riding.

A continuous and connected low-stress network is essential for bicyclists of all ages and abilities to travel comfortably throughout the network



Existing Level of Traffic Stress on and Parallel to Caltrans Facilities

As part of this Bike Plan Update, Level of Traffic Stress (LTS) was calculated on the State Highway System, based on available data. This was done to assist with assessing bicycle needs and gaps. Figure 5 illustrates the LTS for Caltrans roadways throughout the Bay Area.

The analysis found that most of the State Highway System has a LTS 4, with about 83% of state routes where bikes are permitted with an LTS uncomfortable for most cyclists. This is a result of the State Highway System's speeds, with most roads in excess of 40 mph. Roads with speeds 35 mph or greater require a Class I or Class IV facility to be a LTS 1 or 2. About 14% of the State Highway System has a LTS 1, the lowest amount of traffic stress. Notable facilities with LTS 1, include the bike paths on Caltrans owned and operated bridges, such as the Bay Bridge, Carquinez Bridge, and Dumbarton Bridge. Facilities in the LTS analysis were also calculated as LTS 1 when there is an adjacent bike path, even if the bicycle facility isn't owned or operated by Caltrans, such as the Joe Rodota Trail, Highway 1 Coastal Trail, and the Grizzly Island Trail.

Figure 6: Percent of Level of Traffic Stress on and Parallel to the State Highway System where Bicyclists are Permitted

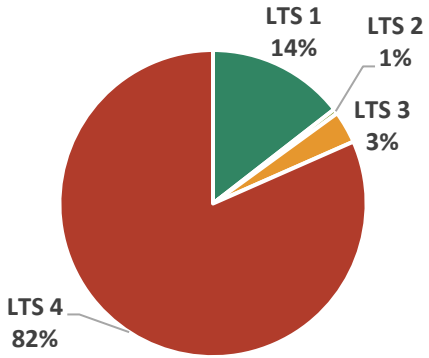
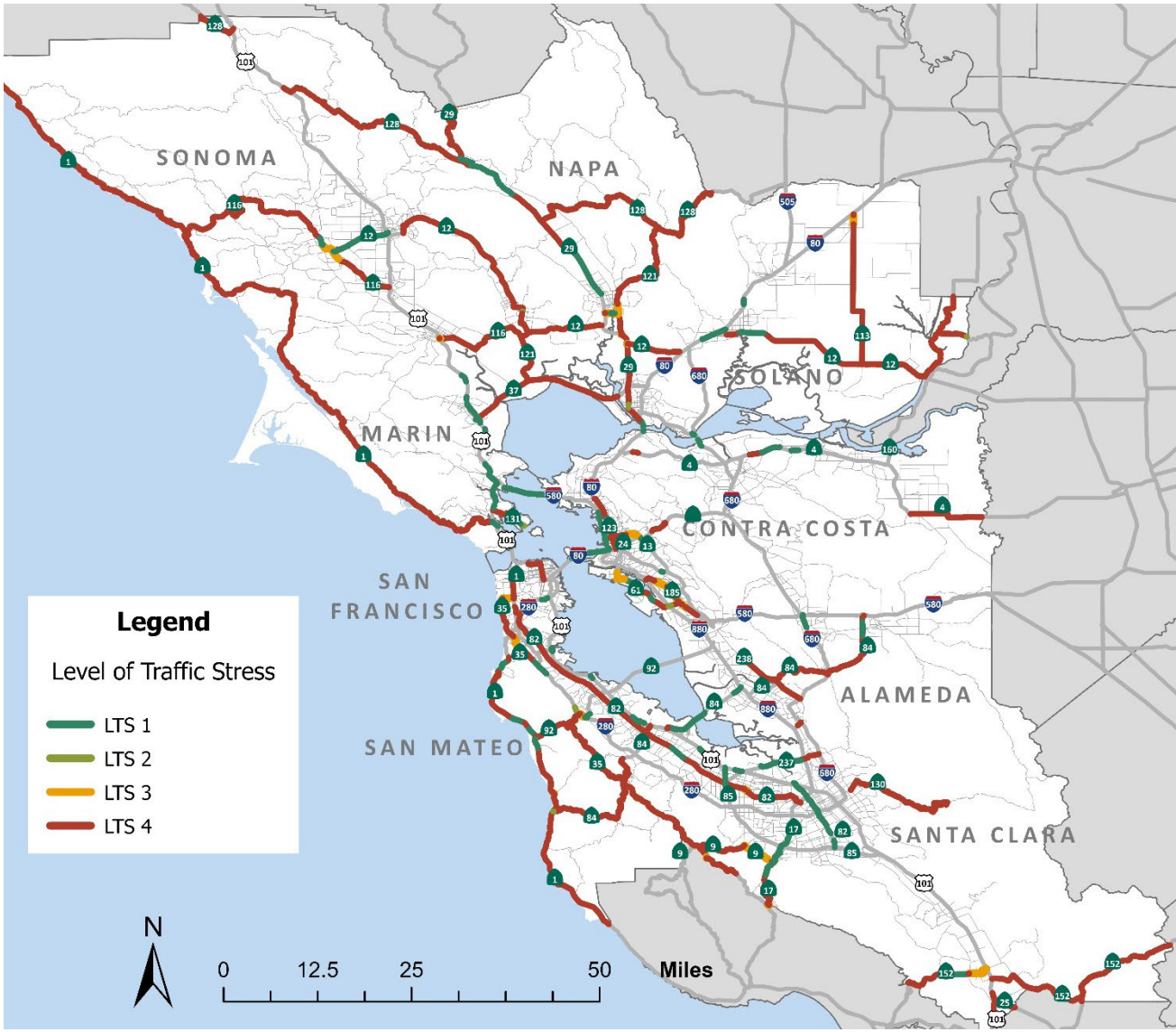


Figure 5: Level of Traffic Stress on and Parallel to the State Highway System



Note: The above map includes bicycle facilities on the State Highway System and bicycle facilities directly parallel to the State Highway System (approximately 100 ft from the State Highway System), including facilities that are not owned and operated by Caltrans.

Existing All Ages and Abilities Network on or Parallel to the State Highway System

As identified in Director's Policy 37, it is Caltrans policy to provide "comfortable, convenient, and connected complete streets facilities" for people walking and biking, which will only be possible through a major expansion of the All Ages and Abilities Network, either on state roadways or along parallel routes.

The "all ages and abilities" concept strives to serve all users- regardless of age, gender, race, or ability and inclusive of the mobility needs of children, older adults, and people with disabilities- by embodying national and international best practices related to traffic calming, speed reduction, universal design, and roadway design to increase user safety and comfort, as well as accessibility for people with disabilities.

Figure 7. All Ages and Abilities Network on or parallel to the State Highway System

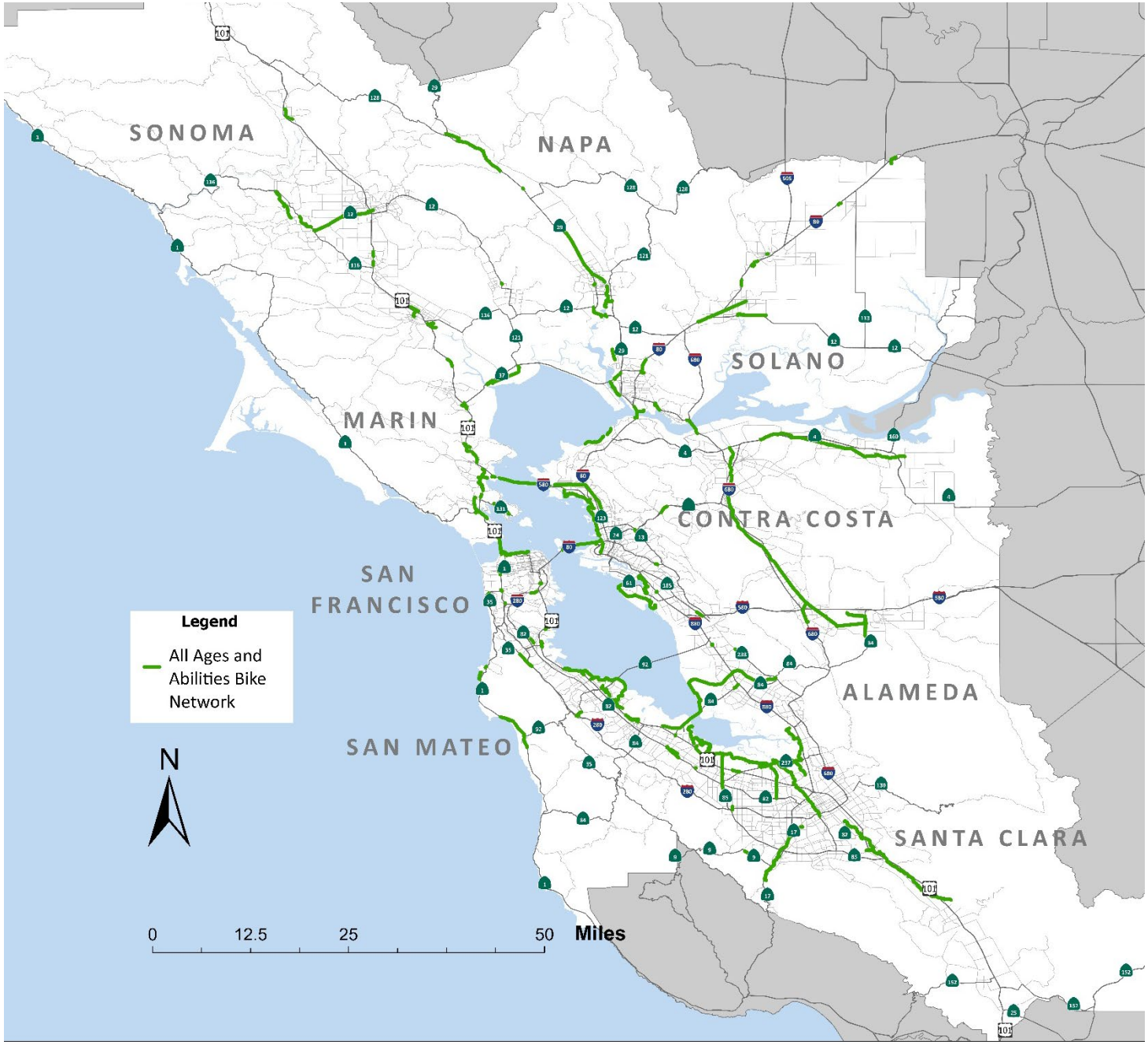


Figure 7 identifies the existing All Ages and Abilities bikeway network in the Bay Area on or parallel to the State Highway System. The current network is approximately 337 miles long. Recent additions to this network include the SMART Pathway segments parallel to US-101 in Marin and Sonoma Counties, the Napa Valley Vine Trail segments adjacent to SR-29 in Napa County, and the Richmond-San Rafael Bridge Path on I-580.

In 2022, Caltrans Bay Area (District 4) completed a Bike Highway Study to identify opportunities for developing a network of long-distance bicycle highways throughout the Bay Area that would further build out the network. Several projects identified in the study are in development, and will become major additions to the All Ages and Abilities Network including Class IV separated bikeways on San Pablo Ave/SR-123 in Oakland and Emeryville, Class IV bikeways on 13th Street in San Francisco (running below the U.S. 101 right of way), bikeways along El Camino Real (SR-82) and the East Bay Greenway.

However, amidst this growth in the Bay Area all ages and abilities network, key gaps at the intersections remain crucial, underdeveloped parts of some segments. Some trails lack key connections across the State Highway System, reducing their utility and convenience. Intersections are also the places where the most vehicle-bike conflicts occur. In the past 5 years, three bike fatalities occurred on trail facilities crossing the State Highway System. On many streets, large turn radii and wide lanes may encourage drivers to make sweeping, fast turns. These designs can increase exposure and risk for people walking and biking, reduce the comfort of the bike network, and discourage cycling. As Caltrans Bay Area (District 4) works to make streets safer and more welcoming for bicyclists of all ages and abilities, intersections remain a key priority.

7. Needs Analysis

Need Identification

The primary purpose of this planning effort is to establish a prioritized list of "location-based needs," or specific locations along the State Highway System where infrastructure investments would most benefit people bicycling and best achieve the goals identified in Toward an Active California. These needs were identified through public outreach, local jurisdiction bike plans, stakeholder outreach, gaps in the existing all ages and abilities network, and locations with a history of collisions. This list will help assess which needs might be best suited to move into the project development process over time.

In addition, Caltrans collected data to identify needs through partner and public surveys and other engagement efforts. The feedback was used to confirm assumptions made about the potential needs identified from the local plans, and will be used to inform the project development process in the future. This information is available for review on the online Story Map. The result of this analysis is a map and list of individual location-based needs at specific locations where gaps or barriers may exist for people biking along or across the State Highway System.

Prioritization Methodology

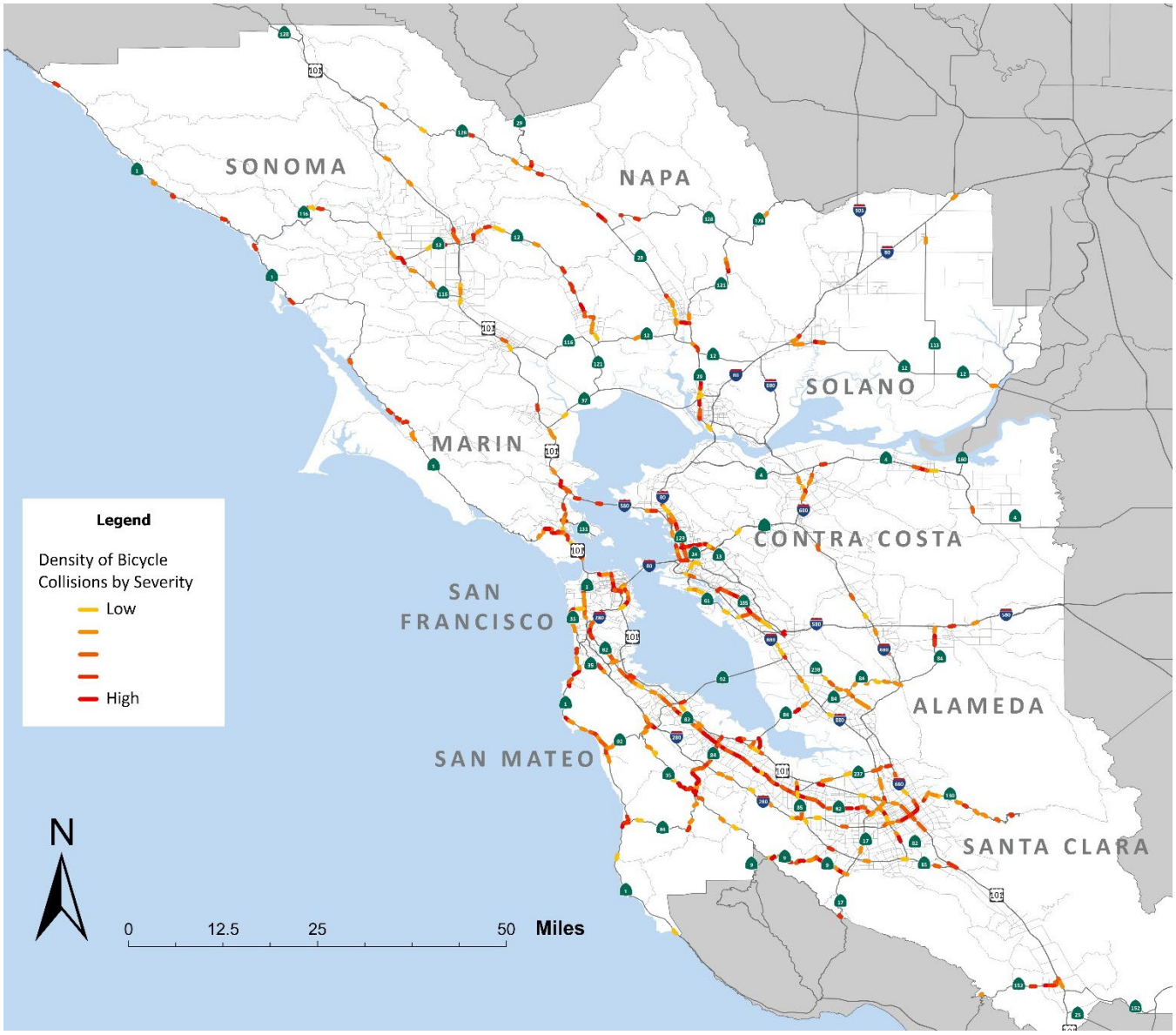
The identified location-based needs were ranked and sorted into three tiers based on their relative intensity of need, with Tier 1 representing the highest intensity. Each location-based need was scored on three metrics: safety, mobility and equity to be consistent with the stated goals of the plan and the Statewide Plan, *Toward an Active California*. These three metrics were given an equal weight of 33% each. They were also quantified using available statewide and regional metrics. The measures are summarized in the table to the right, as well as detailed below. The specifics of the prioritization methodology are also detailed in Appendix C.

Goal	Weight	Measure(s)
Safety	33%	Severity-weighted crash density
Mobility	33%	Short-distance travel demand, proximity to transit, on MTC's Regional Active Transportation Network, permeability, public feedback, stakeholder feedback
Equity	33%	MTC's Equity priority community, Cal Enviro Screen

Safety

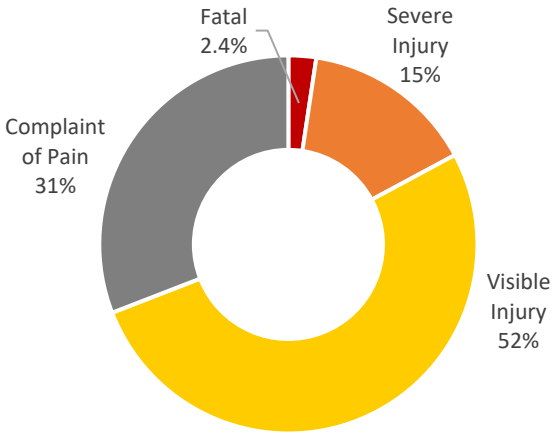
This analysis is used for planning-level prioritization of location-based bicycling needs at a district level only. Reported bicycle-involved collisions on the State Highway System in the Bay Area (District 4) were analyzed over the most recent five-year period of available data, 2018-2022. Collision data for this analysis was generated from the Transportation Injury Mapping System (TIMS) crash database by SafeTREC, a University of California, Berkeley research center. The database is composed of CHP and local police-reported crashes from the California Statewide Integrated Traffic Records System (SWITRS). It is important to note that the number of collisions reported to SWITRS is likely an underestimate of the actual number of collisions that take place because some parties do not report collisions to law enforcement, particularly collisions not resulting in injury or property damage. Although underreporting and omissions of "near-misses" are limitations, analyzing the crash data can illustrate trends both spatially and in behaviors or design factors that cause bicycle collisions on the State Highway System. A map of bicycle-related collisions from 2018 to 2022 is shown in Figure 8.

Figure 8: Bicycle Involved Collisions on the State Highway System (2018-2022)



Collision Summary

The analysis of reported bicycle-involved collisions can reveal patterns and trends across the district. These findings can supplement other safety programs and the Strategic Highway Safety Plan to inform Caltrans Bay Area of strategies to enhance bicycle safety. A list of primary findings is summarized below of bicycle involved collisions on the State Highway System, in the Bay Area, in the five year study period.



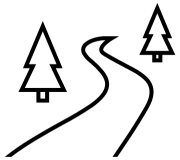
In the five-year period between 2018 and 2022, there was a total 1,224 reported bicycle collisions on or across the State Highway System in the nine county Bay Area. 29 of those collisions were fatal and 181 involved a severe injury.

Collision Profiles

Intersection Collisions

The majority of bicycle involved collisions (77%) occurred within 150 feet of an intersection.

Unincorporated Areas



28% of bicycle fatalities occurred in unincorporated areas of the Bay Area.

Top 5

51% of reported bicycle collisions occurred on just 5 routes (El Camino Real SR-82, US-101, SR-1, SR-84 and SR-185)

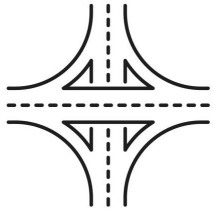
Speeding

20% of fatal or severe injury bicycle collisions involved motorists traveling at an unsafe speed for the conditions.

SR-12

The route with the most bicycle fatalities in the study period occurred on route 12, with 4 fatalities in 5 years.

Interchanges



28% of bicycle fatalities in Caltrans Right of Way occurred at interchanges.

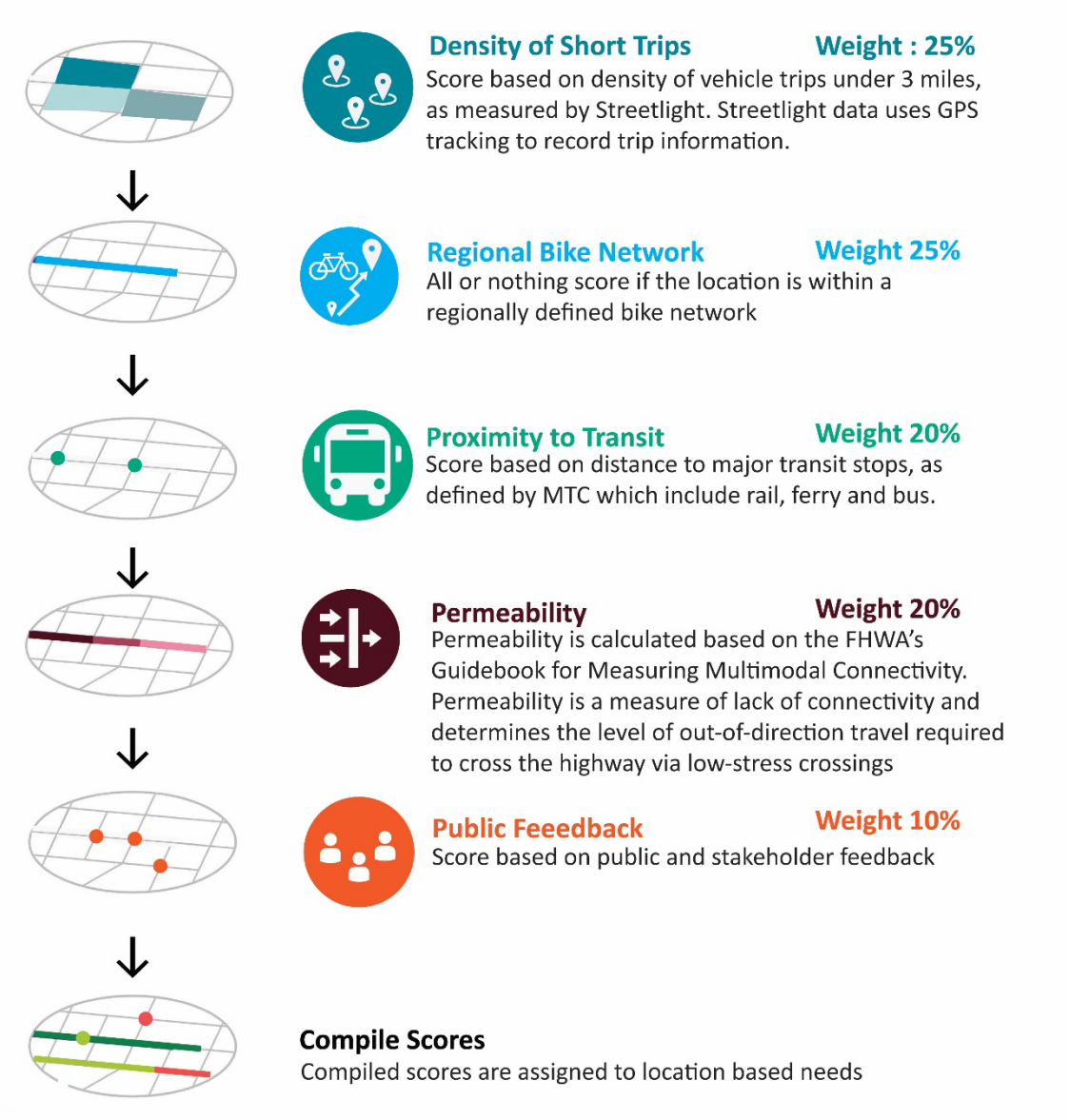
Source: (SWITRS, TIMs, 2018-2022)

Mobility

A goal of both the *Toward an Active California* (2017) and the Caltrans Bay Area Bike Plan is to increase the number of bicycle trips. Research has demonstrated that for a bicycle network to attract the widest possible segment of the population, its most fundamental attribute should be low-stress connectivity, that is, provide routes between people's origins and destinations with low stress facilities[1]. Several factors were used to identify which bikeway projects will advance mobility or result in the highest modal shift: density of short trips, along a regional bike network, proximity from transit, permeability (a measure of lack of connectivity), and public feedback. These factors were given a score and weighted. These scores were then compiled, using the percent breakdown shown in Figure 9, that resulted in an overall mobility ranking: high, medium, and low.

Generally, highway segments in urban areas, next to transit, such as El Camino Real (SR-82) and San Pablo Ave (SR-123) received a higher mobility score than highway segments in rural areas such as Niles Canyon Rd (SR-84). The analysis also scored needs adjacent to suburban and rural main street communities such as Downtown Petaluma, Santa Rosa, Gilroy, and Napa as high on mobility as well, indicating the potential for mode shift in rural main street communities.

Figure 9: How Bike Mobility was Quantified



[1] Mekuria M.C., Furth P.G., Nixon H. Low-stress bicycling and network connectivity. *Mineta Transportation Institute Report.* 2012:11–19.Retrieved from 1005-low-stress-bicycling-network-connectivity.pdf (sjsu.edu)

Equity

The Caltrans Equity Statement, published December 10, 2020, acknowledges that communities of color and under-served communities experience fewer benefits and a greater share of negative impacts associated with our state's transportation system. Some of these disparities reflect a history of transportation decision-making, policy, processes, planning, design, and construction that divided communities, and amplified racial inequities, particularly in our Black and Brown neighborhoods.

Historic Harm

Research has demonstrated that the historical placement of transportation infrastructure has not been equitably distributed across locations or demographic groups (Karner et al. 2018). This is particularly true with the development and placement of the State Highway System. Research suggests that freeway planning and construction has historically marginalized many lower-income and minority populations from the planning process, leading to displacement of many of those populations as neighborhoods were cleared to make way for highway construction (Marshall and Ferenchak, 2023). Research also suggests that people that remained were exposed to elevated air pollution, noise pollution, diminished property values, economic decline, and higher traffic injury risks as the arterial highways became the high-injury networks of most cities (Loukaitou-Sideris, A.; Handy, S. L; Ong, P. M; Barajas, J. M; Wasserman, J. L; Pech, C., et al. 2023). Such practices and decisions tend to disadvantage local populations, some of whom choose not to drive, or cannot afford to, and therefore experience fewer direct benefits from highways (Golub et al. 2013). Such infrastructure also served – and continues to serve – as barriers to active transportation (Ferenchak and Marshall 2020).

Bicycle Infrastructure and Inequity

Research suggests that Black and Hispanic populations tend to be at higher risk on the road – particularly as pedestrians and bicyclists – than White populations (Mayrose and Jehle 2002, Braver 2003, Campos-Outcalt et al. 2003, McAndrews et al. 2013, Marshall and Ferenchak 2017). Research also suggests that bike facilities are inequitably distributed outside of downtown areas, with one study documenting less bicycle facility installation in communities with people of color over a ten-year period across 29 US cities (Marshall and Ferenchak, 2023).

What is a Disadvantaged Community?

Disadvantaged communities are places that are most likely to experience disproportionately negative impacts of poor air quality and underinvestment in transportation infrastructure. Disadvantaged communities are often also low-income communities. This Plan uses CalEnviroScreen, a tool that produces a score using environmental, health, and socioeconomic information for every census tract in the state, to quantify equity communities. The full methodology can be found at: oehha.ca.gov/calenviroscreen

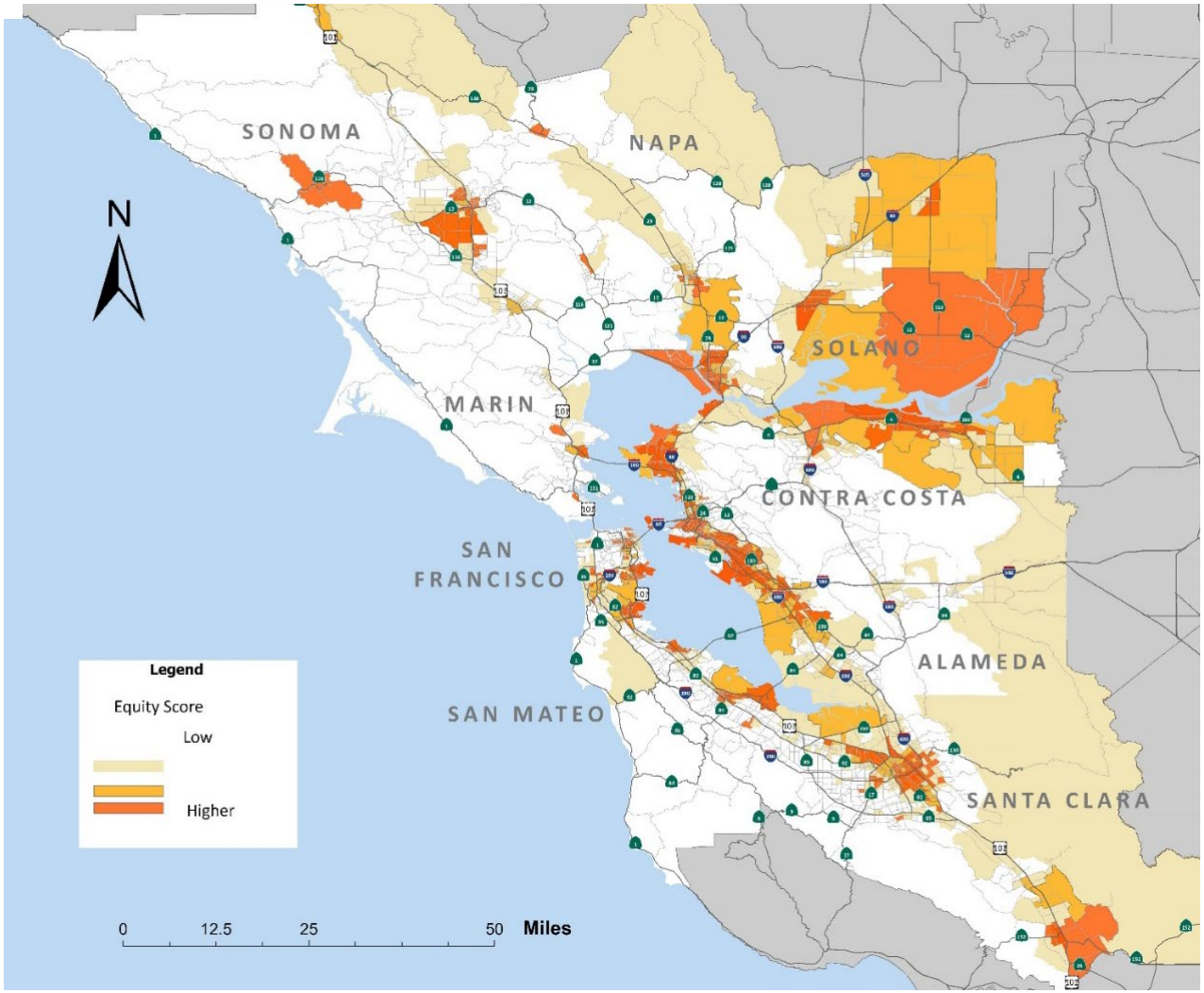
What is an Equity Priority Community?

Equity Priority Communities, as designated by the Metropolitan Transportation Commission (MTC), include a diverse cross-section of populations and have a significant concentration of underserved populations, such as households with low income, people of color, seniors, people who have limited English proficiency, rent burdened households and more. More info on the methodology can be found at: https://bayareametro.github.io/Spatial-Analysis-Mapping-Projects/Project-Documentation/Equity-Priority-Communities/

Mapping Equity

To ensure everyone has access to high-quality biking infrastructure, this Plan prioritizes location-based needs identified in Disadvantaged Communities or Equity Priority Communities. A summary of the factors used to quantify equity is depicted to the right. A map depicting locations of Disadvantaged communities and Equity Priority Communities in the nine county Bay Area is summarized in Figure 10.

Figure 10: Equity Scores for the Bay Area



Factors Used to Quantify Equity

CalEnviroScreen's Disadvantaged Communities

Exposure
- Ozone
- PM 2.5 Exposure
- Diesel Emissions
- Drinking Water Contaminants
- Pesticide Use
- Toxic Release from Facilities

Socioeconomic Factors
- Education Attainment
- Housing Burden
- Linguistic Isolation
- Poverty
- Unemployment

Environmental Effects
- Clean up Sites
- Groundwater Threats
- Hazardous Waste
- Impaired Water Bodies
- Solid Waste Sites

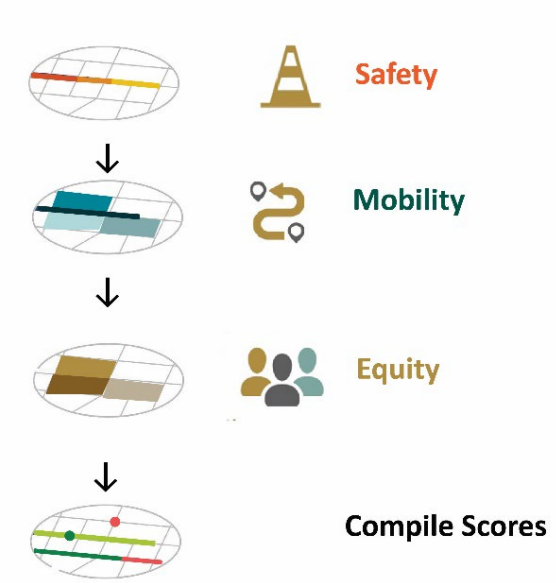
Sensitive Populations
- Asthma
- Cardiovascular Disease
- Low Birth Weight in Infants

MTC's Equity Priority Communities

- Households with Low Income
- Seniors 75 Years and Over
- People of Color
- People with a Disability
- Limited English Proficiency
- Single-Parent Family
- Zero-Vehicle Households
- Severely Rent-Burdened Households

Prioritizing Needs

The information described in previous sections was compiled into scores, the below details the framework for developing these scores.



Safety Score

A safety score of high, medium, low, or none was calculated at each location-based need based on a weighted crash density of the collision history as reported in the Statewide Integrated Traffic Records System (SWITRS). The weighted crash score of each collision severity was calculated based on the Highway Safety Manual's Part B. The top third of locations were given a score of high, mid third was given a score of medium and bottom third given a score of low and locations without a collision history were given a score of none.

Mobility Score

To estimate mobility, a number of factors were used to determine which improvements will result in the highest modal shift. A mobility score of high, medium, low, and none was given to each location-based need based on the five metrics: density of short trips, along a regional bike network, proximity to transit, permeability (a lack of connectivity), and public feedback. . The top third of locations were given a score of high, mid third was given a score of medium and bottom third given a score of low.

Equity Score

An equity score of high, medium, low, or none was given to each location-based need based on MTC's Equity Priority Community designation or CalEnviroScreen's percentile score. A high score was given to a location that is either in an MTC defined Equity Priority Community, or whose CalEnviroScreen's percentile score is 75% or higher. A medium score was given to location-based needs that was in a census tract whose CalEnviroScreen's percentile score is <75% but greater than 50%. A low score was given to a location-based needs that were in a census tract whose CalEnvrioScreen's percentile score is less than 50% but greater than 25%. A score of zero was given to location-based needs that were in a census tract whose CalEnviroScreen's percentile score is less than 25%.

Final Scoring

A final score of high, medium, or low was given to each location-based need. The top one third was given the high priority ranking, the middle third was given a mid-priority ranking and the bottom third was given a low priority ranking. After discussion and feedback from stakeholders, some location rankings were manually adjusted, if the need was a key location in the regional network and to regionally distribute the high priority rankings more evenly.

This plan identifies 698 needs for people biking across highways and 203 needs for people biking along highways.

8. Next Steps

The section below outlines the next steps and details how Caltrans plans to implement the location-based bicycle needs identified in this Plan.

Coordinate at the Local Level

Coordinating with local agencies is critical for Caltrans to improve the State Highway System for people biking. Local partners can provide critical input about how incorporating active transportation elements into projects will provide improved connections to the local road network. Buy-in from local jurisdictions is critical to move projects forward, especially projects that may repurpose travel lanes or parking. Caltrans staff will continue to coordinate with the public and stakeholders to help advance projects.

Partner with Agencies to Fund Projects

Local agencies are key partners with Caltrans in developing projects on and across the State Highway System (SHS). Local partners have access to different funding sources than Caltrans, such as local sales tax measures, developer fees, and various grants. Caltrans will continue to partner with local agencies to fund critical needs on and across the SHS. They will also construct and maintain them together with innovation due to limited funding and resources, by collaborating in the early stages of project development.

Utilize SHOPP

The majority of projects built on and across the State Highway System are SHOPP projects. SHOPP projects, such as repaving projects, provide an opportunity to incorporate bicycle upgrades that might otherwise take decades longer to fund and implement. These projects sometimes preclude the use of more expensive materials, but can still provide robust improvements. Caltrans staff will continue to use this source of funding to implement bicycle projects.

Seek Alternative Ways to Initiate Bicycle Mobility Projects

In the past, Caltrans has mostly initiated projects based on maintenance or motor vehicle needs. Caltrans has started to initiate projects for bicycle needs through the Bicycle Safety Monitoring program and non-SHOPP PIDs. District 4 will work with regional partners to use the identified needs and priorities in initiating standalone bicycle mobility projects.

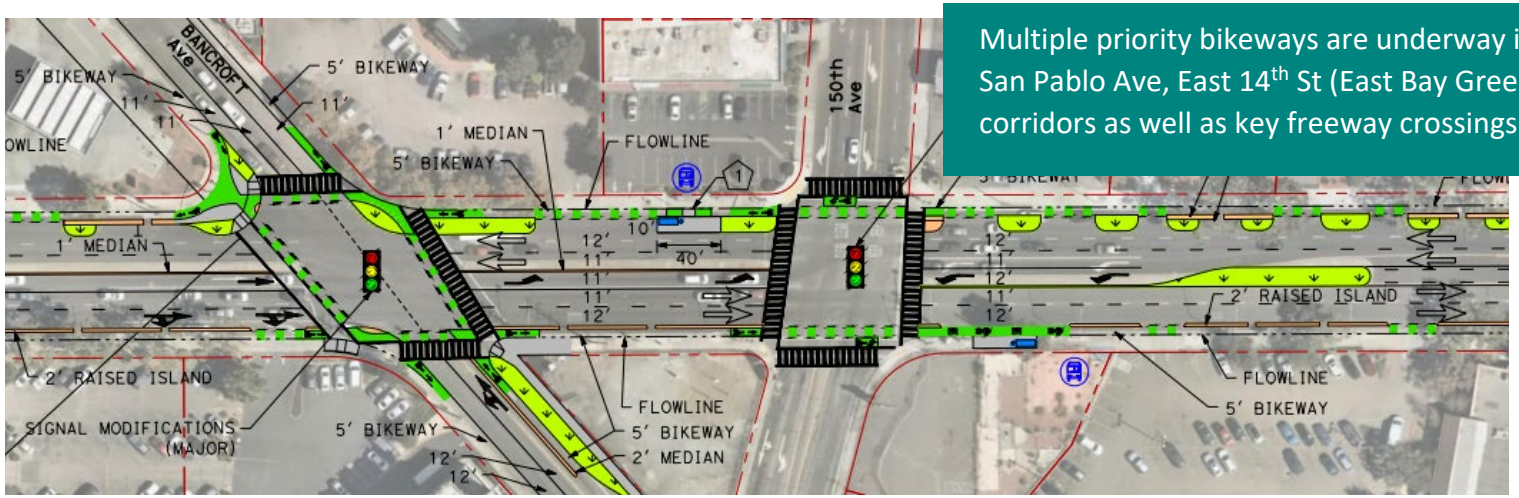
Track Performance Measures

Each Caltrans District is tasked with setting and meeting complete street performance goals. District 4 will continue to track the implementation of bicycle improvements along and across the SHS in the Bay Area and ensure its performance targets are being met.

Alameda County Top Tier Project Highlights

ID	Route	City	Improvement Type	Location	Description
Ala-185-NC02	185	Hayward	Corridor Improvement-Class IV	E Lewling Blvd - Jackson St/Foothill Blvd	Provide a Class IV separated bikeway on Mission Blvd (SR 185) from E Lewling Blvd to Jackson St/Foothill Blvd
Ala-185-NC01	185	Oakland	Corridor Improvement - Class IV	54th Ave - 81st Ave	Upgrade existing Class II, to Class IV or Class IIB. Install green conflict markings, install intersection improvements
Ala-260-X01	260	Oakland, Alameda	New separated crossing	Embarcadero - Marina Village Pkwy	New estuary overcrossing that would connect Alameda and Oakland, as studied in the Estuary Crossing Study Report (2021)
Ala-185-C02	185	San Leandro	Corridor Improvement-Class IV	Davis St - Fairmont Dr	Provide a Class IV separated bikeway on E 14th (Hwy 185) from Davis St - Fairmont Dr
Ala-61-C02	61	Oakland	Corridor Improvement-Class I	Swan Way - Airport Access Rd	Install Class I on northside of SR 61 from Swan Way to Shoreline Center on Doolittle Drive to connect with the existing Bay Trail or Class IV as described in Oakland's Bike Plan (2019)
Ala-123-C02	123	Emeryville/ Oakland	Corridor Improvement-Class IV	Heinz Ave - 35th Ave	Provide Class IV bikeway on San Pablo Ave from 35th Ave in Oakland to Heinz Ave in Berkeley. Project underway, led by Alameda CTC.
Ala-123-X05	123	Berkeley	Intersection Improvement at controlled intersection	Channing Way	Proposed City of Berkeley Bicycle Plan (2017) project for Pedestrian Hybrid Beacon across San Pablo to connect Channing Way. See Alameda CTC San Pablo Safety Enhancements project.
Ala-880-X03	880	San Leandro	Interchange improvements - Class IV	Washington Ave	Install Class IV separated bikeway as proposed in the San Leandro Bicycle and Pedestrian Master Plan (2018). Explore reconfiguring interchange ramps west of I-880
Ala-580-X06	580	Castro Valley	Interchange improvements - Class IV	Castro Valley Blvd	Reconstruct and square up ramps. Provide Class IV through complex interchange, add green striping to conflict zones, and add partially separated bikeway at floating bike lanes.
Ala-238-NC01	238	Union City	Corridor Improvement-Class I and IIB	King Ave - Blanche St	Install Class I shared-use path and Class II buffered bike lanes. See concept designs in Union City Bike Ped Master Plan appendix H.

This table identifies a partial list of top-tier projects in the County. A full list of projects is included in Appendix B.



Multiple priority bikeways are underway in Alameda County, including on San Pablo Ave, East 14th St (East Bay Greenway) and Mission Blvd. These corridors as well as key freeway crossings remain a Countywide priority.

Contra Costa County Top Tier Project Highlights

ID	Route	City	Improvement Type	Location	Description
CC-123-C01	123	El Cerrito	Corridor Improvement- Class IV	Central Ave - Potrero Ave	Provide Class IV separated bikeway on San Pablo Ave from Central Ave to Potrero Ave consistent with El Cerrito San Pablo Ave Specific Plan (2022)
CC-80-X02	80	El Cerrito, Richmond	Interchange improvements - Class I or IV	Potrero Ave	Provide Class IV or Class I bikeway, conflict striping, signage on Potrero Ave thru I-80 interchange. Consider using space under I-80 for a Class I path similar to Powell St in Emeryville.
CC-4-C02	4	Pittsburg	Corridor Improvement- Class I	Crestview Dr - Harbor St	Provide improved bike/ped connections to Pittsburg Center eBART station. Proposed shared use path consistent with Railroad Ave Specific Plan.
CC-4-NC01	4	Pittsburg	Corridor Improvement- Class I	Chelsea Way - Dover Way	Add a Class I facility using land south of freeway. Project identified in Pittsburg Moves Active Transportation Plan.
CC-580-X02	580	Richmond	Interchange improvement - Class IV	Cutting Blvd	Reconfigure ramps at Cutting Blvd and S Harbor Way to remove free flowing on-ramps. Provide green striping and Class IV bikeways.
CC-242-X02	242	Concord	Interchange improvements - Class I or IV	Grant St	Provide Class IV or Class I bikeway, conflict striping, and signage on Grant Ave thru Hwy 242 interchange. Coordinate with proposed Concord complete streets study. Connect with existing 242 Class I trail.
CC-4-X05	4	Antioch	Interchange improvements - Class IV	Contra Loma Rd	Upgrade Class II to Class IV bikeways. Reduce the number of on-ramp entry lanes such that there are only as many on-ramp entry lanes as the number of lanes that feed into them during any given signal phase.
CC-80-X07	80	Richmond	Interchange improvements - Class I or IV	MacDonald Rd	Reconstruct offramp from I-80 to Macdonald Road, provide Class I or IV through interchange to connect to Richmond Greenway
CC-680-NX04	680	Walnut Creek	Interchange improvements - Class I or IV	Treat Blvd	Provide Class IV or Class I bikeways through interchange see I-680/Treat Blvd Bicycle & Pedestrian Improvements study
CC-80-NX03	80	San Pablo	Interchange improvements - Class IV	San Pablo Dam Rd	Install Class IV bikeways through interchange, square up ramps and add green conflict markings

This table identifies a partial list of top-tier projects in the County. A full list of projects is included in Appendix B.

San Pablo Ave is a top priority in Contra Costa County and will enhance local connectivity. Interchange improvements across highways that act as barriers to cycling remain a top priority.

Marin County Top Tier Project Highlights

ID	Route	City	Improvement Type	Location	Description
Mar-580-X01	580	San Rafael	Interchange improvements - Class I or IV	Bellam Blvd	Install bicycle interchange improvements, such as square up ramps, install Class I or IV bikeways, add signage and striping to mark bicycle conflict points and remove free right turns.
Mar-101-X06	101	San Rafael	Interchange improvements - Class IV	4th St	Explore Class IV facilities on 4th Street with improved intersections on Heatherton (Caltrans jurisdiction) and Irwin (City of San Rafael jurisdiction) as described in the San Rafael Bike Ped Master Plan
Mar-580-C01	580	San Rafael	Corridor Improvement-Class IV	2nd St - Main St	Install Class IV bikeway on Francisco Blvd E parallel to I-580 to provide connectivity through Canal Neighborhood. To connect Grand Ave bridge, SF Bay Trail and Richmond San Rafael Bridge Path.
CCMa-580-C01	580	Richmond, San Rafael	Corridor Improvement-Class I	Western Ave - Main St	Provide 24/7 bicycle access on the Richmond San Rafael Bridge
Mar-131-C02	131	Tiburon	Corridor Improvement-Class IV	US 101 - Blacke's Pasture	Provide Class IV along Hwy 131
Mar-101-X07	101	San Rafael	Interchange improvements - Class I	N San Pedro Rd	Install bicycle interchange improvements, such as square up ramps, install Class I bikeways, add signage and striping to mark bicycle conflict points and remove free right turns.
Mar-580-NX01	580	Unincorporated	New Separated Crossing	Andersen Dr/ Sir Francis Drake	Install new separated crossing or other low stress crossing to help cyclists cross Sir Francis Drake and navigate to the Richmond San Rafael Bridge.
Mar-131-C01	131	Strawberry, Tiburon	Corridor Improvement-Class I	E Strawberry Dr - Greenwood Cove Dr	Proposed Class I Path on the eastbound side of Tiburon Boulevard between E Strawberry Drive and Greenwood Cove Drive. Project proposed in the Town of Tiburon Bay Trail Gap Study. Cyclists currently travel in the opposite direction on this short stretch.
Mar-101,131-X01	101,131	Strawberry, Alto	Interchange improvements - Class I or IV	US 101/Hwy 131 interchange	Install bicycle interchange improvements, such as square up ramps, install Class I or IV bikeways, add signage and striping to mark bicycle conflict points and remove free right turns.
Mar-101-X02	101	Unincorporated	Interchange improvements - Class I	Alexander Rd - Vista Pt Trail	Provide Class I path along US 101 from Vista Point to Alexander Ave in conjunction with interchange crossing improvements, consistent with FHWA Alexander Avenue Planning Study. Provide Class I along Alexander Ave to Conzelman Rd and at undercrossing.

This table identifies a partial list of top-tier projects in the County. A full list of projects is included in Appendix B.

Marin County has made significant strides implementing the North-South Greenway, Cross Marin Bikeway and Bay Trail over the last few decades. Key gaps in these regional trails remain a top priority as well as key freeway interchanges and maintaining 24/7 access on, and improving access to, the Richmond-San Rafael Bridge Path.

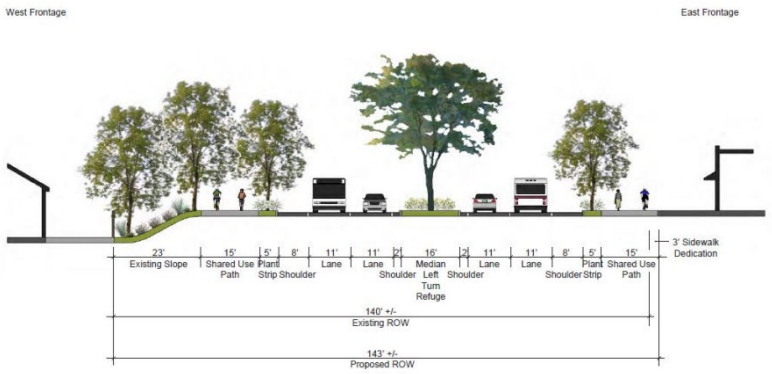
Napa County Top Tier Project Highlights

ID	Route	City	Improvement Type	Location	Description
Nap-121-C01	121	Napa	Corridor Improvement-Class II	Soscol Ave - Trancas St	Planned Class I multi use path adjacent to Hwy. Interim improvement to provide buffered bike lanes or Class IV bikeways on Hwy 221.
Nap-121-NC01	121	Napa	Corridor Improvement-Class IV	S Freeway Dr - Soscol Ave	Provide Class IV bikeways on Imola Ave. See Imola Ave Corridor Complete Streets Improvement Plan (2020)
Nap-29-C07	29	American Canyon	Corridor Improvement - Class I	American Canyon Rd - Paoli Loop Rd	Provide Class I on both sides of Hwy 29 through American Canyon. Partially apart of project 4Q010. Completed PSR.
Nap-221-C01	221	Napa	Corridor Improvement-Class I	Imola Ave - Hwy 12	Planned Class I multi use path adjacent to Hwy. Interim improvement to provide buffered bike lanes on Hwy 221.
Nap-29-C03	29	Calistoga	Corridor Improvement-Class I	Foothill Blvd/Hwy 29 - Silverado Trail	Class I Multi use path on SR 29 through Calistoga as proposed in the Napa Countywide Bike Plan (2019)
Nap-29-C04	29	Calistoga	Corridor Improvement-Class II	Dunaweal Ln - Bennett Rd	Class II bicycle lanes on SR 29 as proposed in the Napa Countywide Bike Plan (2019)
Nap-29-C06	29	Unincorporated	Corridor Improvement-Class I or IV	Soscol Ferry Rd - Airport Blvd	Provide Class I or Class IV on Hwy 29 from Airport Blvd to Soscol Ferry Rd
Nap-29-NX02	29	American Canyon	Intersection improvement at controlled intersection	W American Canyon Rd	Install intersection improvements, either a protected intersection, signal separated crossing or roundabout with Class IV/Class I to connect with proposed Class I on Hwy 29 as part of project 4Q010
Nap-29-X06	29	Napa	Intersection Improvement at controlled intersection	Trower Rd	Class I path on west side of SR 29
Nap-29-X07	29	Napa	Interchange improvements- Class IV	Trancas Rd/Redwood Rd	Provide Class IV bikeways on Trancas Rd/Redwood Rd interchange with Hwy 29

This table identifies a partial list of top-tier projects in the County. A full list of projects is included in Appendix B.

SR 29 Multimodal Improvements - SR 37 to Napa Junction Rd

This segment includes multimodal roadway improvements from SR 37 to Napa Junction Road. Improvements would include use of the existing four lane roadway, Class I shared use paths on each side of the roadway, Class II striped bike lanes, pedestrian refuge at intersections, and landscaped planting strips to separate bicyclists and pedestrians from vehicular traffic.

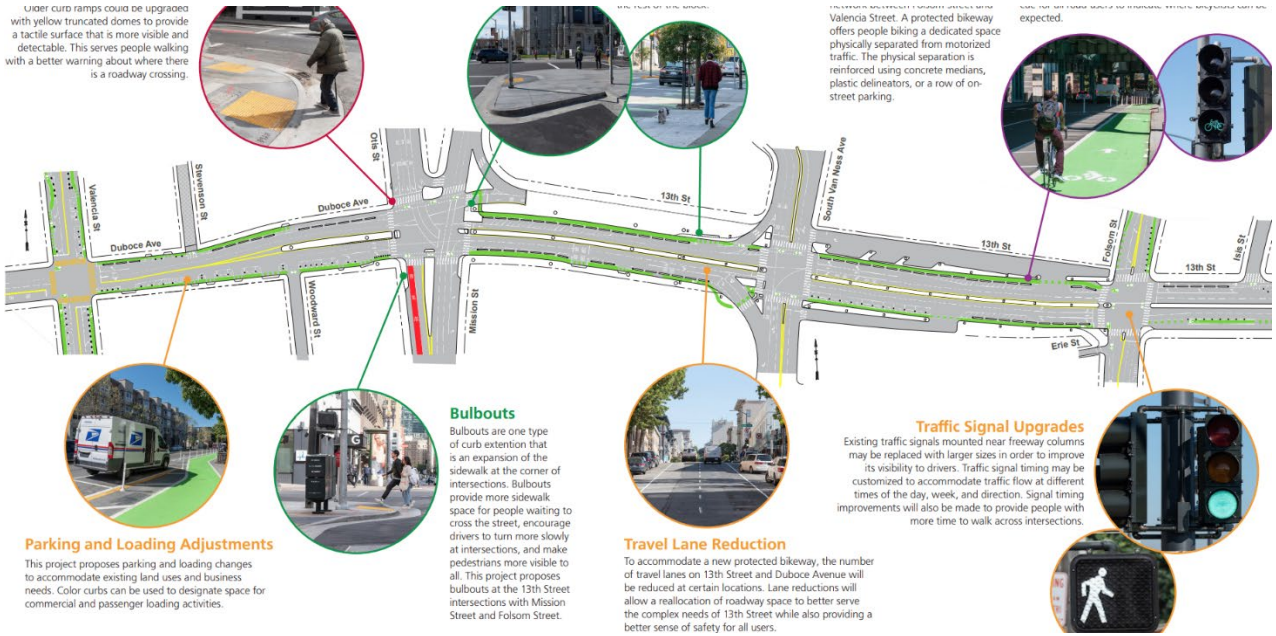


The Napa Valley Vine Trail is a top priority in Napa County and will enhance local connectivity throughout the county. Key segments such as the St Helena to Yountville are under construction. Connecting trails along regional routes remain a top priority.

San Francisco County Top Tier Project Highlights

ID	Route	City	Improvement Type	Location	Description
SF-101-NC01	101	San Francisco	Corridor Improvement-Class IV	Folsom St - Valencia St	Corridor improvement Class IV facility on 13th St under US-101
SF-80-C01	80	San Francisco	Corridor Improvement-Class I	SF touchdown to Yerba Buena Island	New separated Class I between Yerba Buena Island and Downtown San Francisco. MTC lead project, completed initial study.
SF-101-X01	101	San Francisco	Interchange improvements - Class I or IV	Cesar Chavez St	Improve Bike/ped facilities through interchange as described in Cesar Chavez/Potrero Ave/Bayshore Blvd Intersection Improvements (The Hairball). VZ Ramps Phase 3 Study to provide improvement recommendations.
SF-101-NX05	101	San Francisco	Intersection Improvement at controlled intersection	Grove St/ Van Ness	Improve intersection for bicyclists crossing Van Ness
SF-101-NX01	101	San Francisco	Interchange improvements - Class IV	South Van Ness/ 13th St	Improve intersection and address conflicts as depicted in SOMA Freeway Ramp Safety Study
SF-101-NX02	101	San Francisco	Intersection Improvement at controlled intersection	Otis/ Mission/ 13th	Improve intersection and address conflicts as depicted in SOMA Freeway Ramp Safety Study
SF-280-X02	280	San Francisco	Interchange improvements- Class IV	Ocean Ave/Geneva Ave	I-280 ramps intersect with existing bicycle facilities on Ocean Avenue and Geneva Avenue. Explore potential for Class IV bicycle facility upgrades. Further recommendations to be determined by SFCTA Vision Zero Ramps Phase III study.
SF-101-NX06	101	San Francisco	Intersection Improvement at controlled intersection	McAllister St/ Van Ness	Improve intersection for bicyclists crossing Van Ness
SF-101-NX08	101	San Francisco	Interchange improvements - Class IV	Bayshore Blvd and Hester Ave	Improve bicycle accommodations at US 101 interchange at Bayshore Blvd. Upgrade bike lane to a Class IV, add green conflict striping. Near-term recommendations to be determined by SFCTA Vision Zero Ramps Phase III study.

This table identifies a partial list of top-tier projects in the County. A full list of projects is included in Appendix B.



Freeway and arterial crossing improvements are a top priority in San Francisco to provide key connections across the bikeway network. Improvements on the Alemany interchange and the Cesar Chavez / Potrero Ave / Bayshore Blvd intersection are underway. Comfortable bikeway intersections across Van Ness, Sloat Blvd and freeway crossings remain a priority.

San Mateo County Top Tier Project Highlights

ID	Route	City	Improvement Type	Location	Description
SM-84-X01	84	Redwood City	Intersection Improvement at controlled intersection	Middlefield Rd	Improve arterial crossing. Explore installing a protected intersection.
SM-1-NC07	1	Pacifica	Corridor Improvement-Class I	Fassler Ave - Westport St	Provide a Class I trail along Hwy 1 as a long term project. As an interim project, widen shoulders and provide a rumble strip buffered bike lane
SM-84-C03	84	Redwood City	Corridor Improvement-Class IV	US 101 - Hudson St/Central Ave	Install Class IV facility from US 101 to Hudson St/Central Ave in Redwood City. Include ramp improvements at Hwy 82.
SM-109-NC01	109	Menlo Park, East Palo Alto	Corridor Improvement-Class IV	University Ave - Dononhoe St	Explore options of upgrading existing Class II to a Class IV
SM-82-NC01	82	Colma	Corridor Improvement-Class IV	F St - Arlington Dr	Colma El Camino Pedestrian and Bicycle Improvement Plan recommends Class IV on El Camino through Colma
SM-82-C09	82	Redwood City	Corridor Improvement-Class IV	Cordilleras Creek to Berkshire Ave	Class IV on El Camino Real throughout Redwood City (~ Cordilleras Creek to Berkshire Ave). Priority project identified in Redwood City Walk Bike Thrive Plan (2022) and concept plans in Bike and Ped Safety Improvement Study El Camino Real
SM-82-C11	82	Menlo Park	Corridor Improvement-Class IV	Sand Hill Rd - Encincal Ave	Explore option of installing Class IV on El Camino to connect with planned adjacent jurisdiction's bikeways on El Camino.
SM-280-NX01	280	Daly City	Interchange improvements - Class IV	John Daly Blvd	Install Class I or Class IV bikeway on interchange as identified in Walk Bike Daly City and to connect to existing path on west side to the BART station. See Walk Bike Daly City pg 58 for interchange conceptual plan.
SM-101-NX02	101	San Mateo	Interchange improvements - Class IV	E Hillsdale Blvd	Install Class IV through interchange on Hillsdale Blvd
SM-101-X06	101	South San Francisco	Interchange improvements - Class IV	Oyster Point Blvd	Install bicycle interchange improvements, such as square up ramps, install Class IV bikeways, add signage and striping to mark bicycle conflict points and remove free right turns.

This table identifies a partial list of top-tier projects in the County. A full list of projects is included in Appendix B.

Multiple priority bikeways are underway in San Mateo County, including upcoming improvements on El Camino Real and SR-1. Interchange and intersection improvements across highways that act as barriers to cycling remain a top priority.

Santa Clara County Top Tier Project Highlights

ID	Route	City	Improvement Type	Location	Description
SC-130-C01	130	San Jose	Corridor Improvement-Class I	White St - Mt Hamilton Rd	Install Class I or Class IV, shared frontage road marked for bikes, and some Class II buffered segments along Alum Rock Ave from White Rd to N Hamilton Ave
SC-82-C01	82	Mountain View	Corridor Improvement-Class IV	San Antonio Rd - Bernardo Ave	Install continuous Class IV bikeway on El Camino Real with high-quality separation and bus boarding island to continue bikeway separation.
SC-101-C02	101	Gilroy	Corridor Improvement-Class I	Leavesley Rd - E Sixth St	Install Class I path next to Highway 101 via Santa Clara County Water District Storm Channel
SC-237-NC01	237	Milpitas	Corridor Improvement-Class I	McCarthy Blvd - S Park Victoria Dr	Provide Class IV along Calaveras Blvd. This is a critical link as it is one of the few east-west connections across the UPP/BART tracks.
SC-82-C03	82	Santa Clara	Corridor Improvement-Class IV	Lawrence Expwy - I-880	Provide a Class IV separated bikeway on El Camino Real (Hwy 82) from Lawrence Expressway to I-880 in the City of Santa Clara as detailed in the VTA Central Bikeway Study (2022)
SC-880-X01	880	Milpitas	Interchange improvements - Class IV	Hwy 237/I-880	Install bicycle interchange improvements, such as square up ramps, install Class IV bikeways, add signage and striping to mark bicycle conflict points and remove free right turns.
SC-82-NX01	82	Santa Clara	Intersection Improvement at controlled intersection	San Tomas Expy	Priority intersection improvement. Install bikeway improvements such as a protected intersection, remove slip lanes. See VTA Central Bikeway Study (2022).
SC-280-X08	280	San Jose	Interchange improvements - Class IV	McLaughlin Ave	Replace free-merging on/off ramps to improve bike and ped accommodation. Add continuous sidewalks through interchange. Add continuous Class IV or I bikeways through interchange. Square up on ramps.
SC-87-X06	87	San Jose	Interchange improvements - Class IV	Julian St	Replace free-merging on/off ramps to improve bike and ped accommodation. Add continuous sidewalks through interchange. Add continuous Class IV or I bikeways through interchange.
SMSC-82-C01	82	Palo Alto	Corridor Improvement-Class IV	Sand Hill Rd - San Antonio Rd	Install continuous Class IV bikeway on El Camino Real with high-quality separation and bus boarding island to continue bikeway separation.

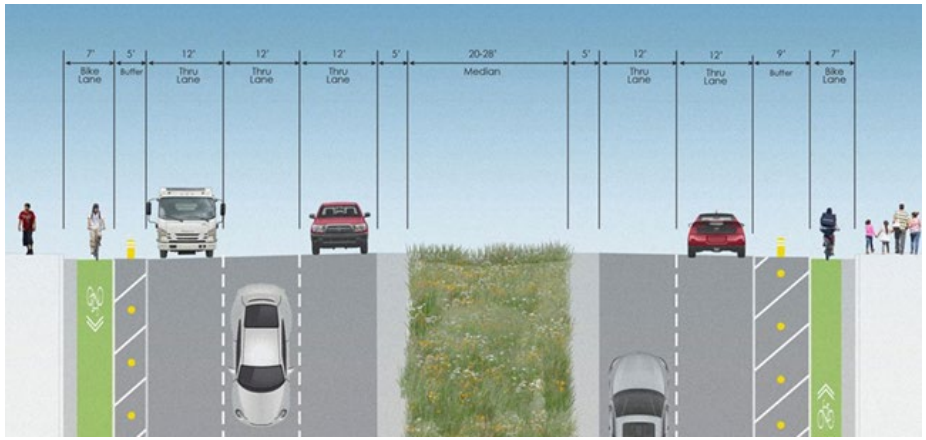
This table identifies a partial list of top-tier projects in the County. A full list of projects is included in Appendix B.

El Camino Real is a critical arterial and Historic Landmark connecting communities from San Francisco to San José. Providing comfortable bikeways on El Camino would enable people biking to make easy connections to destinations and activity areas, improve links to the existing bikeway network and improve safety. Comfortable bikeways along El Camino are a top priority in Santa Clara County.

Solano County Top Tier Project Highlights

ID	Route	City	Improvement Type	Location	Description
Sol-29-C02	29	Vallejo	Corridor Improvement-Class IV	Lewis Brown Dr - Curola Pkwy	Explore road diet on Sonoma Boulevard to provide dedicated bicycle facilities. STA active transportation plan recommends Class IV
Sol-29-C01	29	Vallejo	Corridor Improvement-Class IV	Curtola Pkwy - Maritime Academy Dr	Install Class IV bikeways on SR-29 from Curtola Parkway to Maritime Academy Drive, as recommended in STA Active Transportation Plan, and a part of the San Francisco Bay Trail Network.
Sol-80-C01	80	Vallejo	Corridor Improvement-Class I	Maritime Academy Dr	Install Class I path to implement the Vallejo Bluff Trail Project and connect the Bay Area Ridge Trail, San Francisco Bay Trail, and Carquinez Strait Loop Trail.
Sol-12-C04	12	Rio Vista	Corridor Improvement-Class IV	Hillside Ter - New Front St	Install Class IV bikeway through Rio Vista as part of roadway rehabilitation project on Route 12
Sol-12-X03	12	Suisun City	Intersection Improvement at controlled intersection	Marina Blvd	Install intersection safety improvements such as median refuge island, redo curb ramps to be as wide as the path and be directional, install bicycle detector and bike signals head, install blank out no right on red signs.
Sol-80-X11	80	Fairfield	Interchange improvements - Class II	W Texas St	Provide bike signal and phase for Linear Bike Trail movement through interchange area. Coordinate with City of Fairfield's West Texas Gateway Project that will connect Linear Park Path to Fairfield Transit Center.
Sol-12-X04	12	Fairfield	Intersection improvement at controlled intersection	Beck Ave	Explore removing slip lanes at intersection to provide improved crossing for bikes
Sol-80-X14	80	Vallejo	Overcrossing improvements - Class IV	Solano Ave	Provide Class IV along Solano Ave/ Spring Rd at overcrossing. Install intersection improvements at Solano Ave/ Mariposa St such as removing pork chop, reducing curb radius and adding green conflict markings.
Sol-80-X08	80	Vallejo	New separated crossing	Maritime Academy Dr	Install Class I undercrossing at the SR-29 off ramp
Sol-12-X05	12	Fairfield	Intersection improvement at controlled intersection	Sunset Ave	Provide enhanced connection and intersection safety between Grizzly Island Trail and Central County Bikeway on either side of Hwy 12. See N Mathilda Ave/ W Moffett Park Dr for Class I crossing an arterial.

This table identifies a partial list of top-tier projects in the County. A full list of projects is included in Appendix B.



Hwy 12 and 29 are key regional connectors in the County that connect key destinations and provide regional mobility. Providing comfortable bikeways on these corridors is a top priority in Solano County.

Sonoma County Top Tier Project Highlights

ID	Route	City	Improvement Type	Location	Description
Son-12-C02	12	Santa Rosa, Fetters Hot Springs-Agua Caliente	Corridor Improvement-Class I	Melita Rd - Auga Caliente Rd	The completed Sonoma Valley Trail Feasibility Study recommends a separated 13 mile long Class I bike path along Hwy 12 between Melita Road and Agua Caliente Road. See feasibility study Sonoma County Regional Parks web page.
Son-12-NX02	12	Santa Rosa	Interchange improvements - Class I or IV	Stony Point Rd	Install enhanced crossing at Joe Rodoto Trail. Such as redoing curb ramps to be as wide as the path and be directional, bicycle detector and bike signals head, blank out no right on red signs. See N Mathilda Ave/ W Moffett Park Dr for Class I crossing an arterial. Install a Class IV or I bikeway through interchange to connect with trail trailhead.
Son-101-X01	101	Santa Rosa	Interchange improvements - Class IV	3rd St	Upgrade Class II to Class IV. Reduce crossing distance at on ramp. Add green conflict markings.
Son-101-X05	101	Cotati, Rohnert Park	New separated crossing	Copeland Creek	Explore separated crossing to connect nearby existing and planned creek trails
Son-101-X09	101	Petaluma	Interchange improvements - Class IIB	E Washington St	Consider realigning NB 101 on ramp from west side of Washington to the T intersection of the NB 101 off ramp and eliminating the slip ramp. Consider bike signal phasing on east side of Washington to allow bikes to get ahead of merging traffic.
Son-101-NX07	101	Rohnert Park	Interchange improvements - Class IV	Rohnert Park Expy	Explore upgrading existing Class II to a Class IV
Son-101-X23	101	Santa Rosa	Interchange improvements - Class I	Colgan Ave	Connect proposed Colgan Creek trail to bike lanes. Interchange is offset with numerous conflicts. Suggest reconstructing interchange or provide separate bike/ped overcrossing. Consistent with Sonoma County Bicycle and Pedestrian Plan
Son-101-X16	101	Unincorporated	New separated crossing	Santa Rosa Ave/Roberts Lake Rd	The proposed Bellevue Creek Trail provides an east-west connection starting at Petaluma Hill Road and continues west to the proposed Laguna de Santa Rosa Trail. An overhead crossing of Hwy 101 is needed.
Son-116-C08	116	Guerneville, Sebastapol	Corridor Improvement-Class I	River Rd - Mill Station Rd	Long term provide Class I multi use path on Hwy 116 from Guernville to Sebastapol. As an interim project provide a Class II.
Son-116-C04	116	Guerneville, Forestville	Corridor Improvement-Class I	Hwy 1 - River Rd	The proposed Russian River Trail is identified as Class I bike path in the Sonoma County Bicycle and Pedestrian Plan. As an interim project provide buffered bike lanes on SR 116.

This table identifies a partial list of top-tier projects in the County. A full list of projects is included in Appendix B.

Completing a Class I trail along Hwy 12 is a key priority in Sonoma County. Constructing a Class I along Hwy 12 would improve safety and connect key destinations in the County.

Acknowledgments

Caltrans Project Team

Sergio Ruiz, Chief, Office of Active Transportation and Transit
Greg Currey, Chief, Pedestrian and Bicycle Branch
Jasmine Stitt, Project Manager, Complete Streets Performance Coordinator
Jake Freedman, Complete Streets Performance Coordinator
Joel Mandela, Pedestrian and Bicycle Branch
Hunter Oatman-Stanford, Regional and Community Planning
Khatereh Afshar, Pedestrian and Bicycle Branch
Issa Ibrahimi, Pedestrian and Bicycle Branch
Amber Moran, Pedestrian and Bicycle Branch
Anton Jacquard, Pedestrian and Bicycle Branch
Marley Mathews, Regional and Community Planning
Christina Wong, GIS Branch
Orlando Ramirez, Multimodal System Planning
Fredrick Schermer, Multimodal System Planning
Caroline Chen, Caltrans
Nancy Xu, Caltrans
Hector Chinchilla, Caltrans

Technical Advisory Committee

Claire Amable, San Francisco Bicycle Coalition
Colin Clarke, Contra Costa Transportation Authority
Colin Dentel-Post, Alameda County Transportation Commission
Dulce Jimenez, Solano Transportation Authority
Sandhya Laddha, Silicon Valley Bicycle Coalition
Lauren Ledbetter, Santa Clara Valley Transportation Authority
David Long, San Francisco County Transportation Authority
Chris Marks, Alameda County Transportation Commission
Scott McDonald, Transportation Authority of Marin
Diana Meehan, Napa Valley Transportation Authority
Kara Oberg, Metropolitan Transportation Commission
Robert Prinz, Bike East Bay
Emily Shartin, Sonoma County Bicycle Coalition
Audrey Shiramizu, City/County Association of Governments of San Mateo County
Dana Turréy, Sonoma County Transportation Authority
Kara Vernor, Napa County Bicycle Coalition
Eris Weaver, Sonoma County Bicycle Coalition
April Webster, Silicon Valley Bicycle Coalition
Warren Wells, Marin County Bicycle Coalition
Christopher White, San Francisco Bicycle Coalition

References

1. Sanchez TW, Stolz R, Ma JS. 2003. “Moving to equity: addressing inequitable effects of transportation policies on minorities.” The Civil Rights Project at Harvard University.
2. Mekuria M.C., Furth P.G., Nixon H. 2012. “Low-stress bicycling and network connectivity.” *Mineta Transportation Institute Report.*
3. Karner, A., A. Golub, K. Martens, and G. Robinson. 2018. “Transportation and Environmental Justice: History and Emerging Practice.” The Routledge Handbook of Environmental Justice. 400-411.
4. Marshall, W., and N. Ferenchak. 2017. "Assessing Equity and Urban/Rural Road Safety Disparities in the U.S." Journal of Urbanism. doi: 10.1080/17549175.2017.1310748.
5. Ferenchak N., Marshall W. 2023. “The (In)Equitable Distribution of Quality Bicycling Infrastructure.” National University Transportation Center TriDurLE.
6. Loukaitou-Sideris, A.; Handy, S. L; Ong, P. M; Barajas, J. M; Wasserman, J. L; Pech, C., et al. 2023.“The Implications of Freeway Siting in California: Four Case Studies on the Effects of Freeways on Neighborhoods of Color” Pacific Southwest Region University Transportation Center.
7. A. Golub, R.A. Marcantonio, T.W. Sanchez. 2013. “Race, space, and struggles for mobility: transportation impacts on African Americans in Oakland and the East Bay” Urban Geography, 34 (5) (2013), pp. 699-728
8. J. Mayrose, D.V.K. Jehle, 2002. “An analysis of race and demographic factors among motor vehicle fatalities.” J. Trauma-Injury Infect. Critical Care, 52 (4) (2002), pp. 752-755
9. Elisa Braver. 2003. “Race, Hispanic origin, and socioeconomic status in relation to motor vehicle occupant death rates and risk factors among adults.” Accid. Anal. Prev., 35 (3)
10. D. Campos-Outcalt, C. Bay, A. Dellapena, M.K. Cota. 2003. “Motor vehicle crash fatalities by race/ethnicity in Arizona, 1990–96.” Injury Prevention, 9 (3) (2003)
11. Carolyn McAndrews, Kirsten Beyer, Clare E. Guse, Peter Layde. 2013. “Revisiting exposure: Fatal and non-fatal traffic injury risk across different populations of travelers in Wisconsin, 2001–2009.” Accid. Anal. Prev., 60 (2013)