ACTIVE SOUTH CITY

SOUTH SAN FRANCISCO'S BICYCLE AND PEDESTRIAN MASTER PLAN

FINAL

JUNE 2022

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Introduction

What Is Active South City?

Active South City is an update to the City of South San Francisco's Bicycle and Pedestrian Master Plans. This new plan integrates walking, bicycling, and other active transportation modes into a single plan that prioritizes project and program recommendations that are designed to increase safety and comfort for people bicycling and walking in South San Francisco, also commonly referred to as South City. With a planning horizon of 20 years, Active South City guides current and future decision-makers toward a seamless and integrated active transportation network inclusive of all citizens, needs, and destinations.

Benefits of Active Transportation

PUBLIC HEALTH

Physical inactivity is now widely understood to play a significant role in the most common chronic diseases in the United States, including heart disease, stroke, and diabetes, and each year approximately 280,000 adults in the United States die prematurely due to obesity-related illnesses. A 2004 study published in the *American Journal of Preventive Medicine* by Frank et al. reported that for each additional 60 minutes spent in a car daily, there is a 6% increase in the chances of being obese. Creating a physical environment that encourages bicycling and walking, and improves access to parks and active recreation opportunities in other neighborhoods, is a crucial strategy to fight obesity and inactivity and has been shown to have substantial impacts on health with a relatively small public investment.

COLLISION REDUCTION

Conflicts between people walking, bicycling, and driving can result from poor behavior as well as insufficient or ineffective design. Encouraging development and redevelopment in which bicycling and walking are supported can enhance

WHAT ARE ACTIVE MODES?

For the purposes of this plan, *active modes* refers to walking, bicycling, persons using mobility assistance devices such as wheelchairs, fully human-powered devices like skateboards or kick scooters, and electric-assist pedal bikes. While fully electric-powered vehicles such as e-scooters, e-skateboards, or throttle-powered e-bikes are not technically "active," they do provide human-scaled mobility options, and their speeds are generally compatible with bicycles; therefore, use of the bikeway network by these devices is also considered by this plan.

safety and comfort levels for all users. Designated bicycling and walking facilities, well-designed crossings, and continued education and enforcement can reduce the risk of crashes and injuries. This Active South City plan supports the city's adopted Vision Zero goals as well as ongoing safety goals of the Local Road Safety Program and other ongoing road safety initiatives.

QUALITY OF LIFE

Creating conditions where walking and bicycling are accepted and encouraged increases a community's livability in ways that are difficult to measure but should not be overlooked. The design, land use patterns, and transportation systems that comprise the built environment have a profound impact on quality of life issues. The aesthetic quality of a community improves when visual and noise pollution caused by automobiles is reduced, and when green space is reserved for facilities that allow people of all ages to recreate and travel in pleasant settings.

EQUITY

Bicycling and walking are inexpensive and broadly accessible forms of transportation. The average annual operating cost of a bicycle is $308, compared to $8,220 for the average car.[1] Bicycling and walking are affordable means of transportation for low-income and disadvantaged residents. Access to active transportation provides added freedom and independence for youth and parents (who may otherwise be transporting their children) as well as for some people who cannot drive and those who have chosen not to drive.

ECONOMY

Active transportation programs and projects encourage more bicycling and walking, which leads to a better quality of life. This higher quality of life can attract more diverse and creative people, leading to higher economic growth for a city and region. Additionally, people who commute using active modes of transportation save money on annual automobile operating costs and may see additional savings in health care costs. On a community-wide scale, bicycle and pedestrian infrastructure projects are generally far less expensive than automobile-related infrastructure.

ENVIRONMENTAL

Replacing driving trips with bicycling or walking trips has a measurable impact on reducing greenhouse gases in the atmosphere that contribute to climate change. Fewer vehicle trips and vehicle miles traveled translate into fewer pollutants released into the air, including carbon dioxide, nitrogen oxides, and hydrocarbons. This not only reduces our contribution to climate change but also improves the health and quality of life for residents who are vulnerable to asthma or other chronic respiratory diseases.

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1 Bureau of Transportation Statistics, Pocket Guide to Transportation 2009*, January 2009.*

Vision and Goals

Vision: The City of South San Francisco envisions an environment that supports walking, bicycling, and active living that enables people of all ages and abilities to comfortably access jobs, schools, recreation, shopping, and transit by foot or on a bicycle as part of daily life.

GOALS:

- Promote citywide and regional sustainability goals through investments in active transportation that create a culture of walking and bicycling that enables them to become an increasing part of everyday life
- Improve access and connectivity to major transit stops including Bay Area Rapid Transit (BART) stations, Caltrain stations, and the ferry terminal
- Improve connectivity within and across neighborhoods with low-stress facilities
- Improve safety, eliminate traffic deaths and serious injury collisions, and lower the traffic stress of people walking and biking in South City
- Advance equity with a focus on vulnerable and disadvantaged communities in project recommendations, funding and implementation.
- Link community destinations (parks, schools, libraries, and community centers) together through low-stress networks
- Improve connections across I-280, El Camino Real (SR-82), and US-101

02

The South San Francisco Community

Community Characteristics

With a population of over 66,000 people, South City is the fourth largest city in San Mateo County. South City's population is primarily concentrated west of US-101. The downtown core has the highest population density, followed by the Westborough area. South City has a much higher share of young adults (22—39) and older adults (40—64) than the California average (Stat Atlas); this could lead to continued potential population growth in the future as the young adults start families. Additionally, the aging population will present different transportation needs in the medium-term future as they age. The city currently has a smaller share of children than the state average.

South San Francisco is a culturally rich community with an ethnically diverse population of residents. According to the U.S. Census Bureau (2018 American Community Survey data), the largest ethnic group in South City is residents of Asian descent (40%), followed by Hispanic or Latino (34%), and white alone-non Hispanic or Latino (18%). Other groups such as Black or African American, Pacific Islander, American Indian, and those of two or more races make up less than 10% of the city's population. It is also reported that nearly 60% of residents over the age of five speak a language other than English at home.

Grand Avenue has historically been South City's commercial spine and an important connection east to the industrial areas. South City's development has been constrained by natural barriers, bordered by Sign Hill to the north, marshlands to the south (in the area east of US-101), and mountains to the west. The oldest parts of the city were built on an east-west orientation and used a directional grid pattern with typical blocks of 950 by 300 feet. Beyond the original gridded area, the development patterns took on more suburban characteristics with reduced connectivity. The area east of US-101 transitioned from heavy industrial uses to more research and development uses beginning in the 1990s; there are still railroad tracks and other remains from the area's industrial past.

Commuting Characteristics

The 2014 Climate Action Plan reported that 39,000 people commute into, 25,000 out of, and 4,000 within South San Francisco (2010 Census data). The private automobile is the method the majority of South San Francisco workers use to get to their jobs, but over 13% of those workers carpool. Additionally, over 14% of commuters take public transportation to reach their employment. Active modes currently account for less than 5% of commute trips, but these numbers do not include those who walked or biked to transit or to their carpool (Census Reporter). South City is well served by transit, with SamTrans providing bus service and BART and Caltrain providing regional rail connections. About one-third of South City workers commute to San Francisco, and about 12% work within South City. Other employment destinations that account for at least 3% of the workforce include Burlingame, San Mateo, Oakland, and Daly City. This shows the importance of improving connections both to neighboring cities and to transit stations and stops across the city. The figure on the following page shows the commute mode split of South San Francisco residents.

Population Density

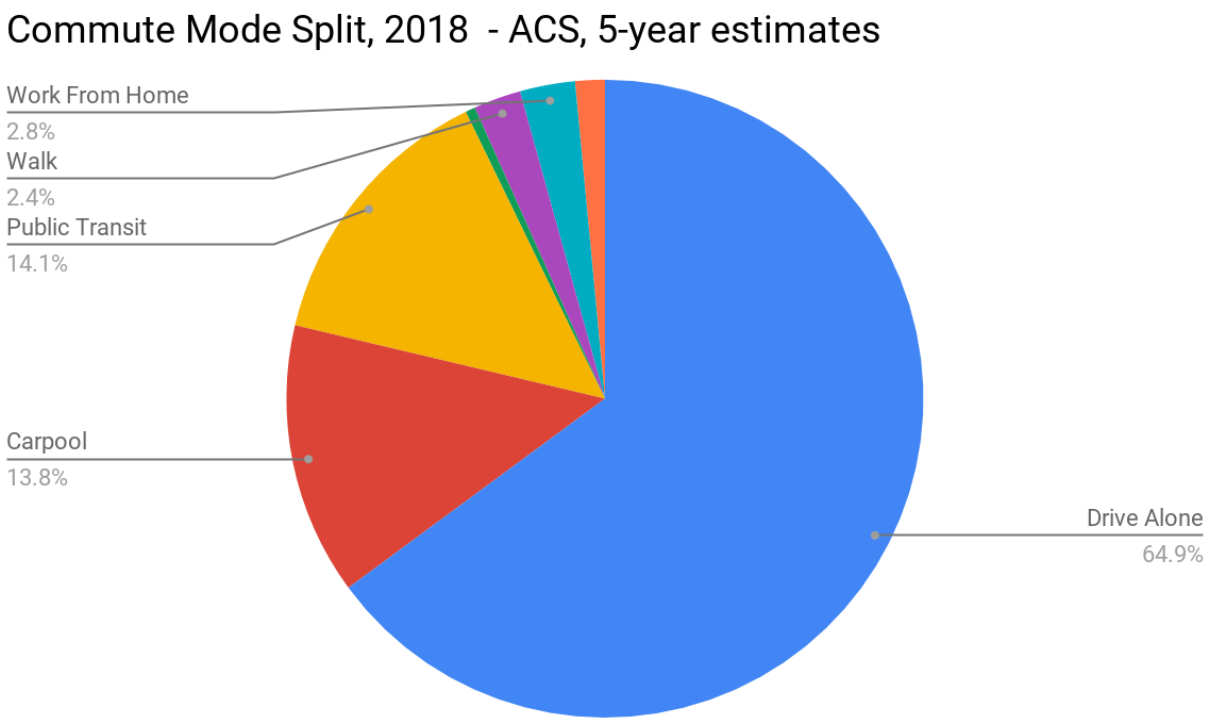
Population density plays an important role in whether or not people choose to bike or walk in South San Francisco. The neighborhoods in the city with the highest density include downtown, Sign Hill, Sierra Highlands, Baden/Avalon, and parts of the Westborough area. Map 1 shows population density across South San Francisco.

Equity

Data from the California Communities Environmental Health Screen Tool 3.0 (CalEnviroScreen) and the Metropolitan Transportation Commission's (MTC's) Equity Priority Communities is used to identify areas in South San Francisco that are considered disadvantaged and disproportionately burdened by multiple sources of pollution. CalEnviroScreen uses a set of 20 indicators grouped into four categories—pollution exposure, environmental effects, sensitive populations, and socioeconomic factors—to rate the environmental vulnerability of communities in California. Similarly, MTC uses eight tract-level socioeconomic variables to identify Equity Priority Communities in the Bay Area.

CalEnviroScreen and Equity Priority Communities data for South San Francisco identify vulnerable areas as downtown, Lindenville, Orange Park, and the East Side/Oyster Point region. Of these identified areas, downtown, Orange Park, and parts of Lindenville consist of residential land uses and suggest a need to invest in adequate bicycle and pedestrian facilities within these areas to serve this population of residents. The CalEnviroScreen results can be seen in Map 2, and the Equity Priority Communities results can be seen in Map 3.

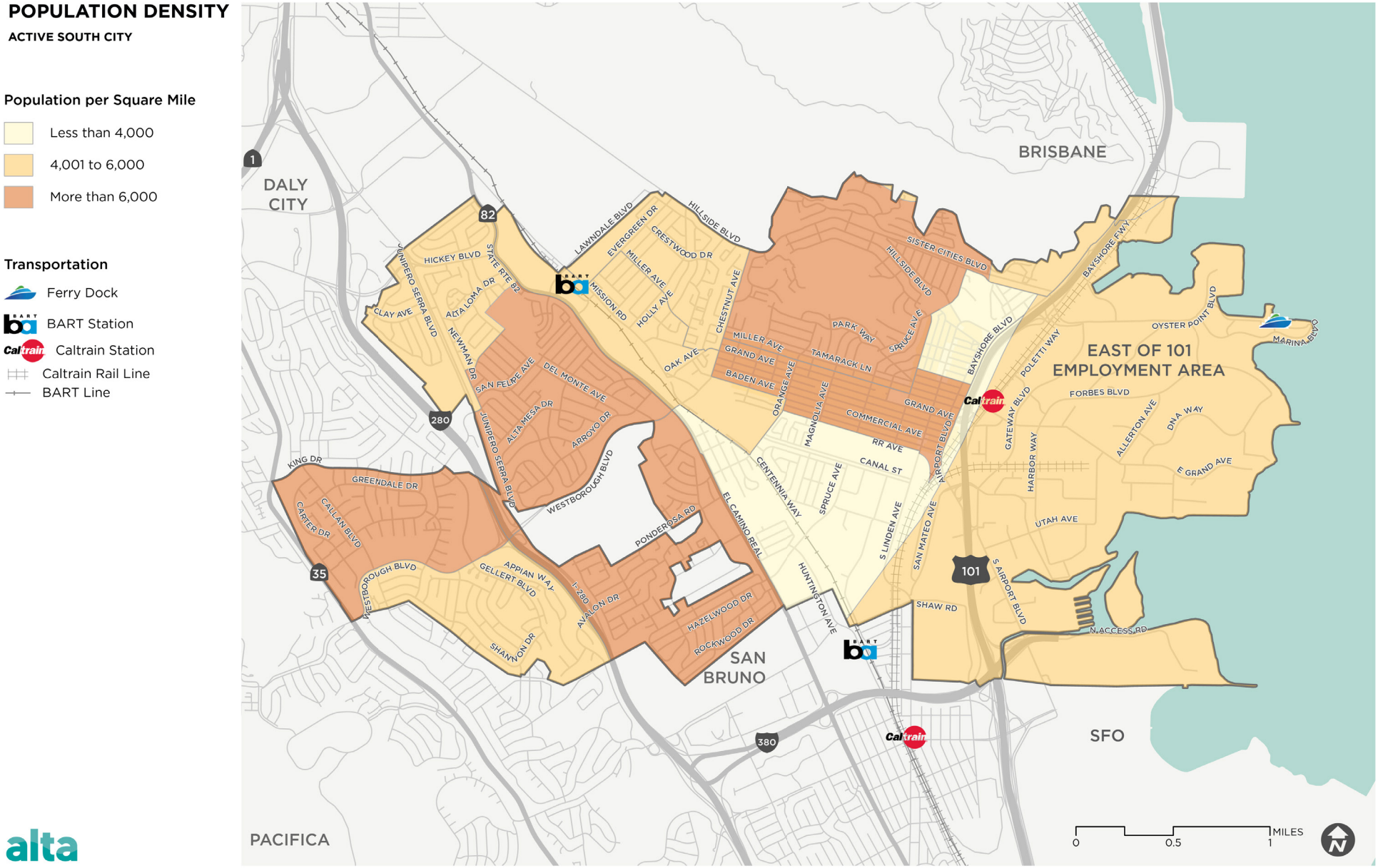
Commute Mode Split 2018



MAP 1

POPULATION DENSITY

ACTIVE SOUTH CITY



MAP 2

CALENVIROSCREEN 3.0

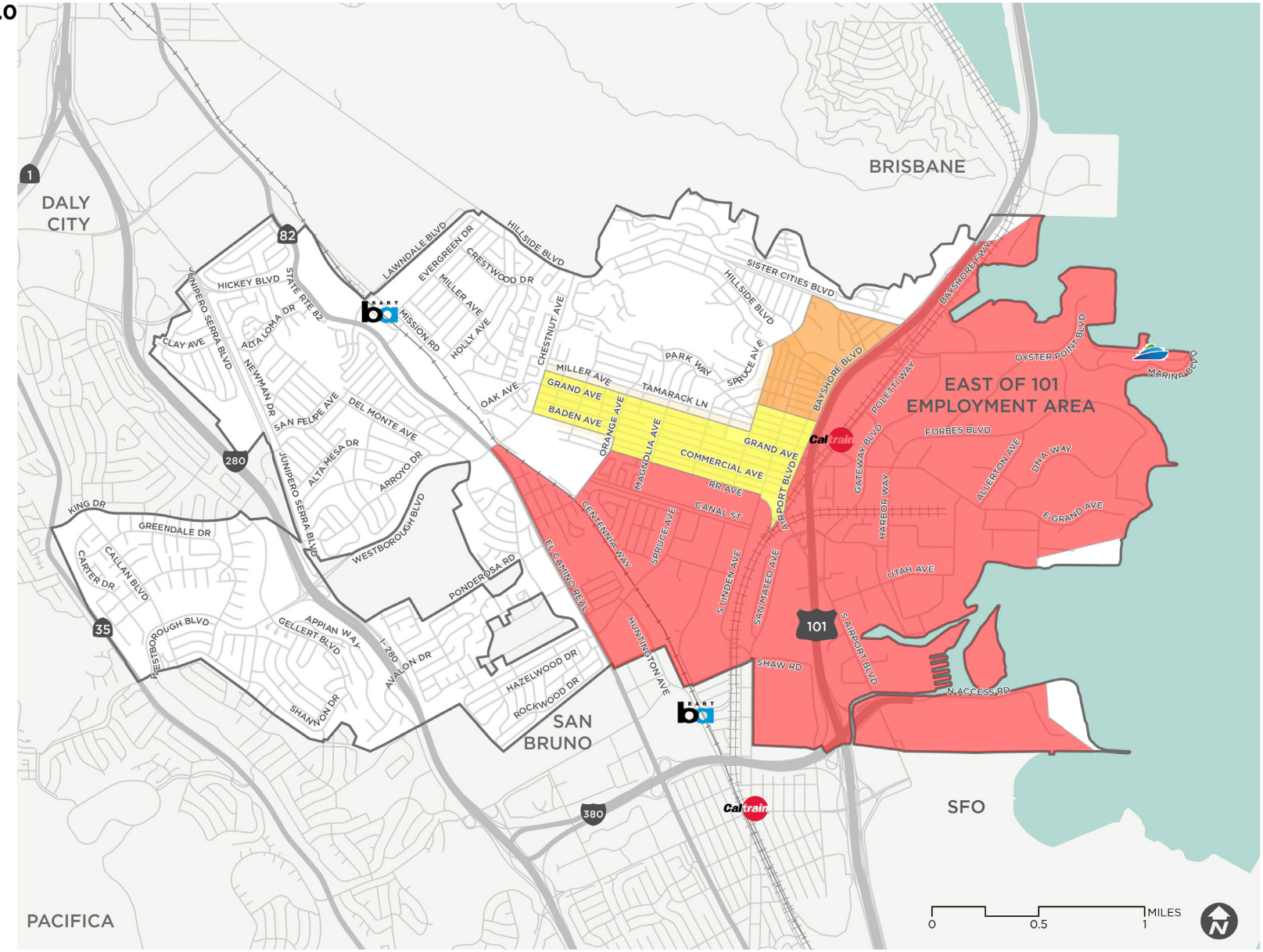
ACTIVE SOUTH CITY

CalEnviroScreen Score (Percentile)

- 70-75%
- 75-80%
- 80-85%

Transportation

- Ferry Dock
- BART Station
- Caltrain Station
- Caltrain Rail Line
- BART Line



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MAP 3

EQUITY PRIORITY COMMUNITIES

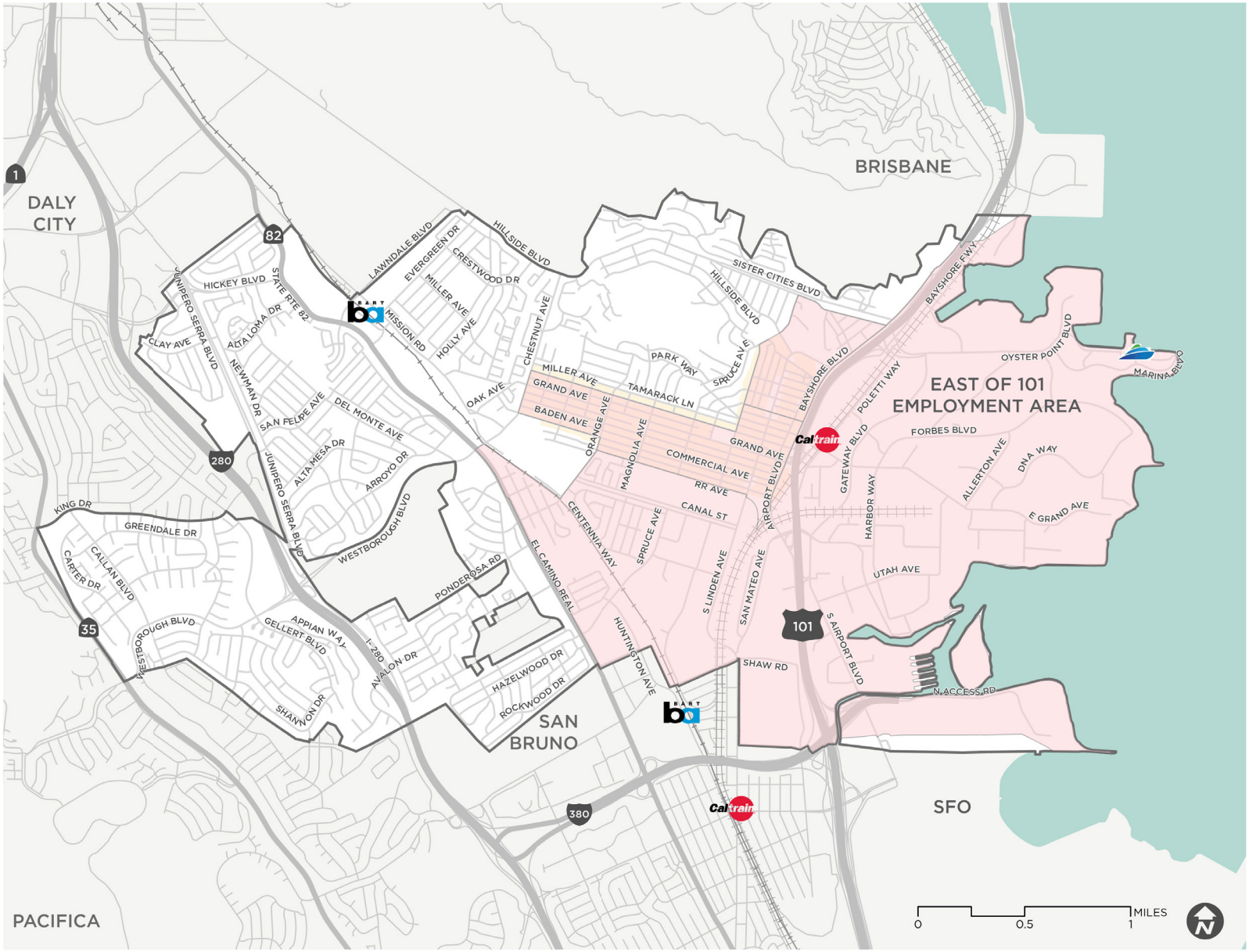
ACTIVE SOUTH CITY

Equity Priority Communities

- High

Transportation

- Ferry Dock
- BART Station
- Caltrain Station
- Caltrain Rail Line
- BART Line



Walking and Biking in South City

EXISTING BICYCLE NETWORK

The California Department of Transportation (Caltrans) defines four classes of bicycle facilities, detailed in this section.

Existing bikeways cover 31% of the city's roadways (154 total roadway miles). Map 4 presents the locations of existing bikeways within South City.

Shared-Use Paths (Class I) – Paved trails wholly separated from the street or highway. They allow two-way travel for people bicycling and walking, and are often considered the most comfortable facilities for children and inexperienced bicyclists because there are few potential conflicts between people bicycling and people driving.

- Examples: Centennial Way Trail, Bay Trail
- Existing Facilities in South City: 10 miles

Bike Lane (Class II) – Striped preferential lanes on the roadway, along with pavement stencils and signs, for one-way bicycle travel. Some bicycle lanes (defined as Class IIB) include a striped buffer on one or both sides to increase separation from the traffic lane or from parked cars, where people may open car doors into the bicycle lane.

- Examples: Sister Cities Boulevard, Grand Avenue
- Existing Facilities in South City: 14 miles

Bike Route (Class III) – Signed routes where people bicycling share a travel lane with people driving. As shared facilities, bicycle routes are typically appropriate on quiet, low-speed streets with relatively low traffic volumes. Class III bicycle routes include shared lane markings or "sharrows" that encourage proper bicyclist positioning in the center of a travel lane and alert drivers that bicyclists may be present.

- Examples: Chestnut Avenue, Spruce Avenue
- Existing Facilities in South City: 22 miles

Separated Bikeways (Class IV) – On-street bicycle facilities that are physically separated from motor vehicle traffic by a vertical element or barrier such as a curb, bollard, or parking aisle. They can allow for one- or two-way bicycle travel on one or both sides of the roadway.

- Examples: N Access Road
- Existing Facilities in South City: 0.25 miles

MAP 4

EXISTING BIKEWAYS

ACTIVE SOUTH CITY

Bikeways

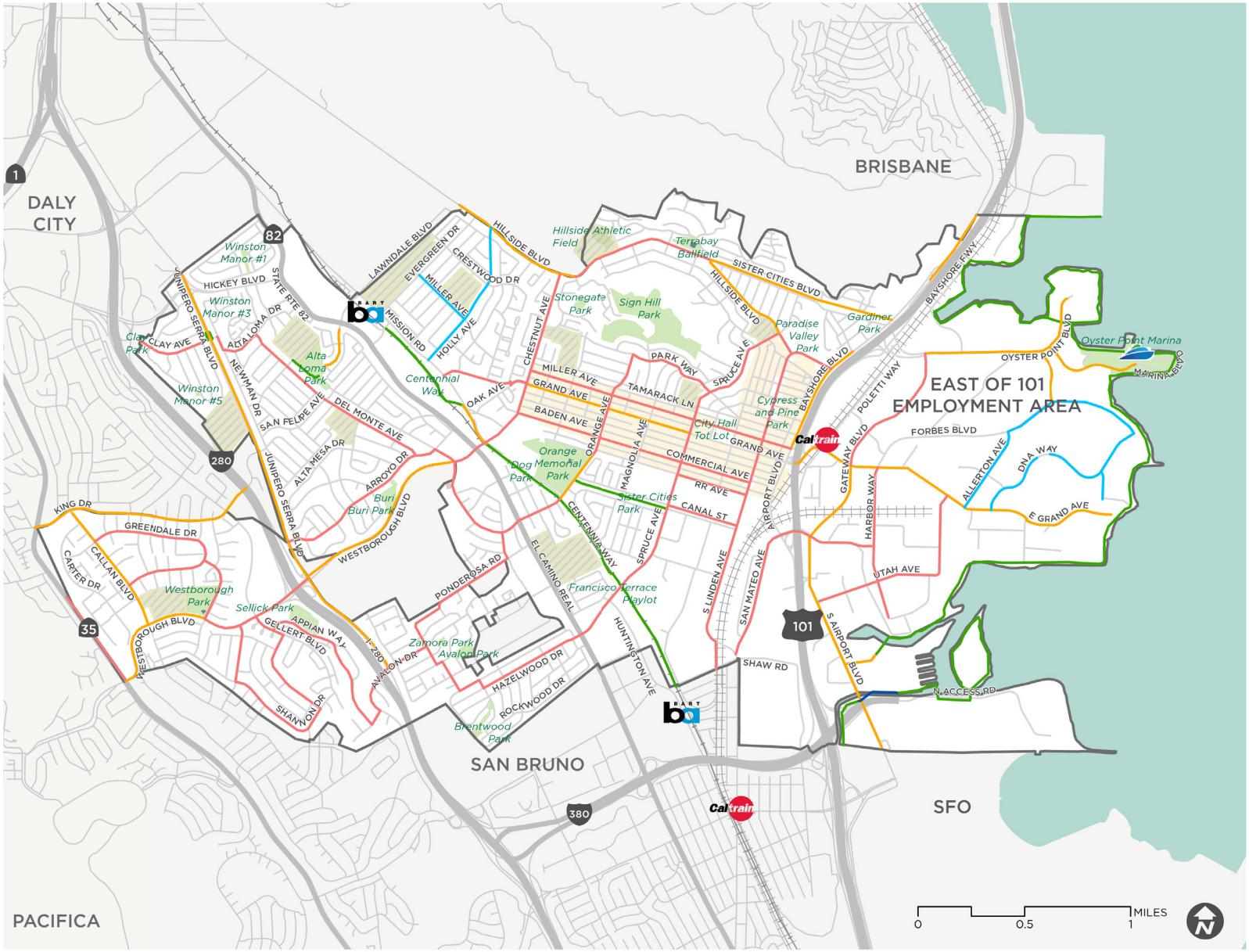
- Class I Shared-Use Path
- Class II Bicycle Lane
- Class IIB Buffered Bike Lane
- Class III Bicycle Route
- Class IV Separated Bikeway

Transportation

- Ferry Dock
- BART Station
- Caltrain Station
- Caltrain Rail Line
- BART Line

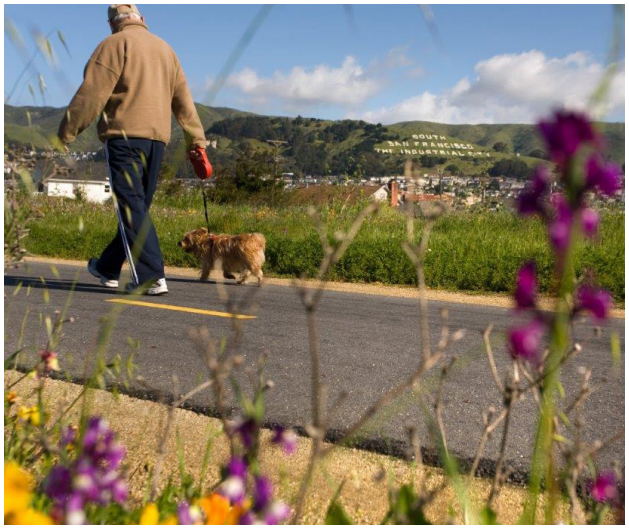
Destinations

- Community Center
- School
- Park
- Library
- Downtown



Existing Walking Network

The transportation system for pedestrians in South City is made up of sidewalks, roadway crossings, separated paths, and a wide variety of amenities that improve the comfort and convenience of walking. Pedestrian infrastructure elements include the following:



Sidewalks – Sidewalks form the backbone of the pedestrian transportation network, forming the primary paths for people walking from home to work, transit, school, shopping, and other needs. The 2013 Pedestrian Master Plan identified sidewalk gaps throughout the city, primarily east of US-101. Other areas with sidewalk gaps included El Camino Real, Westborough Boulevard, Hickey Boulevard, Junipero Serra Boulevard, Gellert Boulevard, Chestnut Avenue, Hillside Boulevard, King Drive, and Carter Drive. Missing sidewalks can be seen in Map 5.

Curb Ramps – Curb ramps provide access to sidewalks and paths for people who use wheelchairs, and are helpful to people pushing strollers or who may have difficulty stepping onto a raised curb. The Americans with Disabilities Act (ADA) requires the installation of curb ramps with all new sidewalk installations and retrofits. Curb ramps may be placed at each end of the crosswalk (perpendicular curb ramps), or between crosswalks (diagonal curb ramps). Detectable warnings (truncated domes) must be used to assist sight-impaired pedestrians in locating the curb ramp.

Crosswalks – Crosswalks are a legal extension of the sidewalk and provide guidance for pedestrians who are crossing roadways by defining and delineating their path of travel. Crosswalks are not required to be marked. However, marked crosswalks alert drivers of a pedestrian crossing point and increase yielding.

Signals and Beacons – Traffic signals at intersections are a critical element for pedestrians, providing a clear indication of the crossing. Pedestrian signal heads provide an indication of appropriate times to cross a signalized intersection. Enhancements such as countdown timers, leading pedestrian intervals, and audible signals can help people cross more safely.

Recent pedestrian-focused signal innovations include rectangular rapid flashing beacons (RRFB), and other

pedestrian-activated warning devices that flash an alternating pattern, highlighting the presence of pedestrians. These are typically installed midblock or at uncontrolled minor intersections.

Pedestrian hybrid beacons (PHB), also known as high-intensity activated crosswalk (HAWK) signals, provide an enhanced pedestrian-activated signal that fully stops traffic. These are typically used for crossings of arterials and other major roads. These signals provide a solid red stop phase and a flashing phase, indicating that drivers should stop before continuing again. There are currently no PHBs in South San Francisco, though Caltrans has installed PHBs in a number of locations along El Camino Real.

Pedestrian Support Facilities – Pedestrian support facilities improve the comfort of the walking environment. Examples include pedestrian-scale lighting on sidewalks and paths, bus stop amenities (e.g., shade structures and benches), enclosure and landscaping (e.g., trees and planters), and trash receptacles. People are less likely to walk to destinations or use public transit without amenities that could provide needed comfort to the walking experience.

The quality of pedestrian facilities across the city varies greatly. Most of the city has sidewalks or side paths adjacent to streets, though there are some exceptions. As noted previously, the 2013 Pedestrian Master Plan compiled a list of missing sidewalks (shown in Map 5). Some of these have been addressed since the previous plan.

Some areas, such as downtown, have better quality pedestrian facilities, while others like the East Side and Lindenville have many instances of missing and broken sidewalks. Much of the city also has rolled curbs and faces challenges with vehicles parking on the sidewalk as a result of the rolled curbs.

MAP 5

MISSING SIDEWALKS

ACTIVE SOUTH CITY

Missing Sidewalk

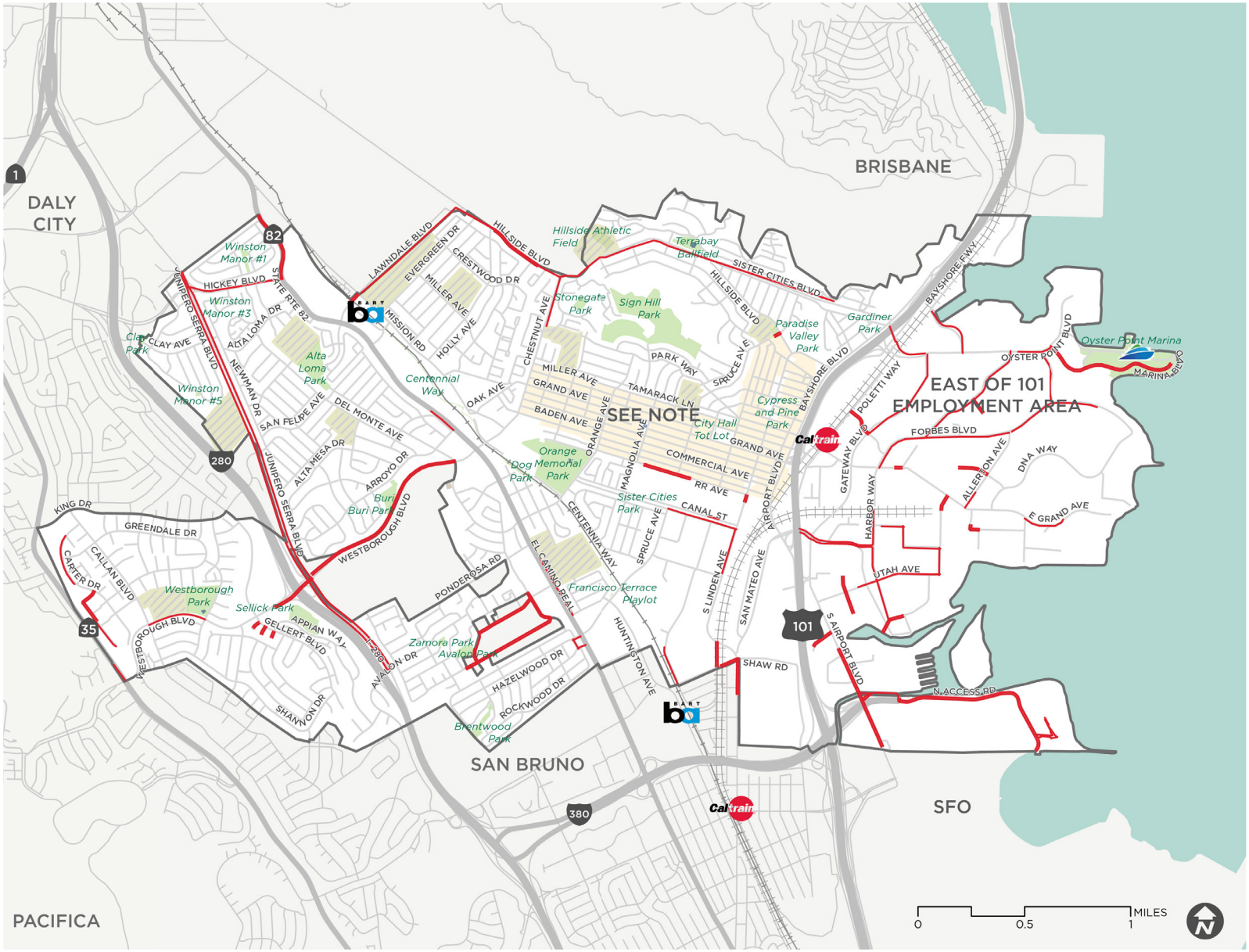
Map based on best available sidewalk inventory data and may not reflect all roadways that lack sidewalks, particularly Lanes within the downtown area that generally lack sidewalks.

Transportation

- Ferry Dock
- BART Station
- Caltrain Station
- Caltrain Rail Line
- BART Line

Destinations

- Community Center
- School
- Park
- Library
- Downtown



Existing Programs and Policies

The City currently offers a number of programs to South City residents and visitors, mainly through the Public Works and Parks and Recreation departments.

VISION ZERO POLICY

On February 24, 2021, the City Council of South San Francisco adopted Vision Zero as a policy direction for South San Francisco, to include the development of a Vision Zero Action Plan aimed at eliminating traffic deaths and severe injuries on city streets through proven practices. These practices include the four Es:

- Evaluating traffic crash data to identify the most serious safety issues
- Engineering and delivering safety improvement projects
- Enforcing traffic laws to reduce unsafe behaviors like speeding, red-light running, and driving under the influence
- Educating the community on safe practices for all modes of travel (walking, bicycling, and driving)

As part of the development of a Vision Zero Action Plan, an additional E for equity would be involved to further address the needs of diverse groups of people in South San Francisco.

To a large extent, the City is already implementing many of the best practices identified in Vision Zero programs. For example, recent capital improvement projects included specific elements to address safety for bicycles (installation of protected bicycle lanes) and pedestrians (bulb-outs or curb extensions to reduce crossing distance at certain streets).

LOCAL ROAD SAFETY PLAN

The City of South San Francisco is currently preparing a Local Road Safety Plan with the following vision, goal, and objectives:

- **Vision:** Support the California vision of moving toward significantly reducing fatalities and serious injuries for all road users.
- **Goal:** Identify transportation safety initiatives (projects and programs) and partnerships under the 5 Es of traffic safety to continue reducing fatalities and serious injuries in South San Francisco.
- **Objectives:**
  - » Identify major contributing factors to crashes and define priority locations for roadway safety improvements including pedestrian, bicycle, and vehicular modes of travel.
  - » Identify cost-effective countermeasures and safety investments that can be applied systemically (e.g., flashing yellow arrows, retroreflective backplates, and leading pedestrian intervals).

- Promote safe, equitable, and multimodal mobility opportunities.
- Define safety projects that are data driven for future Highway Safety Improvement Program (HSIP) and other program funding consideration while providing potential grant funding sources and opportunities.
- Document South San Francisco's procedures for ongoing crash data monitoring.

During the Local Road Safety Plan process, crash data will be used to identify citywide safety trends, high-crash locations, and locations with unusual crash patterns or high crash severities, and to develop recommendations to meet the goal of reducing fatalities and severe injuries.

BART WALK AND BICYCLE NETWORK GAP STUDY

The 2020 Walk and Bicycle Network Gap Study conducted assessments of all BART station areas and developed walking and bicycling recommendations focused on a quarter-mile radius from the station. This Active South City plan supports recommendations identified in the BART study for both the South San Francisco and San Bruno Stations.

HIKING AND WALKING PROGRAMS

The Parks and Recreation department hosts hiking and walking programs at Sign Hill and around the city to encourage community members to learn about natural resources in South City and incorporate movement and physical activity into their daily lives.

STREETS ALIVE! PARKS ALIVE!

Streets Alive! Parks Alive! is an annual event celebrating parks and public spaces. Past events have occurred in Orange Park and encouraged the use of parks and public streets. The event offers a number of activities, such as a youth bicycle course and bicycle helmet giveaways.

SAFE ROUTES TO SCHOOL PROGRAM

Historically, the City has received grants to support Safe Routes to School (SRTS) programs in South City schools. While the City does not currently have dedicated funding, staff still support school safety audits and walking school bus programs with South San Francisco Unified School District.

SHARED MOBILITY SERVICES

The city previously had a pilot bike share program with Lime e-assist bikes in addition to ongoing carpooling and shuttle services. Lime is no longer offering bike share services.

Challenges and Opportunities to Walking and Biking in South City

This section reviews the challenges and opportunities of the city's bicycle and pedestrian network by considering and analyzing the city's demographics, existing bicycling and walking networks, and several measures of the need for walking and bicycling improvements.

Citywide Connectivity – One of the main challenges is the lack of seamless and direct bicycle connections across the street network. Significant barriers like freeways and surface highways, railroad tracks, and the topography create gaps in the street network that make travel difficult for bicyclists and pedestrians alike. Bicycle needs are compounded by the relative lack of high-quality bicycle facilities. Increasing the number of on- and off-street high-quality bicycle routes, especially within major transportation corridors, will help bicyclists navigate through the city street network with more ease and efficiency. New and improved crossings of freeways, major arterials, the Caltrain tracks, and other major transportation facilities will help knit the city together by providing safer and more comfortable routes for people walking and bicycling. Map 6 shows access across major highway and rail barriers in South City.

Neighborhood Accessibility – Many neighborhoods lack low-stress bicycle and pedestrian access routes to major destinations such as transit, parks, schools, and nearby neighborhoods. To gauge how accessible pedestrian and bicycle networks are to the general public, the Level of Traffic Stress (LTS) analysis measures the stress level of the city's bikeways and walkways. LTS is a vital indicator of the nature of the user experience and perceived comfort while traveling. Traffic stress is the perceived sense of danger associated with riding in or adjacent to vehicle traffic and walking along and crossing streets. Studies have shown that traffic stress is one of the most significant deterrents to bicycling and walking. The less stressful—and therefore, more comfortable—a facility is, the wider its appeal to a broader segment of the population.[1] Pedestrian and bicycle networks will attract more significant portions of the population if they are designed to reduce the stress associated with potential motor vehicle conflicts and if they connect people walking and bicycling where they want to go.

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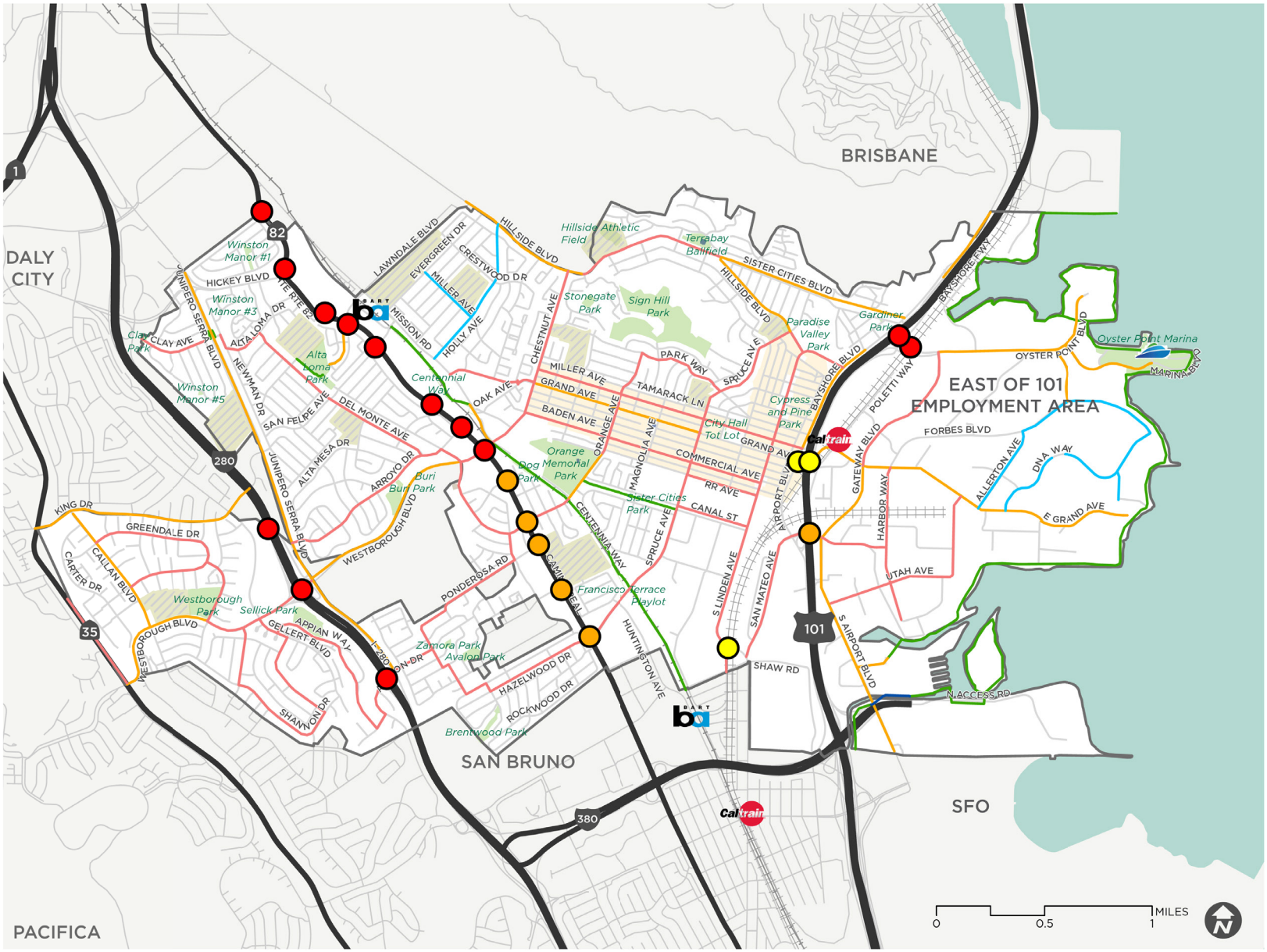
1 Roger Geller, City of Portland Bureau of Transportation. Four Types of Cyclists. http://www.portlandonline.com/transportation/ index.cfm?&a=237507. 2009; 2 Dill, J., McNeil, N. Four Types of Cyclists? Testing a Typology to Better Understand Bicycling Behavior and Potential. 2012.

MAP 6

MAJOR BARRIER CROSSINGS

ACTIVE SOUTH CITY



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TYPES OF BICYCLISTS

Research indicates that the majority of people in the United States (56–73%) would be willing to consider using a bicycle if dedicated bicycle facilities were provided. However, only a small percentage of Americans (1–3%) are willing to ride if no facilities are provided.[2] This research into how people perceive bicycling as a transportation choice has indicated that most people fall into one of four categories, illustrated on the next page.

LEVEL OF TRAFFIC STRESS OVERVIEW

To better meet the needs of the "interested, but concerned" bicyclist, planners developed the Bicycle Level of Traffic Stress (Bicycle LTS) analysis as an objective, data-driven evaluation model to help identify streets with high levels of traffic stress.[3] The analysis uses roadway network data (i.e., posted speed limit, street width, number of travel lanes, intersection conditions, presence and character of bikeway facilities, and land use context) to determine bicyclist comfort levels.

The combination of these criteria creates four levels of traffic stress for the existing roadway network. Lower numbers indicate less stress and higher levels of comfort for people on bicycles. LTS 1 and 2 roads are typically the roadways that appeal to the "interested, but concerned" bicyclists.

LTS 1: All Ages and Abilities

LTS 1 includes off-street shared-use paths and some very low-stress roadways suitable for all ages and abilities. On larger roads, only Class IV separated bikeways that physically separate bicyclists from traffic are considered Bicycle LTS 1 facilities. Quiet residential streets can also be considered LTS 1 facilities.

LTS 2: Average Adult

LTS 2 includes roadways that are comfortable enough for the mainstream adult population to bike on. LTS 2 facilities are typically roadways with lower traffic volumes and slower vehicle speeds. Busier residential streets and some collector streets can be classified as LTS 2. Larger streets that have bicycle facilities can also be considered LTS 2.

2 Roger Geller, City of Portland Bureau of Transportation. Four Types of Cyclists. http://www.portlandonline.com/transportation/ index.cfm?&a=237507. 2009; 2 Dill, J., McNeil, N. Four Types of Cyclists? Testing a Typology to Better Understand Bicycling Behavior and Potential. 2012.

3 The LTS analysis used for Santa Clara is from the 2018 VTA Countywide Bicycle Plan.

LTS 3: Confident Adult

LTS 3 includes roadways that are likely to be comfortable for an experienced, confident bicyclist. LTS 3 streets have moderate traffic volumes and higher speeds. Corridors with bicycle facilities that provide insufficient separation from traffic are commonly considered LTS 3.

LTS 4: Fearless Adult

LTS 4 includes roadways that are typically ridden by strong or fearless bicyclists. LTS 4 corridors have high volumes of traffic and fast vehicle speeds. Even some corridors with moderate traffic volumes and speeds may be considered LTS 4 if there are no bicycle facilities present.

While this typology is typically applied to bicyclists, similar typologies can apply to pedestrians as they walk and travel along different types and sizes of roadways. For pedestrians, roadways with multiple lanes, intersections with free-right turn lanes, highway interchanges, and similar areas are some of the highest-stress pedestrian facility types.

The results of the LTS analysis are shown in Map 7.

MAP 7

BICYCLE LEVEL OF TRAFFIC STRESS

ACTIVE SOUTH CITY

Bikeways

- Level 1 All Ages and Abilities
- Level 1 All Ages and Abilities (Residential)
- Level 2 Average Adult
- Level 3 Confident Adult
- Level 4 Fearless Adult

Transportation

- Ferry Dock
- BART Station
- Caltrain Station
- Caltrain Rail Line
- BART Line

Destinations

- Community Center
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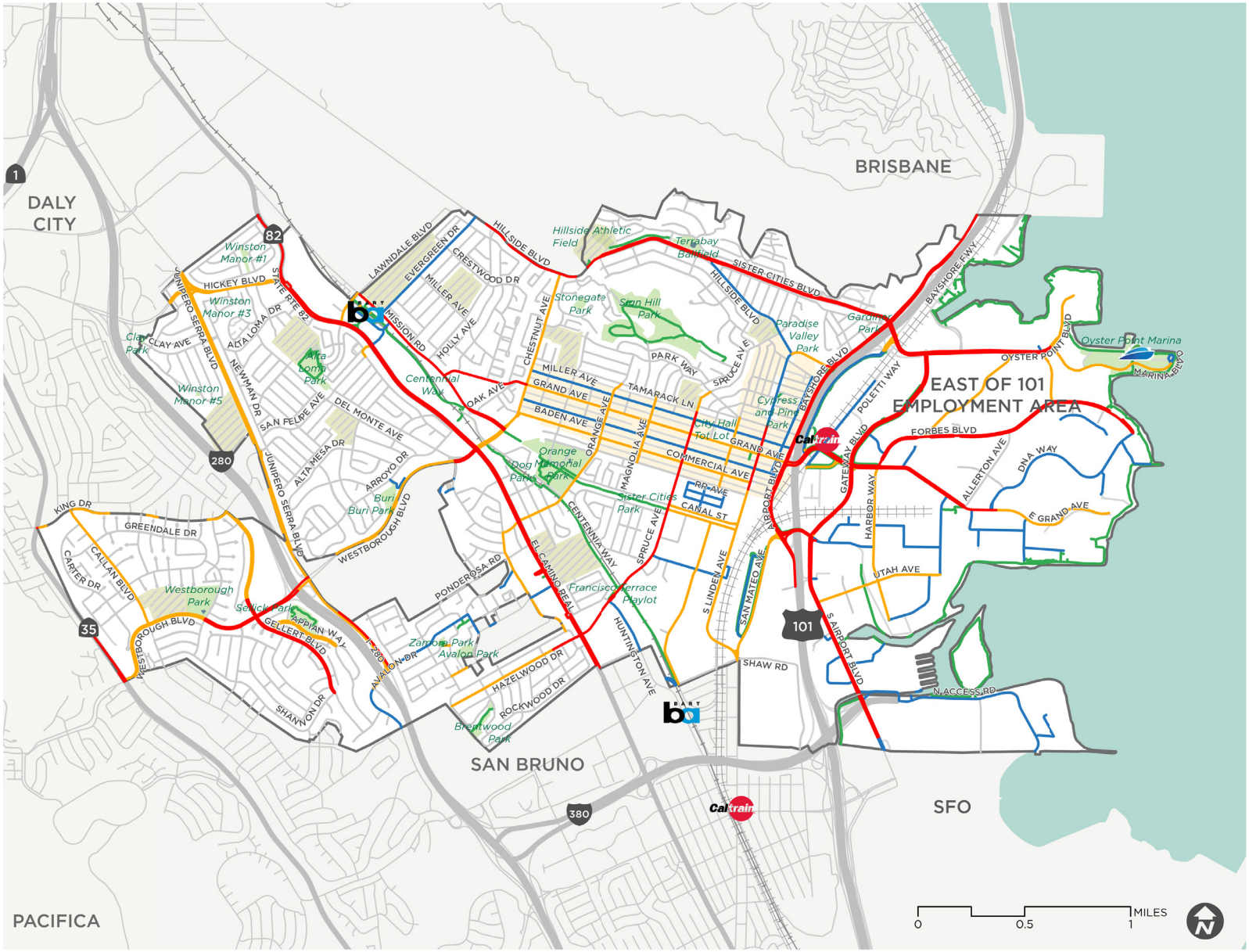
- Park
- Library
- Downtown



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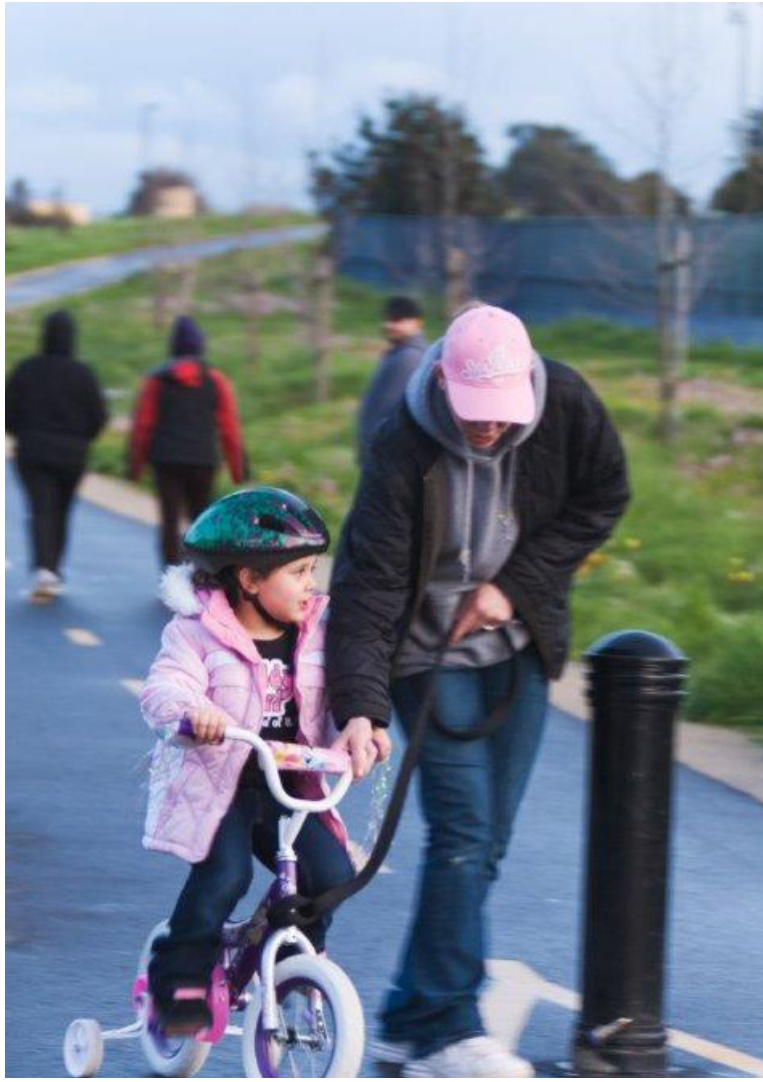
Roadways with high LTS ratings isolate neighborhoods from each other in South San Francisco. In addition, many destinations are located on the fringes of each neighborhood, along collector and arterial roads with high LTS ratings. This makes bicycle and pedestrian travel to destinations undesirable for neighborhood residents who may feel intimidated, unsafe, and unwelcome beyond the realm of low-stress residential streets. In addition to integrating the needs of bicyclists and pedestrians into major and high-stress roads, an essential need is to provide neighborhood traffic calming—bicycle boulevards, street greening and beautification tools, and wayfinding—to improve access to destinations.

BICYCLE AND PEDESTRIAN COLLISION ANALYSIS

Enhancing roadway intersections in pedestrian-focused areas such as downtown, and at freeway crossings and major roads, can help improve conditions for bicyclists and pedestrians in South City. Pedestrian- and bicycle-involved collisions were analyzed between 2013 and 2017 (the most recent set of complete data available when this plan process started). In this five-year analysis period, there were 200 collisions that involved either a pedestrian (126) or a bicyclist (75). Roughly two-thirds of these collisions involved pedestrians. There were five fatalities during this period, all pedestrians. Drivers failing to yield to pedestrians were identified as the cause of about 60% of pedestrian-related collisions. Bicycle- and pedestrian-involved collisions occurred throughout the city, but were concentrated along several higher-stress corridors:

- El Camino Real
- Grand Avenue
- Linden Avenue
- Spruce Avenue
- Airport/Bayshore Boulevards



LTS 1 off-street shared-use paths are suitable for all ages and abilities.

High-visibility crosswalks are a safety measure that can protect pedestrians crossing the street.

The locations of pedestrian- and bicycle-involved collisions and fatalities are shown in Map 8. As part of the City's Vision Zero efforts, a High Injury Network (HIN) was developed identifying roadway corridors in the city that had the highest percentage of serious and fatal crashes. The HIN map is included in this plan in Map 9.

Many of the city's bicycle and pedestrian collisions occurred in high traffic volume locations, such as those previously mentioned. Providing additional safety measures for bicyclists and pedestrians at major conflict areas will help integrate their needs in a network that is primarily designed for vehicle traffic. Such safety measures can include high-visibility crosswalks, curb extensions and reduced corner radii, traffic calming techniques, pedestrian-level street lighting, reduced street widths, leading pedestrian and bicycle signal intervals, and more. Making these types of safety improvements can also bring driver awareness to the needs of bicyclists and pedestrians and can help change the perspective on what is needed to better accommodate the needs of all roadway users.

Growing Demand – New residential development and continued growth of biotechnology and other industries creates a need to provide more numerous and varied sustainable transportation options to help residents and employees access transit, work, and other destinations.

Most areas of South City are expected to experience an increase in trips across all modes for all trip purposes by 2040. The area east of US-101 and the area south of Railroad Avenue between El Camino Real and US-101 are expected to have the greatest increase in trips

MAP 8

BICYCLE AND PEDESTRIAN COLLISIONS

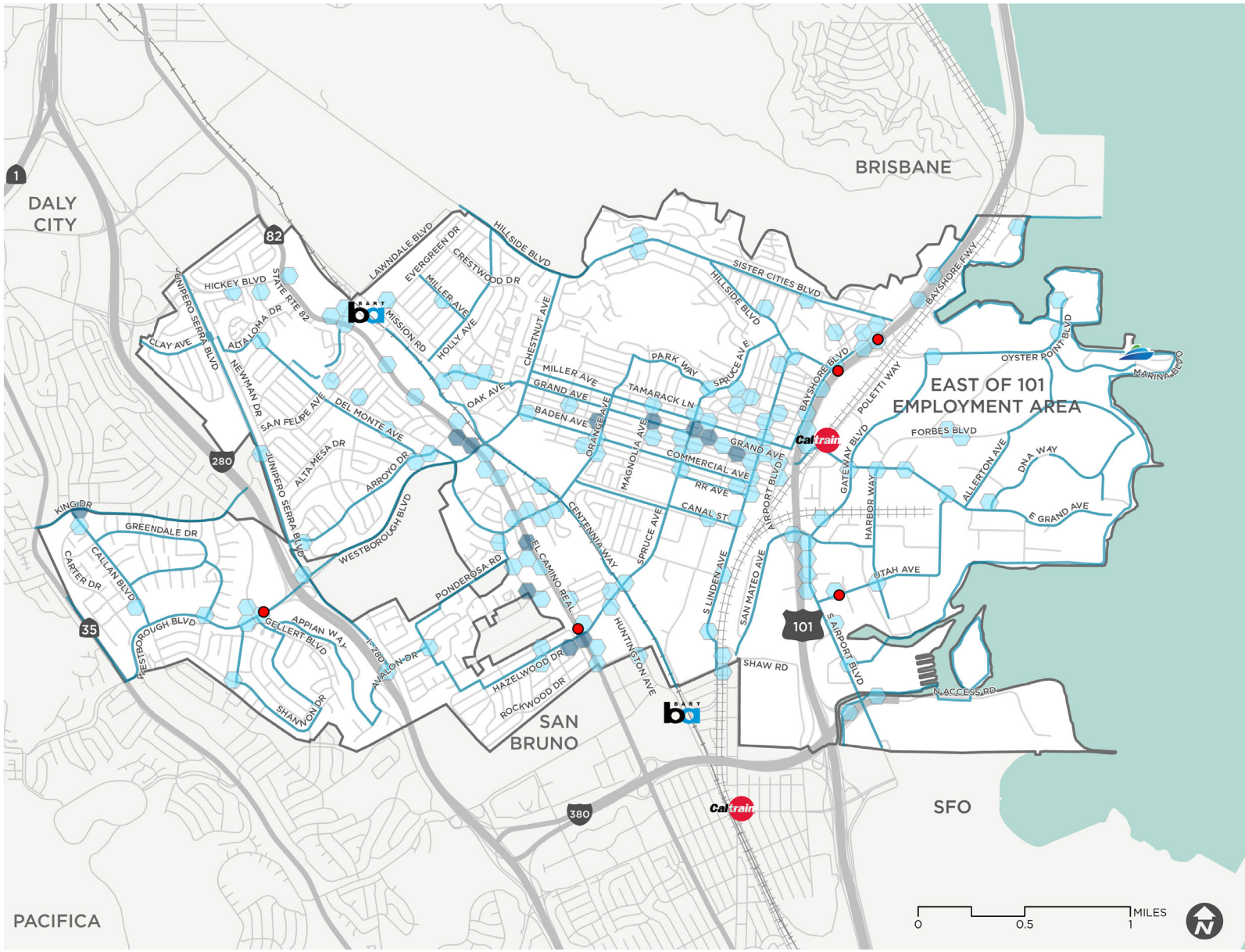
ACTIVE SOUTH CITY

Collisions per Hexagon (2013 - 2017)

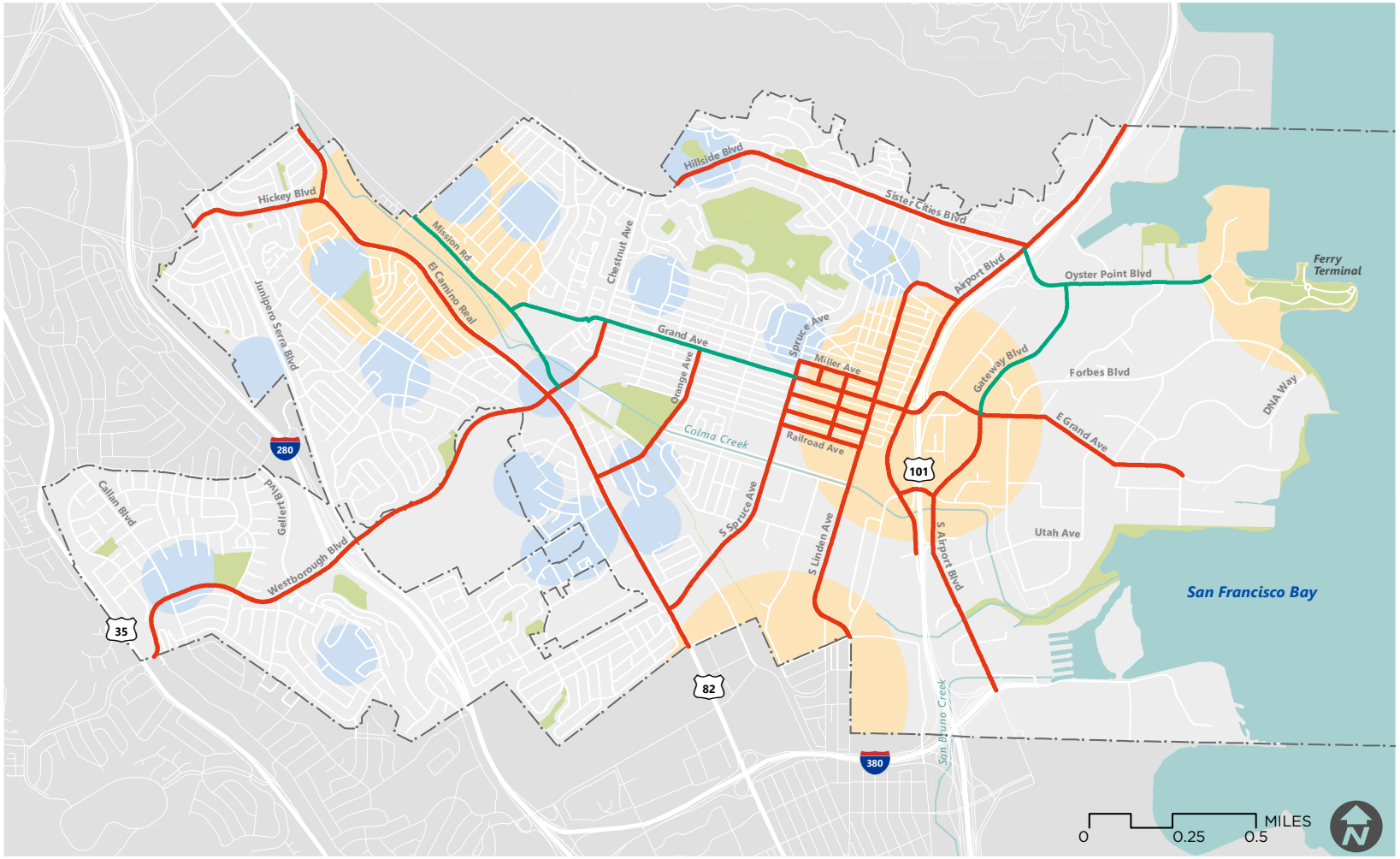
- 1 to 2 Collisions
- 3 to 5 Collisions
- Pedestrian Fatality
- Existing Bikeway

Transportation

- Ferry Dock
- BART Station
- Caltrain Station
- Caltrain Rail Line
- BART Line



MAP 9



HIGH INJURY NETWORK

ACTIVE SOUTH CITY

- Complete Streets Opportunities
- High Injury Network
- 1/8 Mile School & Community Zone
- 1/5 Mile Transit Zone
- City Limits

Source: Draft General Plan, November 2021. Collisions from Transportation Injury Mapping System 2015-2019

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Connecting People to Places in South City

South San Francisco is home to many community destinations, including schools, parks, transit stations, retail areas, and trails. These destinations are spread throughout the city but typically are along larger collector or arterial streets. Additionally, the area east of US-101 is a significant employment hub attracting workers from across the Bay Area and beyond.

SUPPORTING NEIGHBORHOODS

The transportation landscape is unique within each neighborhood as each has a different layout, destinations, and barriers. Barriers are important to understand at the neighborhood level because they create a unique transportation environment for each area. These barriers can limit crossing opportunities and discourage people from making active trips, both internally and across neighborhoods. Most of the existing highway and rail crossings are not well designed for pedestrians and bicyclists with very limited or no dedicated facilities.

For example, an elderly resident may hesitate to walk to downtown from Sign Hill, not because the distance is too far, but because they cannot walk back up the hill easily. This same resident may be comfortable using an e-bike, however. Someone living in Westborough may want to bike to the Caltrain station but is not currently comfortable crossing three highways (I-280, SR-82, and US-101) to get there. Improvements to key components of South City's infrastructure have the potential to unlock inter-neighborhood trips for residents who would otherwise be uncomfortable taking such trips, creating access to community destinations in other parts of the city that were otherwise inaccessible or accessible only by a vehicle trip.

Walking and bicycling improvements can also transform trips within neighborhoods. Important destinations, including parks, schools, and libraries are community hubs used by residents of all ages and cultures. Ensuring that these destinations are highly accessible for everyone will help create a more vibrant, active, and healthier community. Fostering comfortable connections to local destinations can also help transform short vehicle trips into active trips.

Improved local and crosstown connections create a network of enhanced pedestrian and bicycle facilities that will improve safety, generate additional active trips, produce more active residents, and link community destinations together across barriers and neighborhoods.

Considering Various Trip Types

As major destinations and residential neighborhoods are spread across South San Francisco, residents, workers, and visitors commonly travel across neighborhoods. There are many common types of trips that are made throughout the city:

- Trips to parks, trails, and community centers
- Trips to transit (BART, Caltrain, and Oyster Point Terminal)
- Trips to schools and libraries
- Trips to commercial centers
- Trips across freeways

People may have to travel across and along higher-stress streets or use routes with significant out-of-direction travel to avoid higher-stress areas while traveling through South San Francisco. Existing low-stress bikeways can be seen in Map 10. The only current low-stress bicycle facilities in South City are existing trails.

While trails do connect to some of these major destinations, low-stress access is only available for residents who live close to the trail. For other destinations, like the library, schools, and downtown commercial centers, there are no low-stress facilities nearby. Chapter 4 further examines these trip types.

MAP 10

EXISTING BICYCLE STRESS AND ACCESS TO DESTINATIONS

ACTIVE SOUTH CITY

Low Level of Traffic Stress

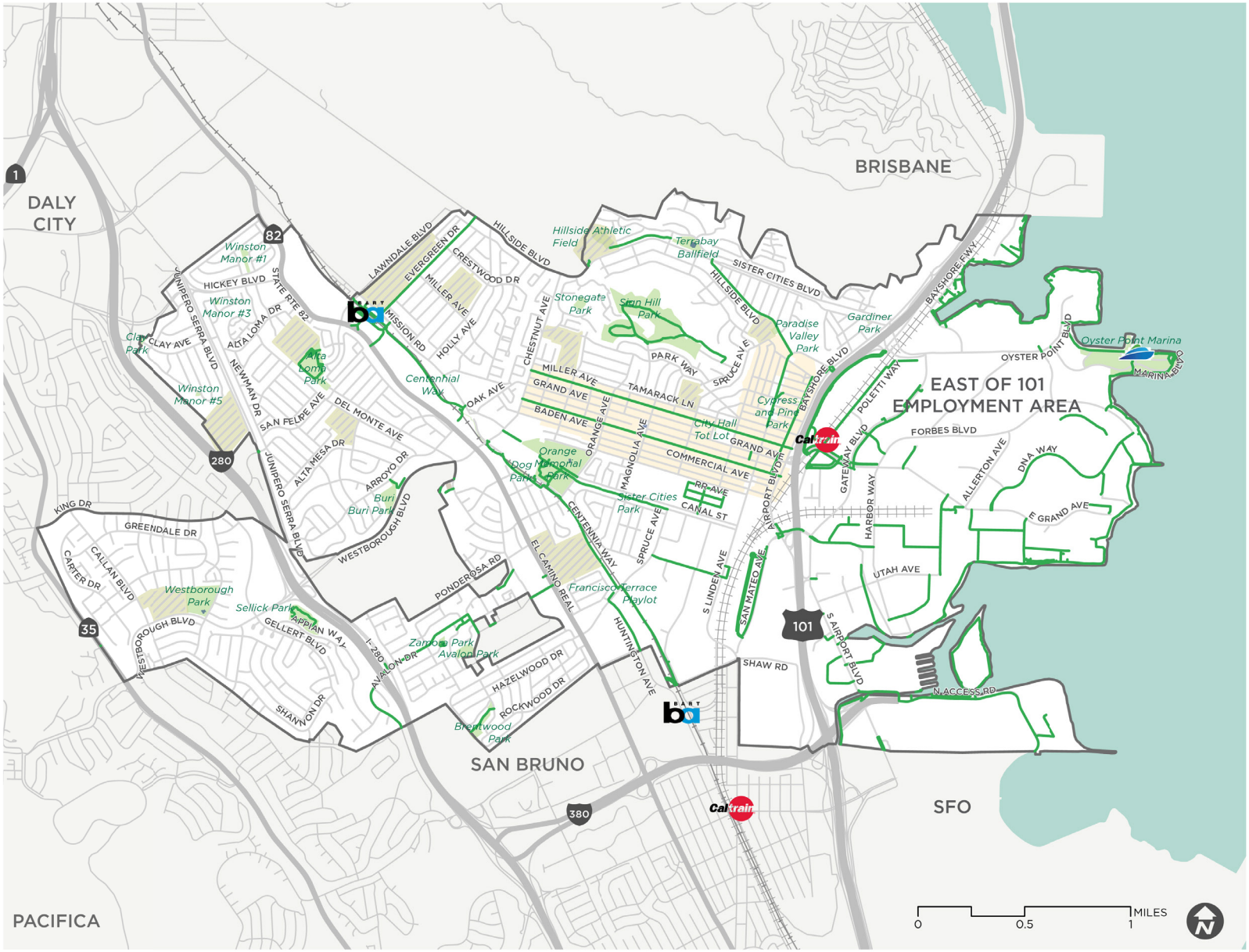
Existing Low Stress Bikeway (LTS 1 and 2)

Transportation

- Ferry Dock
- BART Station
- Caltrain Station
- Caltrain Rail Line
- BART Line

Destinations

- Community Center
- School
- Park
- Library
- Downtown



03

Community Engagement

Community Engagement

Engaging the South City community has been a priority for the Active South City's current planning efforts. Since this project kicked off in July 2018, a variety of outreach opportunities have been used to seek input from diverse South San Francisco residents and community members.

The project team used a variety of outreach formats to inform community members about the development of this bicycle and pedestrian plan.

Pop-Up Events

Throughout the process, six mobile workshops were held to share information and receive comments and feedback. Mobile workshops allowed the project team to go out into the community to bring plan updates and receive feedback from community members at popular locations and community events around the city. These mobile workshops aimed to reach as many residents as possible by trying to intercept them in their daily lives at places such as festivals, transit stations, libraries, and parks and festivals.

Online Engagement

South City residents could provide feedback online at two points in the process. Early in the process, South City community members were asked to identify barriers to walking and biking on an online interactive map, which collected over 250 comments. After draft recommendations were developed, community members could provide feedback on the proposed recommendations through a similar online web tool that allowed people to comment on, "like," or "dislike" recommendations and see the comments of fellow residents.

Committees and Commissions

The project team brought project updates to and solicited input from a number of City committees and commissions, informing important decision-makers of progress and coordinating with other ongoing projects. These groups included the following:

- Bicycle and Pedestrian Advisory Commission
- General Plan Advisory Committee
- Planning Commission
- City Manager's Office
- San Mateo County representatives (Bicycle and Pedestrian Master Plan Coordination)

Outreach Timeline

JULY 2018

PROJECT KICKOFF

FALL 2018 - SPRING 2019

EXISTING CONDITIONS REVIEW

- "Las Fiestas Patrias" (Sep 16, 2018)
- Concert in the Park (Sep 22, 2018)
- BPAC Meeting (Sep 2018)
- South City BART Station (Nov 7, 2018)
- Trivia Night at Armstrong Brewery (Nov 14, 2018)
- City Council (February 13, 2019)
- Library Week "Meet the BPAC" (April 10, 2019)

SUMMER 2019 - FALL 2019

NEEDS ANALYSIS AND PLAN RECOMMENDATIONS

- South City Health Fair (Nov 10, 2019)
- BPAC Meeting (Nov 2019)
- BPAC Meeting (June 2019)

WINTER 2019 - SUMMER 2021

RECOMMENDATION REVISIONS AND PRIORITIZATION

- Santa Comes to Town (Dec 7, 2019)
- General Plan Community Advisory Committee (Dec 10, 2019)
- Planning Commission Meeting (Dec 19, 2019)
- BPAC Meeting (Jan 2020)
- San Mateo County Bicycle and Pedestrian Master Plan Meeting (Jan 31, 2020)
- BPAC Meeting (Feb 2020)

FALL 2021 - SUMMER 2022

DRAFT AND FINAL PLAN

- BPAC Meeting (Feb 2022)
- BPAC Meeting (May 2022)

What Did We Hear?

Overall, this is what South City community members want:

Better connections to the East-of-101 neighborhood. Currently, there are walking and biking barriers to getting to the East-of-101 area, with only three access points. Community members want to be able to access jobs and recreational opportunities along the Bay Trail.

Improve trail access and connectivity. Overall, community members were interested in getting more transportation opportunities away from busy streets. Residents were interested in expanding the Centennial Way Trail and improving access to the Bay Trail.

Improved biking conditions, especially on arterials. South San Francisco has a number of large arterials that are barriers to biking but offer the most direct route to people's destinations. Based on community input, Sister Cities Boulevard, Grand Avenue, and Airport Boulevard are some of the most requested corridors for improved bicycling conditions.

More biking and walking encouragement activities. Community members were interested in seeing more citywide programming encouraging residents and visitors to walk and bike for their local trips. Some mentioned that programs should focus on encouragement, rather than solely on enforcement, as those enforcement tactics are likely to most negatively impact youth and other vulnerable communities.

Slow vehicle speeds around schools. Many residents and families with school-age children were concerned with high vehicle speeds around schools. South City has two high schools located near El Camino Real, a major regional thoroughfare. Community members were interested in recommendations that provided traffic calming effects and improved pedestrian crossings near all South City schools.

Enhanced pedestrian comfort and amenities. People in South City would like to walk more than they do now. Many asked for amenities that would enhance pedestrian comfort, such as placing benches and bus shelters near community centers and libraries. Frequent benches help seniors and others with mobility limitations by providing more frequent resting places during their walks. Community members were also interested in adding more green space into the pedestrian experience, citing examples like the existing parklets and other small neighborhood parks.

04

Recommendations

Recommendations

Built on the needs analysis and public outreach process, Chapter 4 presents the recommended bicycle and pedestrian networks for Active South City.

Bicycle Network Recommendations

This plan aims to create a comfortable and connected bicycle network that gets people where they want to go. In order to do this, the City will implement a number of different bikeway types suitable to different roadway characteristics found throughout the city. This section outlines the different types of bikeways and supporting amenities that South City could install. Dedicated bikeways also serve low speed micromobility devices such as scooters, and help ensure those devices are not improperly ridden on sidewalks.

Bikeways Toolbox

Certain types of bikeways are better suited to different roadways, based on many considerations including how fast vehicles travel and how many vehicles use the road, roadway width, parking, and other types of transportation modes using the space. The following bikeways and bike amenities are part of South City's bikeway toolbox.

Class I Shared-Use Path (trails)

- Paths wholly separated from vehicle traffic and used by people walking and biking
- Comfortable for people of all ages and abilities
- Typically located immediately adjacent and parallel to a roadway or in its own independent right-of-way, such as within a park or along a body of water

Class II Bike Lane

- A dedicated lane for bicycle travel adjacent to traffic
- Painted white lines and symbols demarcate the bicycle lane

Class IIB Buffered Bike Lane

- A dedicated lane for bicycle travel separated from vehicle traffic by a painted buffer
- The buffer (typically two to three feet wide) provides more comfort for users by providing additional separation from moving vehicles and parked cars

Class III Bike Route

- A signed bike route that people biking share with vehicles
- Can include pavement markings (sharrows)
- Comfortable only for people who are more confident biking

Class IIIB Bicycle Boulevard

- Calm, local streets where bicyclists have priority but share roadway space with motor vehicles
- Shared roadway bicycle markings on the pavement, signs, and traffic calming features like speed humps and traffic diverters that slow down or reroute cars, keeping these streets more comfortable for bicyclists with less cut-through traffic
- Comfortable for people with a broader range of comfort levels

Class IV Separated Bikeway

- An on-street bikeway physically separated from motor vehicle traffic by a curb, median, planters, parking, elevation or other barriers
- Comfortable for people with a wider range of comfort levels

Proposed Bicycle Network

At full buildout, the proposed bicycle network would nearly double the existing mileage of bikeways, and add just over 20 miles of Class IV Separated Bikeways. Table 1 displays the existing and recommended bikeway mileage. In addition, the table shows the number of existing bikeways that will be upgraded to more comfortable and separated bikeways. Bicycle boulevard projects were grouped together based on proximity and network connectivity.

A full list of the proposed bikeway segments can be found in Table 2 and Table 3. Map 11 shows the recommended bikeway projects.

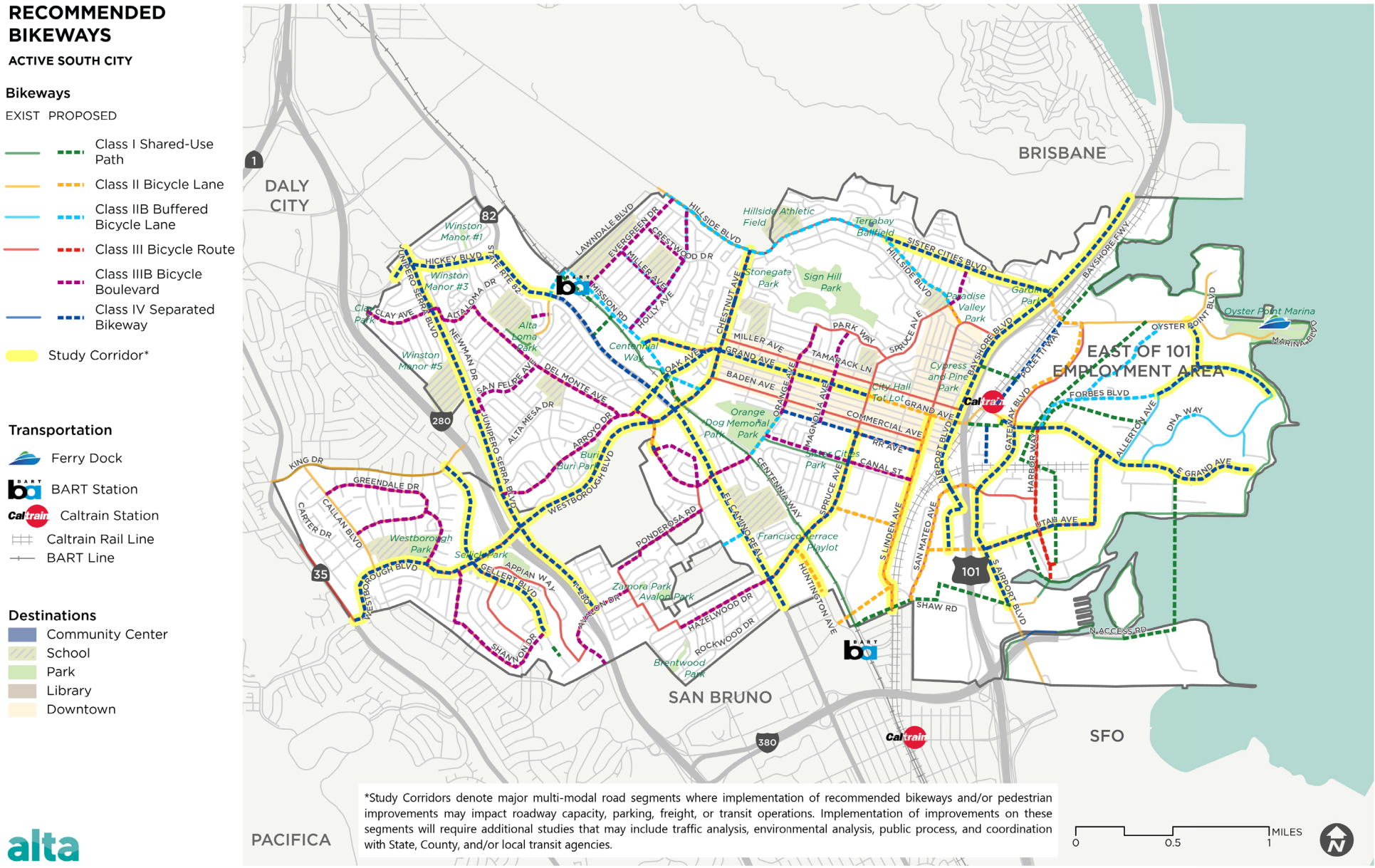
TABLE 1 *Recommended and Upgraded Bikeways*

	Existing Mileage	Recommended Mileage	Upgraded Mileage	Full Buildout Mileage
Class I Shared-Use Path	10.4	6.4	-	16.8
Class II Bike Lane	14	4.8	10.7	8.1
Class IIB Buffered Bike Lane	3.1	4.6	0.7	7
Class III Bike Route	23.5	0.9	17.2	7.2
Class IIIB Bicycle Boulevard	0	11.9	-	11.9
Class IV Separated Bikeway	0.2	21.6	-	21.8
TOTAL	51.2	50.2	28.6	72.8

MAP 11

RECOMMENDED BIKEWAYS

ACTIVE SOUTH CITY



*Study Corridors denote major multi-modal road segments where implementation of recommended bikeways and/or pedestrian improvements may impact roadway capacity, parking, freight, or transit operations. Implementation of improvements on these segments will require additional studies that may include traffic analysis, environmental analysis, public process, and coordination with State, County, and/or local transit agencies.

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TABLE 2 *Recommended and Upgraded Bikeways*

Street	Cross Street 1	Cross Street 2	Bikeway Class	Mileage
Airport Blvd	Miller Ave	Armour Ave	IV	0.34
Airport Blvd	Armour Ave	Chapman Ave	IV	0.23
Airport Blvd	2nd Ln	S Airport Blvd	IV	0.26
Airport Blvd	2nd Ln	Miller Ave	IV	0.17
Airport Blvd	Chapman Ave	Sister Cities Blvd	IV	0.24
Airport Blvd	Grand Ave	Belle Aire Rd	IV	1.03
Arroyo Dr	Camaritas Ave	El Camino Real	IV	0.14
Bay Trail/Shaw/Tanforan	Airport Blvd	Huntington Ave	I	0.91
Bayshore Blvd	Sister Cities Blvd	City limit	IV	0.63
Bike/Ped Bridge	Airport Blvd	Poletti Way	I	0.20
Centennial Way Trail	Existing trail	City limit	I	0.21
Centennial Way Trail Connections	Grand Ave	El Camino Real	I	0.15
Chestnut Ave	El Camino Real	Sunset Ave	IV	0.66
Chestnut Ave	Sunset Ave	Hillside Blvd	IV	0.28
Colma Creek Bay Trail	Existing Bay Trail	Utah Ave	I	0.29
Colma Creek Service Road	Harbor Way	Colma Creek Trail	III	0.09
Country Club Dr	Alida Way	El Camino Real	IIB	0.13
DNA Way	Existing facility	Existing facility	IIB	0.06
E Grand Ave	Forbes Blvd	End	IV	1.18
E Grand Ave Trail	Grand Ave	Forbes Blvd	IV	0.29
E Grand Ave	Grand Ave	Poletti Way	I	0.20
Eccles Ave	Forbes Blvd	Oyster Point Blvd	IIB	0.59
El Camino Real	McLellan Dr	Chestnut Ave	IV	0.88
El Camino Real	Westborough Blvd	City limit	IV	1.16
El Camino Real	Lawndale Blvd	City limit	IV	0.70
Forbes Blvd	E Grand Ave	Allerton Ave	IIB	0.68
Forbes Blvd	DNA Way	Allerton Ave	IV	0.67
Gateway Trail	E Grand Ave	Oyster Point Blvd	II	0.67
Gellert Blvd	Westborough Blvd	Shannon Dr	IV	0.54

Street	Cross Street 1	Cross Street 2	Bikeway Class	Mileage
Gellert Blvd	King Dr	Westborough Blvd	IV	0.56
Gellert-Chateau			I	0.06
Grand Ave	Chestnut Ave	Mission Rd	IV	0.41
Grand Ave	Chestnut Ave	Spruce Ave	IV	0.81
Grand Ave	Spruce Ave	Airport Blvd	II	0.47
Grand Ave	Bayshore Blvd/Airport Blvd	E Grand Ave	II	0.04
Gull Dr	Forbes Blvd	Oyster Point Blvd	IV	0.25
Harbor Way	E Grand Ave	Railroad tracks/proposed trail	III	0.20
Harbor Way	Railroad tracks/proposed trail	Littlefield Ave	III	0.53
Haskins Way	E Grand Ave	North Access Road	I	1.08
Hickey Blvd	City Limit	El Camino Real	IV	0.57
Hillside Blvd	Linden Ave	Spruce Ave	II	0.12
Hillside Blvd	Lawndale Blvd	Spruce Ave E	IIB	1.79
Huntington Ave	Spruce Ave	Noor Ave	II	0.27
Junipero Serra Blvd	Avalon Dr	City limit	IV	2.12
Linden Ave	Tanforan Ave	Grand Ave	II	1.06
Littlefield Ave	E Grand Ave	Utah Ave	IV	0.38
Littlefield Ave	Harbor Way	Proposed trail	III	0.03
McLellan Dr	El Camino Real	Mission Rd	IIB	0.17
Mission Rd	Chestnut Ave	Lawndale Blvd	I	0.23
Mission Rd	Chestnut Ave	Lawndale Blvd	IIB	0.94
Near Cabot Rd	Allerton Ave	E Grand Ave	I	0.61
Near Eccles Ave & Gull Dr	E Grand Ave	Oyster Point Blvd	I	0.79
Near Harbor Way	E Grand Ave	Littlefield Ave	I	0.84
Oak Ave	Mission Rd	Grand Ave	IV	0.13
Oak Ave Extension	El Camino Real	Oak Ave	IV	0.21
Orange Ave	Centennial Way Trail	Railroad Ave	IIB	0.26
Oyster Point Blvd	Sister Cities Blvd	Gateway Blvd	II	0.27
Poletti Way	Caltrain Station Tunnel	Oyster Point Blvd	IV	0.83
Poletti Way	Oyster Point Blvd	Bay Trail	I	0.83

Street	Cross Street 1	Cross Street 2	Bikeway Class	Mileage
Produce Ave/new road	Airport Blvd/San Mateo Ave	Utah Ave extension	IV	0.38
Railroad Ave	Orange Ave	Linden Ave	IV	0.74
S Spruce Ave	N Canal St	Railroad Ave	IV	0.15
S Spruce Ave	Centennial Way	N Canal St	IV	0.45
S Spruce Ave	El Camino Real	Centennial Way	IV	0.31
San Mateo Ave	Airport Blvd	S Sirport Blvd	II	0.78
Sister Cities Blvd	Hillside Blvd	Airport Blvd	IV	0.89
Sneath Ln extension	Huntington Ave	S Linden Ave	II	0.34
Sylvester Rd	E Grand Ave	End	IV	0.19
Utah Ave	US-101	Littlefield Ave	IV	0.59
Utah Ave	San Mateo Ave	US-101	II	0.29
Victory Ave	S Spruce Ave	S Linden Ave	II	0.34
W Orange Ave	Westborough Blvd	Library Driveway	II	0.13
W Orange Ave	Library Driveway	Fairway Dr	IV	0.03
W Orange Ave	Library Driveway	Fairway Dr	III	0.03
Westborough Blvd	Skyline Blvd	Junipero Serra Blvd	IV	1.19
Westborough Blvd	Junipero Serra Blvd	W Orange Ave	IV	1.05

TABLE 3 *Proposed Bicycle Boulevards by Groups*

Bicycle Boulevard Group	Street	Start Extent	End Extent	Mileage
Evergreen/Holly	Crestwood Dr	Evergreen Dr	Holly Ave	0.26
	Evergreen Dr	Mission Rd	Miller Ave	0.63
	Holly Avenue	Mission Rd	Hillside Blvd	0.72
	Miller Ave	Evergreen Dr	Holly Ave	0.30
Alta Loma/Buri Buri	Alta Loma Dr	Newman Dr	Del Monte Ave	0.18
	Arroyo Dr	Junipero Serra Blvd	Camaritas Ave	0.85
	Camaritas Ave	Westborough Blvd	Arroyo Dr	0.10
	Clay Ave	Clay Park	Junipero Serra Blvd	0.37
	Clay Ave	Junipero Serra Blvd	Newman Dr	0.03
	Del Monte Ave	Arroyo Dr	Alta Loma Dr	0.95
	Newman Dr	Clay Ave	Alta Loma Dr	0.07
	Orchid Dr	Alta Loma Park	McLellan Dr	0.09
	San Felipe Ave	Newman Dr	Alta Loma Dr	0.47
Greendale	Galway Dr	Westborough Blvd	Greendale Dr	0.33
	Greendale Dr	Callan Blvd	Callan Blvd	1.00
Shannon	Olympic Dr	Westborough Blvd	Shannon Dr	0.27
	Shannon Dr	Olympic Dr	Gellert Blvd	0.64
Avalon	Avalon Dr	City limit	Alhambra Rd	0.58
	Hazelwood Dr	Rosewood Dr	El Camino Real	0.52
	Ponderosa Rd	Alhambra Rd	Fairway Dr	0.53
West Orange	Fairway Dr	Ponderosa Rd	W Orange Ave	0.38
	W Orange Ave	Fairway Dr	Centennial Way Trail	0.62
Orange/Canal	Magnolia Ave	Park Way	Railroad Ave	0.51
	N Canal St	Orange Ave	Linden Ave	0.79
	Orange Ave	Railroad Ave	Park Way	0.51
Spruce	Spruce Ave	Hillside Blvd	Sister Cities Blvd	0.21

Bicycle Support Facilities

Building a network of connected and low-stress bikeways is the first step in supporting existing bicyclists and attracting more people to bicycle in South City. To ensure an enjoyable trip from beginning to end, supporting infrastructure is needed at intersections to make crossing easier and safer, wayfinding signs along the way to help guide people to their destinations, and appropriate and secure parking once you reach your destination to park your bicycle.

BICYCLE-FRIENDLY INTERSECTIONS

- Intersections designed to provide additional separation, comfort, and safety for people biking and walking.
- Treatments can include bike boxes, signal priority, curb extensions, or islands to separate bicyclists from turning motorists.
- Ideal for locations with conflicts between people driving, walking, and biking.

WAYFINDING ELEMENTS

- Directional signage and distance markers directing people to nearby destinations on preferred routes.
- Can include customized signage and public art that reflects the character of different neighborhoods within South San Francisco, adding placemaking elements.

BIKE PARKING

- Includes curbside sidewalk racks, in-street corrals, bike lockers, or bike stations.
- Bicycle racks provide short-term dedicated parking outdoors. Racks can be custom shapes and colors to match surrounding developments. Customized racks should still meet minimum safety, locking, and durability standards.
- Bicycle lockers provide long-term secure parking at high-demand locations like employment sites and transit centers.
- Bicycle stations provide long-term indoor or enclosed outdoor parking typically near transit and can be staffed or self-serve.

Bicycle-friendly intersection with additional bicycle separation.

Bicycle-friendly intersection with bike box.

Bicycle racks provide short-term parking.

Wayfinding directs people to nearby destinations.

Pedestrian Network Recommendations

The recommended pedestrian improvements look to design pedestrian environments that are comfortable and accessible, and reduce the risk of pedestrian-involved collisions. Moreover, creating more comfortable walking environments will help sustain a healthy South City community.

PEDESTRIAN FOCUS AREAS

Identified Pedestrian Focus Areas highlight important corridors in the city that support walking and are currently considered high stress. These areas are identified in Map 12, which identifies areas where the City should focus on sidewalk, crossing, amenities, and other pedestrian infrastructure improvements.

PEDESTRIAN SPOT IMPROVEMENTS

This plan identifies spot improvements for 40 intersection crossings and other locations, primarily within the Pedestrian Priority Areas. Each location has recommendations that will improve the comfort and safety of pedestrians. These improvements are listed in Table 4.

Rectangular Rapid Flashing Beacon (RRFB)

TABLE 4 *Pedestrian Spot Improvements*

Location	Improvement
Mission and Lawndale/ McLellan	Upgrade all crosswalks to high-visibility crosswalks. Construct curb extensions at all four corners. Provide leading pedestrian intervals for all crossings. Construct sidewalks on the west side of McLellan south of Mission Rd.
El Camino Real and McLellan	Upgrade all crosswalks to high-visibility crosswalks. Install a high-visibility crosswalk at the western ECR approach. Provide a leading pedestrian interval for the ECR crossings. Construct curb extensions.
McLellan and BART	Upgrade existing crosswalks to high-visibility crosswalks. Install leading pedestrian intervals at all crossings. Build curb extensions at the eastern corners.
El Camino Real and BART	Straighten the crosswalk across the northern approach. Upgrade both crosswalks to high-visibility crosswalks. Provide a leading pedestrian interval.
Airport and Baden	Consider improvements such as curb extensions, signage & lighting, crosswalks & curb ramps, pedestrian crossing beacons, conflict markings & advance stop/yield markings, bicycle detection, and/or traffic circles.
Airport and Gateway	Upgrade existing crosswalks to high-visibility crosswalks. Construct median refuge islands at the west, east, and south approaches. Remove slip lane from southern approach.
Airport Blvd and San Mateo Ave	Consider improvements such as curb extensions,no right turn on red, crosswalks & curb ramps, slip lane removal, leading pedestrian intervals, conflict markings, bicycle detection, signage & lighting, and/or traffic circles
Airport Blvd and Railroad Undercrossing	Improve lighting and maintenance in existing sidewalk pedestrian tunnels beneath railroad.
Arroyo and Alta Loma	Construct curb extensions on both sides of the crosswalk. Construct a median refuge island. Install an RRFB. Install a high visibility crosswalk across Alta Loma Drive.
Chestnut and Commercial	Intersection design study - traffic signal or roundabout
Chestnut and Grand	Consider improvements such as curb extensions,no right turn on red, crosswalks & curb ramps, slip lane removal, leading pedestrian intervals, conflict markings, bicycle detection, signage & lighting, and/or traffic circles
Chestnut and Hillside	Consider improvements such as curb extensions,no right turn on red, crosswalks & curb ramps, slip lane removal, leading pedestrian intervals, conflict markings, bicycle detection, signage & lighting, and/or traffic circles
Chestnut and Mission	Consider improvements such as curb extensions,no right turn on red, crosswalks & curb ramps, slip lane removal, leading pedestrian intervals, conflict markings, bicycle detection, signage & lighting, and/or traffic circles
Crestwood/Evergreen	Consider improvements such as curb extensions, signage & lighting, crosswalks & curb ramps, pedestrian crossing beacons, conflict markings & advance stop/yield markings, red curb, crossing guards/traffic control, leading pedestrian intervals, pedestrian-only phases, and extended crossing time
Crestwood/Ferndale	Consider improvements such as curb extensions, signage & lighting, crosswalks & curb ramps, pedestrian crossing beacons, conflict markings & advance stop/yield markings, red curb, crossing guards/traffic control, leading pedestrian intervals, pedestrian-only phases, and extended crossing time
E Grand/Sylvester	Implement ped crossing
East Grand and Forbes	Upgrade all crosswalks to high-visibility crosswalks. Install curb extensions at the northwest, northeast, and southeast corners. Install a curb extension at the southwest corner. Install pedestrian refuge islands across E Grand Avenue.
El Camino Real and Arroyo & Arroyo and Del Paso	Remove the crosswalk at Del Paso Drive across Arroyo Drive; close gap in median and remove yield paddle. Provide a leading pedestrian interval for ECR crossings. Consider curb extensions at the northern and southeast corners.

Location	Improvement
El Camino Real and Kaiser	Construct sidewalks on the south side of ECR from the bus stop to the bend in Del Paso Drive. Build sidewalk between ECR and Del Paso. Redesign the pedestrian refuge island in the western ECR crossing. Provide a leading pedestrian interval for the ECR crossing.
El Camino Real and Orange	Straighten the southern crosswalk across ECR. Create pedestrian refuge islands for the ECR crossings. Upgrade all four crosswalks to high visibility crosswalks. Provide a leading pedestrian interval for the ECR crossing.
El Camino Real and Spruce	Upgrade all four crosswalks to high-visibility crosswalks. Construct pedestrian refuge islands for the two ECR crossings. Provide a leading pedestrian interval for the ECR crossings. Consider curb extensions at all four corners.
El Camino Real and Ponderosa	Construct sidewalks on the eastern side of ECR between Country Club Drive and Ponderosa. Upgrade all three marked crosswalks to high-visibility crosswalks. Provide a leading pedestrian interval for the ECR crossings. Construct median refuge islands for the ECR crossings.
Evergreen/Baywood	Consider improvements such as curb extensions, signage & lighting, crosswalks & curb ramps, pedestrian crossing beacons, conflict markings & advance stop/yield markings, red curb, crossing guards/traffic control, leading pedestrian intervals, pedestrian-only phases, and extended crossing time
Forbes and Eccles	Consider improvements such as curb extensions,no right turn on red, crosswalks & curb ramps, slip lane removal, leading pedestrian intervals, conflict markings, bicycle detection, signage & lighting, and/or traffic circles
Forbes and Gull	Consider improvements such as curb extensions,no right turn on red, crosswalks & curb ramps, slip lane removal, leading pedestrian intervals, conflict markings, bicycle detection, signage & lighting, and/or traffic circles
Gellert and Westborough Square access	Consider improvements such as curb extensions, crossing guards/traffic control, high-visibility crosswalks, leading pedestrian intervals, pedestrian-only phases, and extended crossing times
Grand and Airport Blvd	Remove free right turn lane. Upgrade two marked crossings to high-visibility. Consider pedestrian-only phase. Construct a pedestrian refuge island at the Airport Boulevard approach.
Grand and Cypress	Install advance yield markings and signs for the Grand Avenue crossings.
Grand and Gateway	Upgrade all crosswalks to high-visibility crosswalks. Remove free right turn lanes at northwest and southeast corners. Install pedestrian refuge islands in all crossings. Install curb extensions at all four corners.
Grand and Linden	Install advance stop markings at all approaches. Provide a leading pedestrian intervals for all crossings.
Grand and Magnolia	Consider improvements such as curb extensions,no right turn on red, crosswalks & curb ramps, slip lane removal, leading pedestrian intervals, conflict markings, bicycle detection, signage & lighting, crossing guards/traffic control, pedestrian-only phasing, extended crossing times, and/or traffic circles
Grand and Maple	Install advance stop markings at all approaches. Provide a leading pedestrian intervals for all crossings.
Grand and Mission	Upgrade both crosswalks to high-visibility crosswalks. Extend medians and create pedestrian refuge islands.
Grand and Orange	Upgrade all crosswalks to high-visibility crosswalks. Consider installing curb extensions at all four corners. Provide a leading pedestrian interval for the crossings of Grand Avenue.
Grand and Roebling	Consider improvements such as curb extensions, signage & lighting, crosswalks & curb ramps, pedestrian crossing beacons, conflict markings & advance stop/yield markings, bicycle detection, and/or traffic circles
Grand and Walnut	Install advance yield pavement markings and signs.
Grand and Willow	Consider improvements such as curb extensions, signage & lighting, crosswalks & curb ramps, pedestrian crossing beacons, conflict markings & advance stop/yield markings, and red curb

Location	Improvement
Grand mid-block crossings between Linden and Maple	Install advance yield pavement markings and signs.
Hickey and El Camino Real	Upgrade all crosswalks to high-visibility crosswalks. Straighten the northern ECR crosswalk. Install a high-visibility crosswalk across the southern ECR approach (push back the northbound stop bar and median to create a straight crossing). Provide a leading pedestrian interval for the ECR crossings.
Hickey and Hilton	Consider improvements such as curb extensions, signage & lighting, crosswalks & curb ramps, pedestrian crossing beacons, conflict markings & advance stop/yield markings, bicycle detection, and/or traffic circles
Holly Ave/ Westview/Villa	Consider improvements such as curb extensions, signage & lighting, crosswalks & curb ramps, pedestrian crossing beacons, conflict markings & advance stop/yield markings, and red curb
Junipero Serra and Arroyo	Construct sidewalks on the western (highway) side of Junipero Serra Boulevard to Arroyo Drive. Install a HAWK beacon at JSB/ Arroyo Drive.
Junipero Serra and Avalon	Mark high-visibility crosswalks across Valverde Drive. Construct sidewalks on the eastern (golf course) side of JSB to Avalon Drive. Mark a high-visibility crosswalk across the eastern approach of Avalon Drive/JSB.
Junipero Serra and Hickey	Remove the free right turn lane at the southeast, southwest, and northwest corner. Upgrade all crosswalks to high visibility crosswalks. Provide leading pedestrian intervals for both crosswalks. Construct pedestrian refuge islands.
Junipero Serra and King	Consider improvements such as curb extensions,no right turn on red, crosswalks & curb ramps, slip lane removal, leading pedestrian intervals, conflict markings, bicycle detection, signage & lighting, and/or traffic circles
Linden and 6th Ln	Consider improvements such as curb extensions, signage & lighting, crosswalks & curb ramps, pedestrian crossing beacons, conflict markings & advance stop/yield markings, and red curb
Linden and Airport Blvd	Consider improvements such as curb extensions,no right turn on red, crosswalks & curb ramps, slip lane removal, leading pedestrian intervals, conflict markings, bicycle detection, signage & lighting, and/or traffic circles
Linden and Armour	Consider improvements such as curb extensions, signage & lighting, crosswalks & curb ramps, pedestrian crossing beacons, conflict markings & advance stop/yield markings, red curb, crossing guards/traffic control, leading pedestrian intervals, pedestrian-only phases, and extended crossing time
Linden and California	Consider improvements such as curb extensions, signage & lighting, crosswalks & curb ramps, pedestrian crossing beacons, conflict markings & advance stop/yield markings, and red curb
Linden and Commercial	Consider improvements such as curb extensions, signage & lighting, crosswalks & curb ramps, pedestrian crossing beacons, conflict markings & advance stop/yield markings, and red curb
Linden and Lux	Consider improvements such as curb extensions, signage & lighting, crosswalks & curb ramps, pedestrian crossing beacons, conflict markings & advance stop/yield markings, and red curb
Linden and Miller	Consider improvements such as curb extensions, signage & lighting, crosswalks & curb ramps, pedestrian crossing beacons, conflict markings & advance stop/yield markings, and red curb
Linden and N Canal	Construct sidewalks on one or both sides of the Colma Creek bridge. Install appropriate curb ramps. Mark a crosswalk across S Canal street if sidewalks are present on the west side.
Linden and Tamarack	Consider improvements such as curb extensions, signage & lighting, crosswalks & curb ramps, pedestrian crossing beacons, conflict markings & advance stop/yield markings, and red curb
Maple and School	Consider improvements such as curb extensions, signage & lighting, crosswalks & curb ramps, pedestrian crossing beacons, conflict markings & advance stop/yield markings, and red curb

Location	Improvement
Miller and Holly	Consider improvements such as curb extensions, signage & lighting, crosswalks & curb ramps, pedestrian crossing beacons, conflict markings & advance stop/yield markings, red curb, crossing guards/traffic control, leading pedestrian intervals, pedestrian-only phases, and extended crossing time
Miller/Evergreen	Consider improvements such as curb extensions, signage & lighting, crosswalks & curb ramps, pedestrian crossing beacons, conflict markings & advance stop/yield markings, red curb, crossing guards/traffic control, leading pedestrian intervals, pedestrian-only phases, and extended crossing time
Miller/Ferndale	Consider improvements such as curb extensions, signage & lighting, crosswalks & curb ramps, pedestrian crossing beacons, conflict markings & advance stop/yield markings, red curb, crossing guards/traffic control, leading pedestrian intervals, pedestrian-only phases, and extended crossing time
Miller/Gardenside	Consider improvements such as curb extensions, signage & lighting, crosswalks & curb ramps, pedestrian crossing beacons, conflict markings & advance stop/yield markings, red curb, crossing guards/traffic control, leading pedestrian intervals, pedestrian-only phases, and extended crossing time
Mission and Sequoia	Install a crosswalk on the northern approach. Upgrade all crosswalks to high-visibility crosswalks. Construct curb extensions.
Neighborhood Path	Create a stair channel along the existing stairs to improve bicycle access. Remove the gate at Alta Loma/Cymbidium to open stair access to both neighborhoods. At ECR, upgrade crosswalk to high visibility and straighten the crosswalk. Provide a leading pedestrian interval.
Neighborhood Path	Consider improvements such as curb extensions, signage & lighting, crosswalks & curb ramps, pedestrian crossing beacons, bicycle detection, and wayfinding
Orange and A	Consider improvements such as curb extensions, signage & lighting, crosswalks & curb ramps, pedestrian crossing beacons, conflict markings & advance stop/yield markings, red curb, crossing guards/traffic control, leading pedestrian intervals, pedestrian-only phases, and extended crossing time
Orange and B	Consider crossing improvements such as high-visibility crosswalks, RRFB or HAWK signals, curb extensions, and/or pavement markings
Orange and Baden	Consider improvements such as curb extensions, signage & lighting, crosswalks & curb ramps, pedestrian crossing beacons, conflict markings & advance stop/yield markings, and red curb
Orange and C	Consider crossing improvements such as high-visibility crosswalk, RRFB or HAWK signals, curb extensions, and/or pavement markings
Orange and Railroad	Upgrade the transverse crosswalk across Railroad Avenue to high-visibility and construct a curb extension at the southeast corner.
Orange and Tennis Dr	Construct curb extensions for the crossings of Orange Avenue and Tennis Drive. Install a high-visibility crosswalk across Tennis Drive.
Oyster Point and Airport	Construct curb extensions at the north, west, and south corners. Upgrade two marked crosswalks to high-visibility crosswalks and realign to be straight. Implement a leading pedestrian interval for both crosswalks.
Oyster Point and Dubuque	Consider improvements such as marked crosswalks, signs, pavement markings, sidewalk gap filling/repair, lighting, and slip lane removal

Location	Improvement
Oyster Point and Eccles	Consider improvements such as curb extensions, signage & lighting, crosswalks & curb ramps, pedestrian crossing beacons, conflict markings & advance stop/yield markings, bicycle detection, and/or traffic circles
Oyster Point and Gateway	Consider improvements such as curb extensions,no right turn on red, crosswalks & curb ramps, slip lane removal, leading pedestrian intervals, conflict markings, bicycle detection, signage & lighting, and/or traffic circles
Oyster Point and Gull	Consider improvements such as curb extensions,no right turn on red, crosswalks & curb ramps, slip lane removal, leading pedestrian intervals, conflict markings, bicycle detection, signage & lighting, and/or traffic circles
S Airport and Marco	Consider improvements such as curb extensions, signage & lighting, crosswalks & curb ramps, pedestrian crossing beacons, conflict markings & advance stop/yield markings, bicycle detection, and/or traffic circles
S Airport and Utah	Consistent with proposed Utah overcrossing of 101, install high visibility crosswalks at all four approaches. Provide a leading pedestrian interval.
S Airport and Wondercolor	Consider improvements such as marked crosswalks, signs, pavement markings, sidewalk gap filling/repair, lighting, and slip lane removal
S Airport/N Access Rd	Consider improvements such as curb extensions,no right turn on red, crosswalks & curb ramps, slip lane removal, leading pedestrian intervals, conflict markings, bicycle detection, signage & lighting, pedestrian crossing beacons, wayfinding, and/or traffic circles
School and Olive	Consider improvements such as curb extensions, signage & lighting, crosswalks & curb ramps, pedestrian crossing beacons, conflict markings & advance stop/yield markings, and red curb
Spruce and Baden	Consider improvements such as curb extensions,no right turn on red, crosswalks & curb ramps, slip lane removal, leading pedestrian intervals, conflict markings, bicycle detection, signage & lighting, and/or traffic circles
Spruce and Beech	Consider improvements such as curb extensions, signage & lighting, crosswalks & curb ramps, pedestrian crossing beacons, conflict markings & advance stop/yield markings, and red curb
Spruce and Commercial	Consider improvements such as curb extensions, signage & lighting, crosswalks & curb ramps, pedestrian crossing beacons, conflict markings & advance stop/yield markings, and red curb
Spruce and Grand	Install yellow transverse markings around the decorative crosswalk. Upgrade three remaining crosswalks to high-visibility. Consider installing curb extensions at all corners.
Spruce and Hemlock	Consider improvements such as curb extensions, signage & lighting, crosswalks & curb ramps, pedestrian crossing beacons, conflict markings & advance stop/yield markings, and red curb
Spruce and Hillside	Construct curb extensions at the two northern and southeastern corners.
Spruce and Huntington	Consider improvements such as curb extensions,no right turn on red, crosswalks & curb ramps, slip lane removal, leading pedestrian intervals, conflict markings, bicycle detection, signage & lighting, and/or traffic circles
Spruce and Lux	Consider improvements such as curb extensions, signage & lighting, crosswalks & curb ramps, pedestrian crossing beacons, conflict markings & advance stop/yield markings, and red curb
Spruce and Mayfair	Consider improvements such as curb extensions, signage & lighting, crosswalks & curb ramps, pedestrian crossing beacons, conflict markings & advance stop/yield markings, bicycle detection, wayfinding, and/or traffic circles

Location	Improvement
Spruce and Miller	Consider improvements such as curb extensions,no right turn on red, crosswalks & curb ramps, slip lane removal, leading pedestrian intervals, conflict markings, bicycle detection, signage & lighting, and/or traffic circles
Spruce and N Canal St	Build curb extensions at the two northern corners. Straighten and upgrade all three marked crosswalks to high-visibility crosswalks.
Spruce and Park Way	Upgrade the two existing crosswalks across Park Way to high-visibility crosswalks. Install high-visibility crosswalks across both Spruce approaches. Paint/refresh red curb at all corners.
Spruce and S Canal Way	Straighten the crosswalk across S Canal Street. Upgrade both crosswalks to high-visibility crosswalks. Construct a curb extension at the southeast corner. Add trail wayfinding information. Consider leading pedestrian interval for Spruce Avenue crossing.
Spruce and Tamarack	Consider improvements such as curb extensions, signage & lighting, crosswalks & curb ramps, pedestrian crossing beacons, conflict markings & advance stop/yield markings, and red curb
Sunnyside/Holly	Consider improvements such as curb extensions, signage & lighting, crosswalks & curb ramps, pedestrian crossing beacons, conflict markings & advance stop/yield markings, and red curb
Utah and Corey	Consider improvements such as curb extensions, signage & lighting, crosswalks & curb ramps, pedestrian crossing beacons, conflict markings & advance stop/yield markings, bicycle detection, and/or traffic circles
Utah and Harbor Way	Consider improvements such as curb extensions, signage & lighting, crosswalks & curb ramps, pedestrian crossing beacons, conflict markings & advance stop/yield markings, bicycle detection, and/or traffic circles
Utah Ave/San Mateo Ave	Install a protected intersection with high visibility crosswalks.
Westborough and Callan	Upgrade all four crosswalks to yellow high-visibility crosswalks. Construct pedestrian refuge islands on the Westborough and Callan crossings. Update/add school zone signs.
Westborough and Galway	Upgrade all four crosswalks to yellow high-visibility crosswalks. Construct pedestrian refuge islands on the Westborough crossings. Construct curb ramps at all corners. Install curb extensions to tighten corner radii. Update/add school zone signs.
Westborough and Gellert	Upgrade the three marked, and install on the fourth approach high-visibility crosswalks. Build out the necessary corners to straighten all crosswalks. Construct pedestrian refuge islands at all crosswalks. Provide a leading pedestrian interval for the northern Westborough crosswalk.
Westborough and Junipero Serra Blvd	Construct sidewalks on the southern side of Westborough Boulevard through the interchange area to Junipero Serra. Install/ upgrade high visibility crosswalks at all interchange crossing locations. Install with appropriate signs and pavement markings.
Westborough and Skyline	Consider improvements such as curb extensions,no right turn on red, crosswalks & curb ramps, slip lane removal, leading pedestrian intervals, conflict markings, bicycle detection, signage & lighting, and/or traffic circles


SINCE 1912
South City

MAP 12

PEDESTRIAN SPOT LOCATIONS AND FOCUS AREAS

ACTIVE SOUTH CITY

Pedestrian Improvements

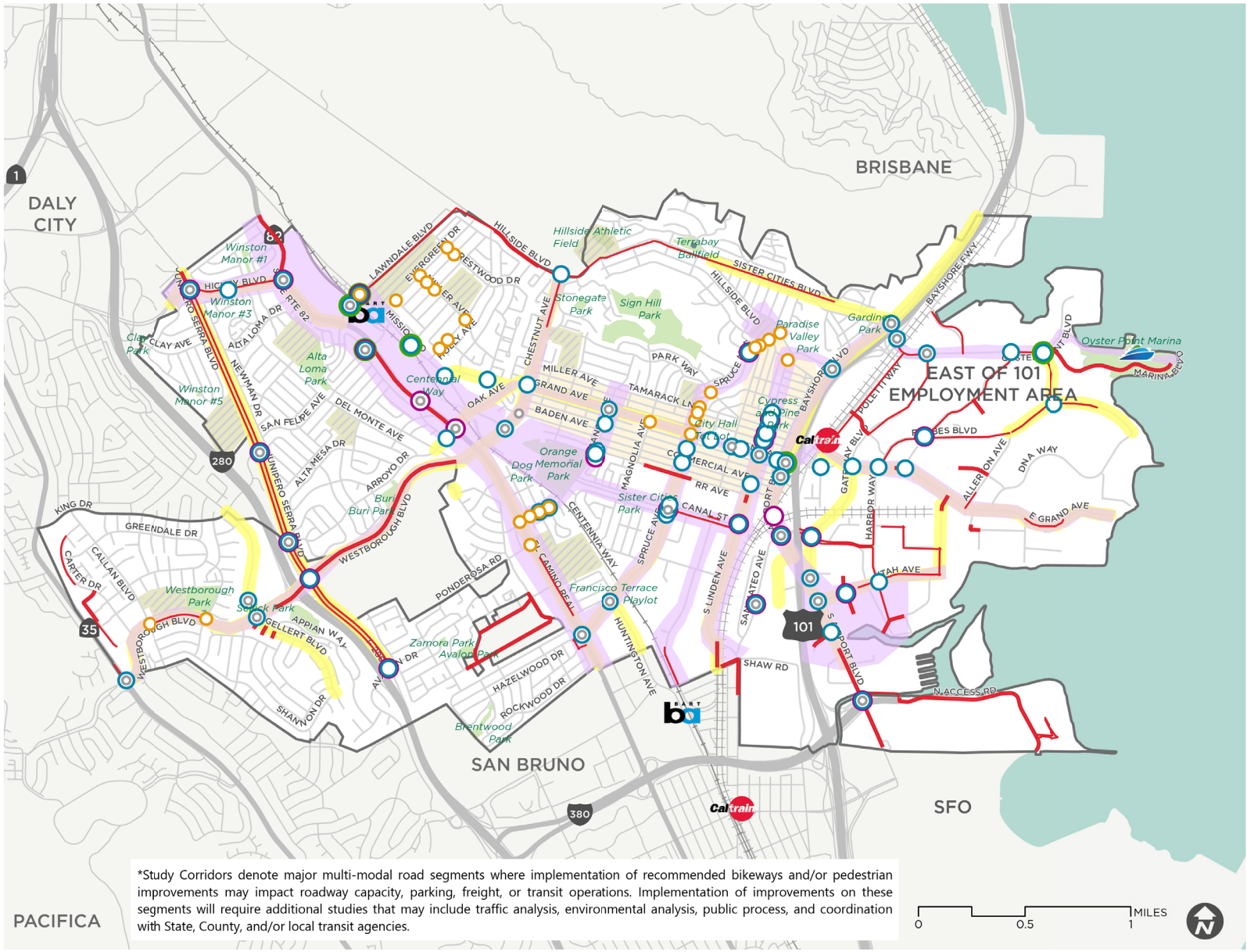
- Pedestrian Signal Improvements
- Pedestrian School Area Improvements
- Pedestrian Crossing Improvements
- Walking Environment Improvements
- Pedestrian Transit Access Improvements
- Pedestrian Focus Areas
- Recommended Sidewalk Project
- Study Corridor*

Transportation

- Ferry Dock
- BART Station
- Caltrain Station
- Caltrain Rail Line
- BART Line

Destinations

- Community Center
- School
- Park
- Library
- Downtown



*Study Corridors denote major multi-modal road segments where implementation of recommended bikeways and/or pedestrian improvements may impact roadway capacity, parking, freight, or transit operations. Implementation of improvements on these segments will require additional studies that may include traffic analysis, environmental analysis, public process, and coordination with State, County, and/or local transit agencies.

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Pedestrian Crossing Typologies

This plan could not provide specific recommendations for every intersection in the city. In addition to the 40 locations mentioned previously, additional intersections were identified as proposed project sites. Map 12 shows the location of all identified intersections. The following pages describe a number of crossing typologies that represent the types of improvements to be implemented at intersections, based on characteristics of the intersecting streets. Improvements at intersections of larger arterial roadways with cars moving at faster speeds differ from improvements on lower volume, smaller residential streets.

These typologies are broken down by the characteristics of the intersection and include the appropriate infrastructure improvements for each. The typologies include the following:

1. Signalized intersection
2. Major street/minor street
3. Minor street/minor street
4. Midblock crossing
5. High-volume pedestrian area
6. Freeway interchange and highway crossing

A full list of the spot improvements delineated by these crossing typologies can be found in Appendix C.

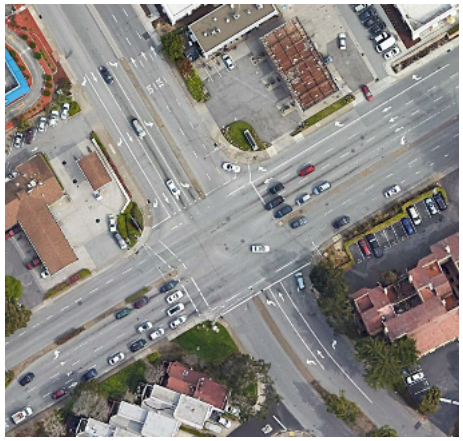
Catering to Various Trip Types

As discussed in Chapter 2, many of South City's community destinations are not easily accessible through low-stress networks. In fact, unless a destination is by either the Centennial Way Trail or the Bay Trail, it is not accessible by low-stress bikeways. Limited connections to these trail facilities also limit destination accessibility. Improving access to these destinations for both pedestrians and bicyclists is one of the primary objectives of this plan. The common types of trips discussed in Chapter 2 are examined under the context of building out the proposed recommendations in this plan; proximity to low-stress bikeways and pedestrian infrastructure improvements are the main factors in creating improved travel experiences.

The proposed low-stress bicycle network can be seen in Map 13.

Signalized Intersection

Typically major street at major street



COMMON CHALLENGES

- High vehicle speeds
- High vehicle volumes
- Free right-turn lanes
- Left-turn pedestrian conflicts
- Cars stop too close to the crosswalk

TOOLS

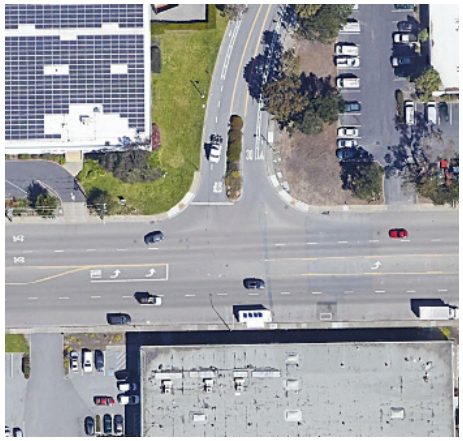
- Curb extensions
- No right on red
- Crosswalks and curb ramps
- Slip lane removal
- Leading pedestrian intervals
- Conflict markings
- Bicycle detection
- Signage and lighting
- Traffic circles

IDENTIFIED SPOT IMPROVEMENTS

- Chestnut Avenue/Grand Avenue
- Forbes Boulevard/Gull Drive
- Junipero Serra Boulevard/King Drive

Major Street/Minor Street

Major street uncontrolled



COMMON CHALLENGES

- Failure to yield to pedestrians
- Unmarked crosswalks
- Lighting
- High vehicle speeds
- High vehicle volumes
- Long blocks without controlled crossings

TOOLS

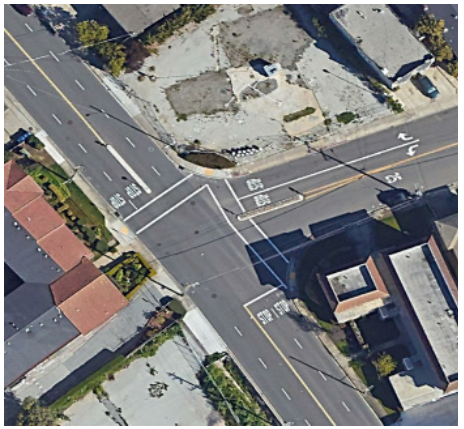
- Curb extensions
- Signage and lighting
- Crosswalks and curb ramps
- Pedestrian crossing beacons
- Conflict markings and advance stop/ yield pavement markings
- Bicycle detection
- Traffic circles

IDENTIFIED SPOT IMPROVEMENTS

- Oyster Point Boulevard/Eccles Avenue
- S Airport Boulevard/Marco Way
- Utah Avenue/Harbor Way

Minor Street/Minor Street

Controlled or uncontrolled intersection



COMMON CHALLENGES

- Failure to yield to pedestrians
- Unmarked crosswalks
- Parking too close to the corner (visibility)
- Incomplete stops (rolling stops)

TOOLS

- Curb extensions
- Signage and lighting
- Crosswalks and curb ramps
- Pedestrian crossing beacons
- Conflict markings and advance stop/ yield pavement markings
- Red curb

IDENTIFIED SPOT IMPROVEMENTS

- Miller Avenue/Holly Avenue
- Evergreen Drive/Baywood Avenue

Midblock Crossing

Uncontrolled midblock crossings and trail crossings

COMMON CHALLENGES

- Uncontrolled crossings
- Vehicles have priority
- Lack of driver awareness
- Unmarked crosswalks

TOOLS

- Curb extensions
- Signage and lighting
- Crosswalks and curb ramps
- Pedestrian crossing beacons
- Bicycle detection
- Wayfinding signs

IDENTIFIED SPOT IMPROVEMENTS

- S Airport Boulevard/N Access Road
- Spruce Avenue/Mayfair Way

High-Volume Pedestrian Area

Schools, transit centers, and commercial centers

COMMON CHALLENGES

- Impatient and aggressive drivers
- Limited sidewalk space
- Competing curbside uses
- Limited pedestrian queuing space

TOOLS

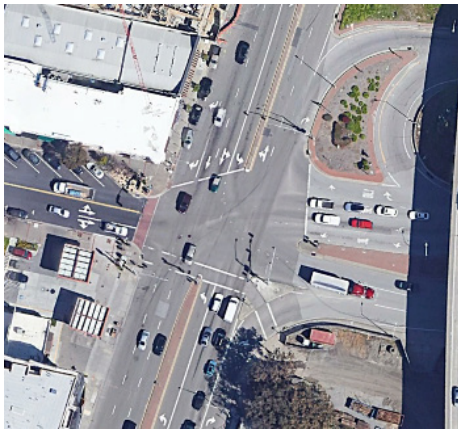
- Curb extensions
- Crossing guards or traffic control
- High-visibility crosswalks
- Leading pedestrian intervals
- Pedestrian-only signal phase
- Extended crossing time

IDENTIFIED SPOT IMPROVEMENTS

- Gellert Boulevard/ Westborough Boulevard
- Crestwood Drive/Ferndale Avenue
- Evergreen Drive/Baywood Avenue

Freeway Interchange

Freeway interchanges, highway crossings, overpass connections



COMMON CHALLENGES

- High vehicle speeds
- High vehicle volumes
- Drivers not expecting pedestrians
- Missing sidewalks
- Unmarked crossings
- Lighting
- Limited alternative routes

TOOLS

- Marked crosswalks
- Signs
- Pavement markings
- Sidewalks
- Lighting
- Slip lane removal

IDENTIFIED SPOT IMPROVEMENTS

- Oyster Point Boulevard/ Dubuque Avenue
- S Airport Boulevard/Wondercolor Lane
- Airport Boulevard/San Mateo Avenue

MAP 13

PROPOSED BICYCLE STRESS AND ACCESS TO DESTINATIONS

ACTIVE SOUTH CITY

Low Level of Traffic Stress

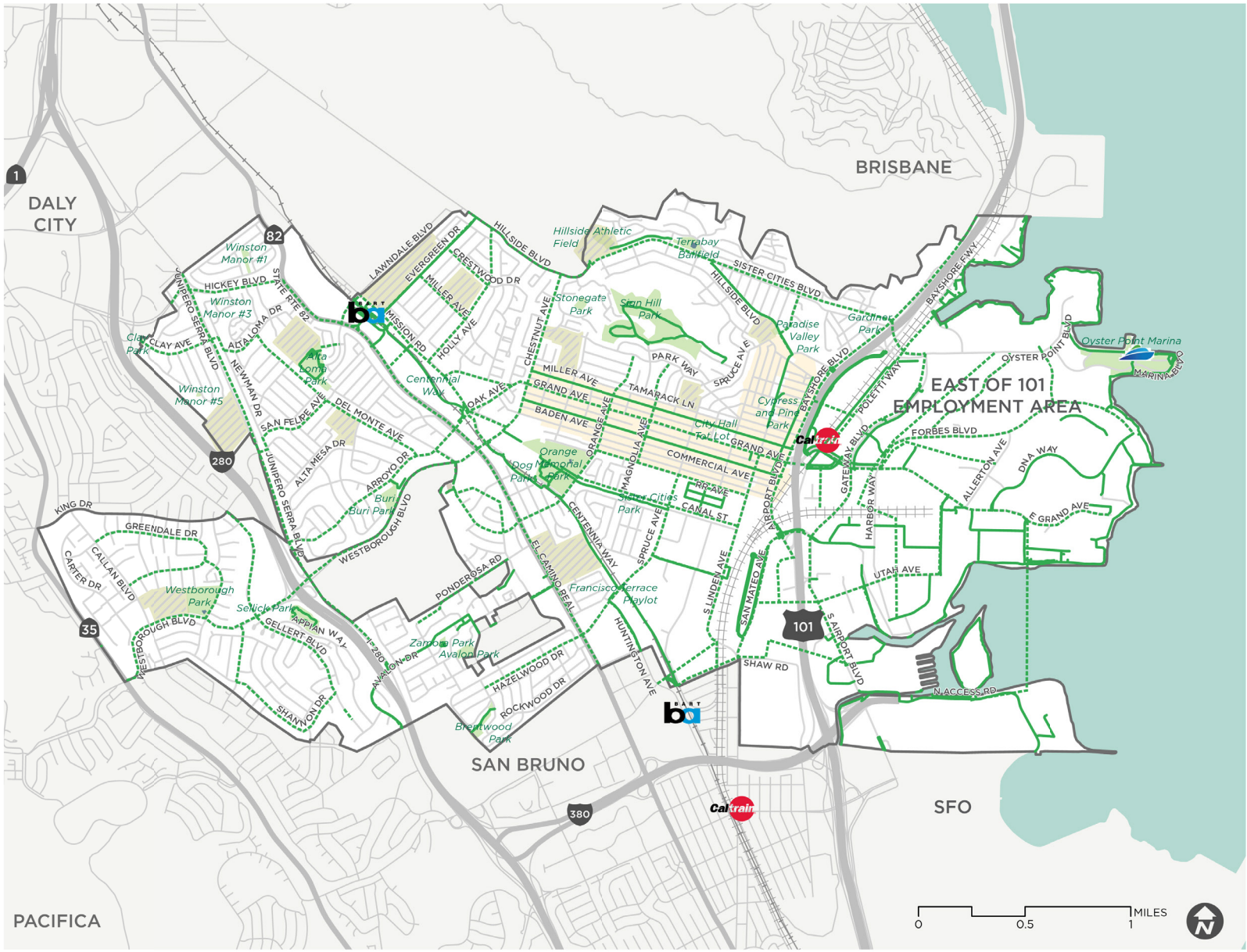
- Existing Low Stress Bikeway (LTS 1 and 2)
- Proposed Low Stress Bikeways (LTS 1 and 2)

Transportation

- Ferry Dock
- BART Station
- Caltrain Station
- Caltrain Rail Line
- BART Line

Destinations

- Community Center
- School
- Park
- Library
- Downtown



Trips to Parks, Trails, and Community Centers

Almost all residences and workplaces are within a half mile of a park, trail, or community center, well within reasonable walking and biking distances. With the exceptions of Orange Memorial Park and Oyster Point Marina, no parks or community centers are easily accessible by bicycle on a designated low-stress route. Under full-buildout conditions, every park and all five recreation centers have improved low-stress access for both pedestrians and bicyclists. In addition to existing trails, there will be a cross-city network of low-stress bicycle facilities to link all these destinations together. Additionally, pedestrian recommendations across the city will enhance crossings by increasing pedestrian visibility and driver awareness while making walking a lower-stress, more comfortable experience.

Although many residents live within close proximity of many of these destinations, one of the most common themes throughout the community outreach process was that people currently drive to many of these destinations because they do not feel comfortable traveling using other modes. These low-stress improvements can shift trips to active modes and promote additional trips. With these improvements implemented, some guardians may feel more comfortable allowing children to walk or bike to the park. The recommendations also address two of the three US-101 crossings, improving access to the Bay Trail. The Centennial Way Trail will have at least five connections with other low-stress facilities, further expanding the amount of and types of trips that can take advantage of this corridor. In addition to typically lower-stress residential streets, the proposed network provides a cross-town network linking neighborhoods to multiple parks.

Trips to Transit (BART, Caltrain, and Oyster Point Terminal)

Closing the first-last mile gap around the BART stations, Caltrain stations, and ferry terminal can expand the number of trips that can be made using transit, encouraging more people to use those services for both commute and utilitarian trips. Under current conditions, both the South San Francisco and San Bruno BART Stations are well connected to the Centennial Way Trail, and the ferry terminal is well connected to the Bay Trail. The South San Francisco Caltrain Station is not well connected for bicyclists and pedestrians.

The proposed improvements will greatly enhance access to the South San Francisco BART Station. The Sunshine Gardens neighborhood will be directly linked to the station with bicycle boulevards, the El Camino Real corridor provides additional north-south crosstown connectivity, and improved connections from Grand Avenue and Mission Road will enhance access from more easterly parts of the city. This plan also proposes a suite of pedestrian recommendations at four intersections around the BART to enhance pedestrian connectivity to the station. Improved connections to the Bay Trail and other corridors will also enhance access to San Bruno BART and Caltrain stations.

South City's Caltrain station will benefit from bicycle and pedestrian improvements along Grand and E Grand Avenues, in addition to the station relocation plan. Workers in the East-of-101 area and station users traveling via the Bay Trail could use many of the proposed trails and separated bikeways proposed in that area. This network of facilities links many of the offices and other workplaces in this dense employment area together, to the Bay Trail, and to mass transit. These trail and in-road improvements also greatly improve the accessibility of the ferry terminal, which was otherwise dependent on the Bay Trail for low-stress access. Improvements to the Sister Cities Boulevard/Airport Boulevard intersection can also improve access to the ferry and Bay Trail, as the northernmost direct link across US-101.

Trips to Schools and Libraries

These recommendations improve connectivity to both South City libraries. The Grand Branch is directly served by a separated bikeway on Grand Avenue and is better connected to the neighborhoods to the north by pedestrian improvements and bicycle boulevards. The one-way road network around the Main Library can be limiting, especially for bicycle traffic. These recommendations provide for bidirectional bicycle access and connections to Westborough Boulevard (not on low-stress facilities, however). The future library at the Civic Campus will also be served by these recommendations.

Enhancing SRTS programs was another priority of this plan. Most schools across

the city have at least one nearby pedestrian crossing improvement. Upon full buildout, every school except for Hillside Academy will have direct access to a low-stress bikeway; a separated facility is not far away on Chestnut Avenue for Hillside families. The connected network of facilities enables continuous lower-stress travel for middle and high schoolers who typically have further distances to travel to reach their school.

Trips to Commercial Centers

The proposed improvements serve commercial and retail uses across South City. In addition to providing direct lower-stress access to most major commercial locations, crosstown connections via the Centennial Way Trail, Grand Avenue, Mission Road, El Camino Real, Westborough Boulevard, and others will link residents to destinations across the city. The low-stress connections from BART, Caltrain, and the ferry also provide access to these centers for workers and visitors. Especially within the downtown area, crossing improvement along and near Grand Avenue will significantly increase the walkability of the area, further supporting local business. Improved connections across US-101 from the Grand Avenue/Caltrain station relocation project will enhance connectivity between these two areas. Recommendations also include sidewalk creation along Junipero Serra Boulevard, which can provide new access to commercial destinations along Westborough Boulevard for residents who live east of I-280.

Trips Across Freeways

The Sister Cities Boulevard/Oyster Point Boulevard and Grand Avenue crossings have pedestrian crossing recommendations on both sides of the freeway. Separated bikeways are proposed on both sides of the freeway at both of these crossings. Both Grand Avenue and Sister Cities/Oyster Point Boulevards have bicycle lanes on the overpasses. There is also an additional pedestrian and bicycle bridge planned near the site of the Lowe's store should that parcel redevelop in the future.

Further south, both the Airport Boulevard crossing and the proposed Utah Avenue overcrossing will also have dedicated bicycle facilities (not low-stress facilities, however). Near the southern city limit, there is a proposed trail that would link the Centennial Way Trail to Bay Trail under US-101. This would create a southern low-stress crossing of US-101 and a direct trail connection between South City's two primary trail facilities.

The low-stress facilities in the rest of the city are now well connected to the East-of-101 neighborhood through a few key corridors: Westborough Boulevard, El Camino Real, Centennial Way Trail, Spruce Avenue, Sister Cities Boulevard, and Grand Avenue.

Programs, Policies, and Supporting Infrastructure Recommendations

This section outlines the recommended bicycle and pedestrian-related programs and policies for the City of South San Francisco.

Expand Safe Routes to School Programming

Families in South City are interested in seeing more SRTS programming at their children's schools. While the City does not currently have a dedicated SRTS funding source, staff can partner with the San Mateo County Office of Education, which offers training, resources, and support to cities and school districts in implementing SRTS programming. To build support across multiple schools, City staff should work to build partnerships with the South San Francisco Unified School District. One example of a successful partnership between San Mateo County Office of Education and the South San Francisco Unified School District is Ruby Bridges Walk to School Day held in November each year. Initiated by students at Martin Elementary in South San Francisco, it has become an annual event in San Mateo County, and expanded to an event celebrated nationally.

Senior Walking Programs

Senior walking programs can encourage older residents to walk together on safer walking routes, and to build relationships at the same time. This program may be best piloted at Magnolia Community Center, which focuses on senior programming.

Online Bicycling Map

Some residents may want to bike more than they do now but may not know the best routes to take to reach their desired destinations. The City should develop a refreshed biking map that highlights comfortable routes to libraries, schools, parks, shopping, and other community destinations. An online map can be easily updated as new projects are built and provide additional safe routes.

Printed maps may be preferred by some bicyclists and can be distributed at bike shops, libraries, and other destinations.

Open Street Events

Open street events celebrate walking and biking by closing key streets to vehicle traffic for a set amount of time. These events can create opportunities for people to try walking or biking without the stress of adjacent vehicle traffic. These events require a high level of coordination between various city departments and local stakeholders. It is recommended that the City find a partner nonprofit organization to lead the event planning and logistics work.

Bicycle Friendly Community

The League of American Bicyclists recognizes communities that improve bicycling conditions through education, encouragement, enforcement, and evaluation programs. Communities can achieve diamond, platinum, gold, silver, or bronze status, or an honorary mention. Bicycle friendliness can indicate that a community is healthy and vibrant. Like good schools and attractive downtowns, bicycle-friendliness can increase property values, spur business growth, and increase tourism. South City is currently a Bronze-level Bicycle Friendly Community. The City should reapply for an elevated Bicycle Friendly Community status after implementation of the priority projects and many of the recommended programs identified in this plan.

Shared Mobility Policy Framework

Building a network of high-quality, connected, and safe bicycle facilities also benefits people on small-wheeled devices such as mobility scooters, skateboards, electric and non-electric scooters, roller skates, and tricycles. South City previously participated in a dockless e-bike system with Lime bike. This pilot ended in 2019 as Lime transitioned out of the bike share business to focus on scooters. Establishing a Shared Mobility Policy Framework will ensure the city is prepared to participate in future programs, and that any future shared mobility services operate within a framework of equity, affordability, and broad geographic distribution.

Quick Build Projects

Quick Build projects use low-cost materials to install temporary improvements to pilot new techniques or introduce concepts to the community. The City can pilot priority bicycle and pedestrian projects through these projects. Quick build projects involve using materials like paint and flexible delineators to designate curb extensions or median islands and can provide more semipermanent, low-cost solutions until funding can be found for permanent facilities. Tactical urbanism projects can involve temporary bike lanes, road diets, and other roadway changes. Community-driven aspects like roadway murals or other art and placemaking elements can be integrated into both short-term and long-term designs. These projects can last anywhere from one day to several weeks.

Bicycle Parking

As noted earlier, knowing you have a secure and convenient place to put your bike at the end of the trip makes it more likely that you will consider bicycling for that trip. The City has recently installed a number of bicycle racks across the city. To continue this work, the City should inventory the locations of all public and private bicycle parking locations in contrast to key biking destinations such as shopping areas, community centers, and large transit centers and fill in necessary gaps. This analysis will help the City take stock of additional areas in need of bicycle parking, and work with the appropriate parties to coordinate installation and maintenance. The City should coordinate with BART to ensure that appropriate secure bicycle facilities (e.g., bike lockers) are provided.

Green Infrastructure and Urban Cooling

Incorporating green infrastructure and urban cooling components into bikeway and pedestrian projects allows streets to become a vital, functional component of the natural ecosystem. Green infrastructure is a catchall term that describes sustainable stormwater management practices and infrastructure and can include components such as bioswales, planter boxes, and green parking. The South San Francisco Green Infrastructure Plan provides a blueprint for these recommendations, and the San Mateo County Sustainable Streets Master Plan offers ways to integrate green infrastructure and active transportation improvements. Urban cooling recommendations include looking for opportunities to plant shade trees along bikeway and pedestrian routes, as well as using paving materials that reflect rather than absorb heat. Tree planting must ensure that sidewalk widths include an adequate buffer zone for tree wells.

Walking and Biking Supportive Amenities

Supporting amenities such as benches, drinking fountains, and bicycle repair stations can help improve comfort and convenience along the active transportation network. The City should consider these amenities in the design of new projects, particularly off-street trails.

Vision Zero Policy

The City should regularly measure progress toward its adopted Vision Zero policy, with the goal of eliminating all serious injuries and deaths on its transportation system.

Transportation Impact Analysis Guidelines

The City should develop Transportation Impact Analysis Guidelines to standardize its approach to incorporating bicycle and pedestrian improvements into the development review process.

Transportation Demand Management Ordinance Update

The City should periodically update its Transportation Demand Management Ordinance to ensure that trip reduction measures, monitoring, and enforcement align with the pedestrian and bicycle network, follow the connectivity and design goals of this plan, and account for evolving technologies such as e-bikes.

Developer Impact Fee Updates

The City should periodically update its citywide Transportation Impact Fee to ensure that developers pay a fair share toward building active transportation projects.

Crosswalk and Pedestrian Signal Policies

The City should develop internal policy guidance for the striping of marked crosswalks and the use of actuated pedestrian signals.

Repaving Policy

The City should develop internal policy guidance to incorporate planned bicycle and pedestrian improvements into all repaving efforts.

Bikeway and Pedestrian Facility Maintenance

The City has a street sweeping/clean team that helps keep streets and public facilities as clean as possible, including bikeways, sidewalks, and City-maintained trails. The City coordinates sweeping routes with posted on-street parking restrictions. The City should continue to ensure that on-street bikeway routes are adequately maintained, as curbside bikeways in particular tend to collect road debris. Buildout of additional Class IV separated bikeways may require investment in smaller sweeper vehicles that can fit into separated bikeway widths.

No Parking On Sidewalks

In areas of the city with rolled curbs, drivers frequently park with their wheels up on the curb and may partially or fully block the sidewalk. The City should ensure that no parking occurs on sidewalks through a combination of clear signage and parking enforcement (including a phone number for residents to call if the sidewalk is blocked by a parked vehicle). Additionally a “Don’t Block the Walk” type of good neighbor campaign could help foster a local driving culture where parking in the sidewalk is not acceptable behavior.

Speed Management

Speeding increases crash risk and crash severity, and makes streets less comfortable for people walking or bicycling. While many of the identified bicycle and pedestrian projects would address speed through improved roadway design (roadway or crossing narrowings, traffic calming), the city should seek to implement a comprehensive speed management program that looks holistically at setting / confirming appropriate speed limits, lowering speed through good roadway design, and seeking appropriate enforcement opportunities. Speed management aligns with the cities Vision Zero goals as well as safety goals of the Local Road Safety Plan.

05 Implementation

Implementation

Implementation of the nearly 50 miles of bikeways and over 40 pedestrian spot improvements recommended in this plan will occur through a combination of ongoing development and upgrade/maintenance of the roadway network, as well as through targeted implementation of specific projects. Funding for active transportation projects is limited and often competitive, and it is important for the City to prioritize projects based on need and benefit, as well as on how those projects align with the key criteria from major funding sources such as the Active Transportation Program. The following prioritization strategy reflects an approach that scores each project's community benefit, as well as assesses the feasibility and complexity of project construction. Projects are sorted into four implementation categories based on the combined results of two evaluations: project priority and project feasibility. Each evaluation scores projects on specific criteria.

Project Priority Criteria

The project priority evaluation places projects into one of two categories—low priority or high priority—based on the following three criteria: safety, connectivity, and accessibility. A maximum of seven points is possible; projects that score five or more points will be rated high, and projects that score four or fewer points will be rated low.

Project Feasibility Criteria

The project feasibility evaluation categorizes projects based on their complexity and high-level costs. Generally speaking, projects that only require signage and striping changes are considered highly feasible. Projects that require interagency coordination or that require hardscape changes or potential road diets (including parking removal) are considered low-feasibility projects. A maximum of two points are available for project feasibility.

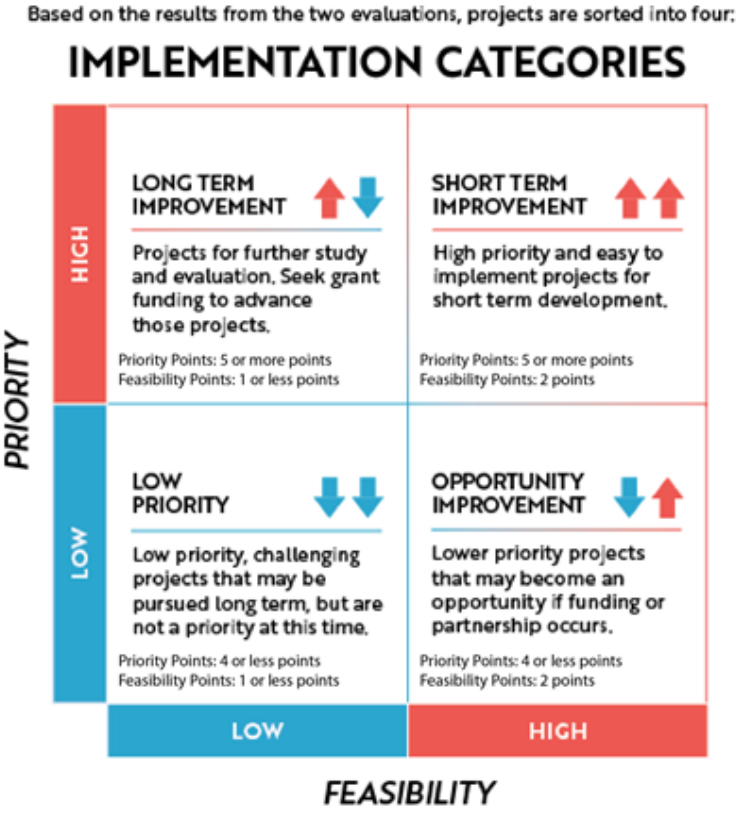
The criteria and scoring metrics are described in Table 5.

TABLE 5 *Project Priority Methodology*

Criteria	Description	Scoring Metrics
Enhanced Safety	Proposed bikeways and pedestrian improvements on corridors with bicycle or pedestrian collisions help reduce the likelihood of additional collisions at these locations. Additionally, this considers multiple locations throughout the City, where members of the public expressed safety concerns; these have also generated recommendations and also contribute to safer pedestrian and bicycle networks.	Projects score one point if located near a bicycle-involved or pedestrian-involved collision (2013-2017)
		Projects score one point if located on a street classified with an LTS 3 or 4
		Bikeway projects score an additional point if the project is a Class I, Class IIB, Class IIIB, or Class IV recommendation
		Pedestrian projects score an additional point if the project includes enhancements other than signage and striping (beacons, curb extensions, etc.)
Connectivity	Projects that close gaps in the pedestrian and bicycle networks benefit network connectivity. There are also proposed facilities that enhance connectivity over I-280, SR-82, and US-101, all major connectivity barriers within South City	Projects score one point if it improves connectivity across I-280, SR-82, and US-101
		Projects score one point if it closes a gap in the bicycle or pedestrian network
		Projects score one point if it addresses connectivity to major transit routes (i.e., BART, Caltrain)
Accessibility	Proposed facilities that improve access to community destinations or enhance accessibility at major crossings/barriers	Projects will score one point if it improves access to important community destinations (parks, schools, and trails)
		Pedestrian projects that include crossing enhancements near these destinations will score one additional point
		Bikeway projects that provide new access to destinations (not upgraded facilities) will receive one additional point
Scoring Breakdown	Projects earning two points are considered highly feasible. Projects with zero or one point are considered low-feasibility projects.	Cost - Projects that only require signage and striping (Class II, Class IIB, Class III, Class IIIB, and some pedestrian crossing improvements) score one point
		Complexity - Projects that will not require interagency coordination (i.e., Caltrans rights-of-way) or will not require a potential road diet score one point

Implementation Categories

Based on the priority and feasibility scoring, projects are placed into four implementation categories: long-term improvements, short-term improvements, opportunity improvements, and low-priority improvements, as shown in this graphic:



Short-term improvement projects are rated high priority and high feasibility, and represent projects that could be pursued for implementation within the first three to five years.

Long-term improvement projects are rated high priority and low feasibility. They may require more study or analysis than short-term projects, more significant interagency coordination, or additional funding for construction.

Opportunity improvements are those projects rated low priority and high feasibility and may be pursued when nearby development or an overlapping project creates an opportunity to include these easy-to-implement projects.

Low-priority improvements are those projects rated low priority and low feasibility. They represent challenging projects that may not add significant value for a greater portion of the community walking or bicycling network on their own, but remain part of a long-term vision for active transportation.

BICYCLE PROJECTS

Out of 12 possible points, bicycle projects scored between 2 and 9 points. The average project score was 5.1 points; 16 projects scored 7, 8, or 9 points and have been classified as the top bicycle recommendations. Prioritized bicycle projects can be seen in Table 6.

TABLE 6 *Prioritized Bicycle Projects with Planning-Level Costs*

Street	Cross Street 1	Cross Street 2	Existing Class	Proposed Class	Mileage	Total Points	Implementation Category	Total Project Cost with Contingency (30%)
Oak Ave	El Camino Real	Oak Ave		IV	0.21	9	Long-Term Improvement	$631,449
Orange/Canal Bicycle Boulevard Group			III	IIIB	2.54	9	Short-Term	$3,368,040
Airport Blvd	2nd Ln	Miller Ave		IV	0.17	8	Long-Term Improvement	$524,888
El Camino Real	City limit	City limit		IV	2.75	8	Long-Term Improvement	$8,260,694
W Orange Bicycle Boulevard Group			III	IIIB	1.00	8	Short-Term	$1,326,000
Airport Blvd	Miller Ave	Armour Ave	II	IV	0.34	7	Short-Term	$170,957
Alta Loma/Buri Buri Bicycle Boulevard Group			III	IIIB	3.11	7	Short-Term	$4,123,860
Arroyo Dr	Camaritas Ave	El Camino Real	III	IV	0.14	7	Opportunity Project	$414,440
Avalon Bicycle Boulevard Group			III	IIIB	1.64	7	Short-Term	$2,174,640
Bike/Ped Bridge Study	Airport Blvd	Poletti Way		I	0.20	7	Long-Term Improvement	$19,500,000
Centennial Way Trail Connections	Grand Ave	El Camino Real		I	0.03	7	Long-Term Improvement	$49,375
Chestnut Ave	El Camino Real	Sunset Ave	III	IV	0.65	7	Long-Term Improvement	$1,954,485
Grand Ave	Bayshore Blvd Airport Blvd	E Grand Ave		II	0.04	7	Long-Term Improvement	$6,864
Hickey Blvd	City limit	El Camino Real		IV	0.57	7	Long-Term Improvement	$1,712,809
Westborough Blvd	Junipero Serra Blvd	El Camino Real	II & III	IV	1.05	7	Long-Term Improvement	$3,157,245

Green indicates an existing facility that is recommended for upgrade.

Street	Cross Street 1	Cross Street 2	Existing Class	Proposed Class	Mileage	Total Points	Implementation Category	Total Project Cost with Contingency (30%)
Westborough Blvd	Skyline Blvd	Junipero Serra Blvd	II & III	IV	1.86	7	Long-Term Improvement	$5,592,834
Airport Blvd	2nd Ln	S Airport Blvd		IV	0.26	6	Long-Term Improvement	$773,307
Bayshore Blvd	Sister Cities Blvd	City limit	II	IV	0.63	6	Long-Term Improvement	$1,903,075
Centennial Way Trail	Existing trail	City limit		I	0.21	6	Long-Term Improvement	$401,030
E Grand Ave	Forbes Blvd	Haskins Ave	II	IV	0.76	6	Long-Term Improvement	$2,294,336
E Grand Ave	Grand Ave	Poletti Way		I	0.20	6	Long-Term Improvement	$390,000
E Grand Ave Trail	Grand Avenue	Forbes Blvd		I	0.29	6	Long-Term Improvement	$557,798
Evergreen/Holly Bicycle Boulevard Group				IIIB	1.91	6	Opportunity Project	$2,532,660
Forbes Blvd	Eccles Ave	Allerton Ave		IV	0.68	6	Long-Term Improvement	$2,052,979
Grand Ave	Spruce Ave	Airport Blvd		IV	0.47	6	Long-Term Improvement	$1,402,711
Harbor Bicycle Boulevard Group				IIIB	0.20	6	Opportunity Project	$265,200
Linden Bicycle Boulevard Group			III	IIIB	0.98	6	Opportunity Project	$1,299,480
McLellan Dr	El Camino Real	Mission Rd		IIB	0.17	6	Opportunity Project	$86,397
Mission Rd	Chestnut Ave	Lawndale Blvd	II	IIB	0.94	6	Long-Term Improvement	$472,258
Mission Rd	Chestnut Ave	Lawndale Blvd		I	0.23	6	Long-Term Improvement	$440,786

Green indicates an existing facility that is recommended for upgrade.

Street	Cross Street 1	Cross Street 2	Existing Class	Proposed Class	Mileage	Total Points	Implementation Category	Total Project Cost with Contingency (30%)
N Access Rd	Bay Trail	S Airport Blvd		IV	0.19	6	Long-Term Improvement	$571,311
Poletti Way	Caltrain Station Tunnel	Oyster Point Blvd		I	0.69	6	Long-Term Improvement	$1,340,830
S Spruce Ave	El Camino Real	N Canal St	III	IV	0.75	6	Low Priority	$2,268,438
Sneath Ln extension	Huntington Ave	S Linden Ave		IV	0.34	6	Low Priority	$1,022,346
Oyster Point Blvd	Gateway Blvd	End of street	II	IV	0.85	6	Opportunity Project	$2,555,865
Bay Trail/Shaw/ Tanforan	Airport Blvd	Huntington Ave		I	0.91	5	Long-Term Improvement	$1,782,091
Colma Creek Bay Trail	Existing Bay Trail	Utah Ave		I	0.29	5	Long-Term Improvement	$565,500
Colma Creek Service Road	Harbor Way	Colma Creek Trail		III	0.09	5	Low Priority	$4,095
E Grand Ave	Existing facility	End of street		III	0.23	5	Opportunity Project	$10,626
E Grand Ave	Existing facility	Gateway Blvd		II	0.12	5	Opportunity Project	$20,592
Gellert Blvd	Westborough Blvd	Shannon Dr	III	IV	0.54	5	Low Priority	$1,635,096
Gellert Blvd	King Dr	Westborough Blvd	II	IV	0.56	5	Low Priority	$1,669,717
Grand Ave	Chestnut Ave	Spruce Ave	II	IV	0.81	5	Opportunity Project	$2,420,810
Greendale Bicycle Boulevard Group			III	IIIB	1.33	5	Opportunity Project	$1,763,580
Harbor Way	RR tracks/proposed trail	Littlefield Ave		III	0.53	5	Opportunity Project	$24,115
Huntington Ave	Spruce Ave	Noor Ave		IV	0.27	5	Low Priority	$811,863
Junipero Serra Blvd	Avalon Dr	City limit	II	IV	2.12	5	Low Priority	$6,389,555
Oyster Point Blvd	Marina Blvd	Parking lot		II	0.08	5	Opportunity Project	$13,295
Oyster Point Blvd	Sister Cities Blvd	Gateway Blvd		II	0.27	5	Low Priority	$45,669
Produce Ave/ new road	Airport Blvd/San Mateo Ave	Utah Ave extension		IV	0.38	5	Long-Term Improvement	$1,142,622

Green indicates an existing facility that is recommended for upgrade.

Street	Cross Street 1	Cross Street 2	Existing Class	Proposed Class	Mileage	Total Points	Implementation Category	Total Project Cost with Contingency (30%)
Shannon Bicycle Boulevard Group			III	IIIB	0.91	5	Opportunity Project	$1,206,660
Airport Blvd	Armour Ave	Sister Cities Blvd	II	IIB	0.24	4	Opportunity Project	$120,728
Airport Blvd	Armour Ave	Chapman Ave	II	IIB	0.23	4	Opportunity Project	$114,258
Airport Blvd	Gateway Blvd	Belle Aire Rd		IV	0.64	4	Low Priority	$1,924,416
Country Club Dr	Alida Way	El Camino Real		IIB	0.13	4	Opportunity Project	$63,407
Gateway Trail	E Grand Ave	Oyster Point Blvd		I	0.67	4	Low Priority	$1,303,385
Gellert-Chateau				NP	0.06	4	Low Priority	$119,981
Haskins Way	E Grand Ave	Sister Cities Blvd	II	IIB	0.24	4	Opportunity Project	$120,728
E Grand Ave	North Access Road		I	1.08	4	Low Priority	$2,099,636	$114,258
Hillside Blvd	Linden Ave	Spruce Ave	III	II	0.12	4	Opportunity Project	$20,703
Hillside Blvd	Sister Cities Blvd	Ridgeview Court	III	II	0.71	4	Opportunity Project	$121,371
Littlefield Ave	Harbor Way	Proposed trail		III	0.03	4	Opportunity Project	$1,365
Near Eccles Ave & Oyster Point Blvd	E Grand Ave	Oyster Point Blvd		I	0.80	4	Low Priority	$1,554,126
Oak Ave	Mission Rd	Grand Ave		IV	0.13	4	Low Priority	$390,897
Orange Ave	Centennial Way Trail	Railroad Ave	II	IIB	0.26	4	Opportunity Project	$132,192
S Spruce	N Canal St	Railroad Ave	III	IV	0.15	4	Low Priority	$458,904
San Mateo Avenue	Airport Blvd	S Airport Blvd	III	II	0.78	4	Low Priority	$133,848
Sister Cities Blvd	Hillside Blvd	Airport Blvd	II	IV	0.89	4	Low Priority	$2,686,082
Utah Ave	San Mateo Ave	US-101	III	II	0.29	4	Long-Term Improvement	$49,764

Green indicates an existing facility that is recommended for upgrade.

Street	Cross Street 1	Cross Street 2	Existing Class	Proposed Class	Mileage	Total Points	Implementation Category	Total Project Cost with Contingency (30%)
W Orange Ave	Library Driveway	Fairway Dr	III	IV	0.26	4	Low Priority	$781,794
Chestnut Ave	Sunset Ave	Hillside Blvd	III	IV	0.28	3	Low Priority	$831,945
Grand Ave	Chestnut Ave	Mission Rd	III	IV	0.41	3	Long-Term Improvement	$1,232,035
Linden Ave	Tanforan Ave	Baden Ave	III	II	0.98	3	Low Priority	$168,847
Littlefield Ave	E Grand Ave	Utah Ave	III	IV	0.38	3	Low Priority	$1,139,761
Mitchell Ave	Harbor Way	Airport Blvd		II	0.31	3	Opportunity Project	$53,196
Near Harbor Way	E Grand Ave	Littlefield Ave		I	0.84	3	Low Priority	$1,643,124
Utah Ave	US-101	Littlefield Ave	III	IV	0.60	3	Low Priority	$1,804,140
Forbes Blvd	Allerton Ave	Gull Dr	IIB	IV	0.25	3	Low Priority	$751,725
Gull Drive	Forbes Blvd	Oyster Point Blvd	II	I	0.25	3	Low Priority	$487,500
DNA Way	Existing facility	Existing facility		IIB	0.06	2	Low Priority	$32,338
Near Cabot Rd	Allerton Ave	E Grand Ave		I	0.61	2	Low Priority	$1,192,484
W Orange Ave	Library Driveway	Westborough Blvd	III	II	0.13	2	Low Priority	$21,486
W Orange Ave	Library Driveway	Fairway Dr	III	III	0.26	2	Low Priority	$11,830

Green indicates an existing facility that is recommended for upgrade.

The top 16 projects include the following projects:

- Class IV separated bikeways on Oak Avenue, Airport Boulevard, El Camino Real, Arroyo Drive, Hickey Boulevard, and Westborough Boulevard
- Class IIIB bicycle boulevards in the Orange/Canal, W Orange, Alta Loma/Buri Buri, and Avalon Bicycle Boulevard Groups
- Class II bike lanes on the Grand Avenue overcrossing project
- Class I shared-use paths including the proposed new bicycle/pedestrian bridge over US-101 and improved connections between the Centennial Way Trail near Kaiser between El Camino Real and Grand Avenue

Twenty-nine bicycle projects were categorized as low-priority projects, 22 were categorized as opportunity projects, 26 were categorized as long-term projects, and 5 were categorized as short-term projects.

PEDESTRIAN PROJECTS

Out of 12 possible points, pedestrian projects scored between 3 and 9 points. The average project score was 5.4 points; 11 projects scored 7, 8, or 9 points and have been classified as the top pedestrian recommendations. Prioritized pedestrian projects can be seen in Table 7.

TABLE 7 *Prioritized Pedestrian Projects with Planning-Level Costs*

Location	Improvement	Total Points	Implementation Category	Project Total with Contingency (30%)
Mission and Lawndale/ McLellan	Upgrade all crosswalks to high-visibility crosswalks. Construct curb extensions at all four corners. Provide leading pedestrian intervals for all crossings. Construct sidewalks on the west side of McLellan south of Mission Rd.	9	Long-Term Improvement	$1,250,340
El Camino Real and McLellan	Upgrade all crosswalks to high-visibility crosswalks. Install a high-visibility crosswalk at the western ECR approach. Provide a leading pedestrian interval for the ECR crossings. Construct curb extensions.		Long-Term Improvement	$1,352,000
McLellan and BART	Upgrade existing crosswalks to high-visibility crosswalks. Install leading pedestrian intervals at all crossings. Build curb extensions at the eastern corners.		Long-Term Improvement	$422,500
El Camino Real and BART	Straighten the crosswalk across the northern approach. Upgrade both crosswalks to high-visibility crosswalks. Provide a leading pedestrian interval.		Long-Term Improvement	$139,750
Grand and Airport Blvd	Remove free right turn lane. Upgrade two marked crossings to high-visibility. Consider pedestrian-only phase. Construct a pedestrian refuge island at the Airport Boulevard approach.	8	Long-Term Improvement	$334,750
El Camino Real and Ponderosa	Construct sidewalks on the eastern side of ECR between Country Club Drive and Ponderosa. Upgrade all three marked crosswalks to high-visibility crosswalks. Provide a leading pedestrian interval for the ECR crossings. Construct median refuge islands for the ECR crossings.	7	Long-Term Improvement	$459,875
Grand Avenue and E Grand Avenue	Upgrade two existing crosswalks to high-visibility crosswalks. Remove free right turn lane at the southeast corner. Install pedestrian refuge island in the E Grand Avenue crossing. Install curb extensions at the northeast, southwest, and southeast corners. Add a leading pedestrian interval for the E Grand Avenue crossing.	7	Long-Term Improvement	$919,750

Location	Improvement	Total Points	Implementation Category	Project Total with Contingency (30%)
Mission and Sequoia	Install a crosswalk on the northern approach. Upgrade all crosswalks to high-visibility crosswalks. Construct curb extensions.	7	Long-Term Improvement	$1,062,750
Orange and Railroad	Upgrade the transverse crosswalk across Railroad Avenue to high-visibility and construct a curb extension at the southeast corner.	7	Long-Term Improvement	$68,250
Orange and Tennis Dr	Construct curb extensions for the crossings of Orange Avenue and Tennis Drive. Install a high-visibility crosswalk across Tennis Drive.	7	Long-Term Improvement	$263,250
Westborough and Galway	Upgrade all four crosswalks to yellow high-visibility crosswalks. Construct pedestrian refuge islands on the Westborough crossings. Construct curb ramps at all corners. Install curb extensions to tighten corner radii. Update/add school zone signs.	7	Long-Term Improvement	$1,453,400
Westborough and Junipero Serra Blvd	Construct sidewalks on the southern side of Westborough Boulevard through the interchange area to Junipero Serra. Install/upgrade high visibility crosswalks at all interchange crossing locations. Install with appropriate signs and pavement markings.	7	Long-Term Improvement	$191,165
Spruce and Grand	Install yellow transverse markings around the decorative crosswalk. Upgrade three remaining crosswalks to high-visibility. Consider installing curb extensions at all corners.	7	Opportunity Improvement	$1,073,150
Oyster Point/Sister Cities and Airport	Construct curb extensions at the north, west, and south corners. Upgrade two marked crosswalks to high-visibility crosswalks and realign to be straight. Implement a leading pedestrian interval for both crosswalks.	7	Long-Term Improvement	$741,000
Arroyo and Alta Loma	Construct curb extensions on both sides of the crosswalk. Construct a median refuge island. Install an RRFB. Install a high visibility crosswalk across Alta Loma Drive.	6	Long-Term Improvement	$406,250

Location	Improvement	Total Points	Implementation Category	Project Total with Contingency (30%)
E Grand and Poletti Way	Mark crosswalks across E Grand Avenue and Industrial Way to enhance Caltrain and Grand Avenue access. Tighten corner radii to square-up intersection approaches. Provide the proposed trail with an enhanced crossing.	6	Long-Term Improvement	$289,250
El Camino Real and Kaiser	Construct sidewalks on the south side of ECR from the bus stop to the bend in Del Paso Drive. Build sidewalk between ECR and Del Paso. At the Kaiser driveway, upgrade all crosswalks to high visibility crosswalks. Redesign the pedestrian refuge island in the western ECR crossing. Provide a leading pedestrian interval for the ECR crossing.	6	Long-Term Improvement	$215,735
El Camino Real and S Spruce	Upgrade all four crosswalks to high-visibility crosswalks. Construct pedestrian refuge islands for the two ECR crossings. Provide a leading pedestrian interval for the ECR crossings. Consider curb extensions at all four corners.	6	Long-Term Improvement	$1,475,500
Grand and Linden	Install advance stop markings at all approaches. Provide a leading pedestrian interval for all crossings.	6	Opportunity Improvement	$171,600
Grand and Maple	Install advance stop markings at all approaches. Provide a leading pedestrian interval for all crossings.	6	Opportunity Improvement	$171,600
Hickey and El Camino Real	Upgrade all crosswalks to high-visibility crosswalks. Straighten the northern ECR crosswalk. Install a high-visibility crosswalk across the southern ECR approach (push back the northbound stop bar and median to create a straight crossing). Provide a leading pedestrian interval for the ECR crossings.	6	Long-Term Improvement	$160,875
Miller and Oakcrest	Construct curb extensions at the southeast, southwest, and northwest corners. Install advance stop/yield pavement markings. Consider installing an RRFB.	6	Long-Term Improvement	$686,400

Location	Improvement	Total Points	Implementation Category	Project Total with Contingency (30%)
BART/Cymbidium Circle Neighborhood Path	Create a stair channel along the existing stairs to improve bicycle access. Remove the gate at Alta Loma/Cymbidium to open stair access to both neighborhoods. At ECR, upgrade crosswalk to high visibility and straighten the crosswalk. Provide a leading pedestrian interval.	6	Long-Term Improvement	$136,500
Spruce and S Canal Way	Straighten the crosswalk across S Canal Street. Upgrade both crosswalks to high-visibility crosswalks. Construct a curb extension at the southeast corner. Add trail wayfinding information. Consider leading pedestrian intervals for Spruce Avenue crossing.	6	Long-Term Improvement	$242,125
Westborough and Gellert	Upgrade the three marked, and install on the fourth approach high-visibility crosswalks. Build out the necessary corners to straighten all crosswalks. Construct pedestrian refuge islands at all crosswalks. Provide a leading pedestrian interval for the northern Westborough crosswalk.	6	Long-Term Improvement	$2,314,000
Westborough/Chestnut and El Camino Real	Upgrade all crosswalks to high-visibility crosswalks. Straighten the northern crosswalk across Chestnut. Provide a leading pedestrian interval for all crossings. Consider installing curb extensions at all corners. Extend all four medians to create pedestrian refuge islands.	6	Long-Term Improvement	$2,314,000
Crestwood/Gardenside	Install a neighborhood traffic circle. Upgrade all crosswalks to high-visibility crosswalks.	5	Low Priority	$247,000
El Camino Real and Arroyo & Arroyo and Del Paso	Remove the crosswalk at Del Paso Drive across Arroyo Drive; close gap in the median, and remove yield paddle. At ECR, upgrade all crosswalks to high visibility crosswalks. Provide a leading pedestrian interval for ECR crossings. Consider curb extensions at all four corners	5	Low Priority	$1,266,525
Grand and Cypress	Install advance yield markings and signs for the Grand Avenue crossings.	5	Opportunity Improvement	$13,000

Location	Improvement	Total Points	Implementation Category	Project Total with Contingency (30%)
Grand midblock crossings between Linden and Maple	Install advance yield pavement markings and signs.	5	Opportunity Improvement	$16,250
Hillside and Arden	Refresh the two existing high-visibility crosswalks. Construct curb extensions at the two eastern corners. Install advance stop/yield markings.	5	Low Priority	$296,400
Hillside and Belmont	Shift the crossing of Hillside Boulevard to the western approach to improve site lines. Install curb extensions at all three corners with a crosswalk. Install an RRFB for the Hillside crosswalk. Install advance yield markings.	5	Low Priority	$677,300
Linden and N Canal	Widen on or both of the existing paths on the Colma Creek bridge to ADA complaint width. Install appropriate curb ramps. Mark a crosswalk across S Canal street if sidewalks are present on the west side.	5	Low Priority	$108,290
Miller and Westview	Construct curb extensions at the southeast, southwest, and northwest corners. Straighten the crosswalk across Miller. Install advance stop/yield pavement markings. Consider installing an RRFB.	5	Low Priority	$689,650
S Airport and Utah	Consistent with proposed Utah overcrossing of 101, install high visibility crosswalks at all four approaches. Provide a leading pedestrian interval.	5	Opportunity Improvement	$191,750
Spruce and Hillside	Construct curb extensions at the two northern and southeastern corners. Mark high-visibility crosswalks across Spruce Avenue and School Street.	5	Low Priority	$598,000
Spruce and Park Way	Upgrade the two existing crosswalks across Park Way to high-visibility crosswalks. Install high-visibility crosswalks across both Spruce approaches. Install advance stop markings. Paint/refresh red curb at all corners.	5	Opportunity Improvement	$93,686
Utah Ave/ San Mateo Ave	Install a protected intersection with high visibility crosswalks.	5	Long-Term Improvement	$650,000

Location	Improvement	Total Points	Implementation Category	Project Total with Contingency (30%)
Westborough and Callan	Upgrade all four crosswalks to yellow high-visibility crosswalks. Construct pedestrian refuge islands on the Westborough and Callan crossings. Update/add school zone signs	5	Long-Term Improvement	$629,525
Airport and Gateway	Upgrade existing crosswalks to high-visibility crosswalks. Construct median refuge islands at the west, east, and south approaches. Remove slip lane from the southern approach.	4	Low Priority	$793,000
Chestnut and Commercial	Upgrade all crosswalks to high-visibility. Remove the slip lane from the southeast corner and construct a curb extension; straighten both crosswalks from this corner.	4	Low Priority	$247,000
Grand and Gateway	Upgrade all crosswalks to high-visibility crosswalks. Remove free right turn lanes at northwest and southeast corners. Install pedestrian refuge islands in all crossings. Install curb extensions at all four corners.	4	Low Priority	$2,645,500
Grand and Walnut	Install advance yield pavement markings and signs.	4	Opportunity Improvement	$29,250
Holly/Crestwood	Upgrade all crossings to high-visibility crosswalks. Consider installing a neighborhood traffic circle.	4	Opportunity Improvement	$247,000
Junipero Serra and Arroyo	Construct sidewalks on the western (highway) side of Junipero Serra Boulevard from the interchange to Arroyo Drive. Install a HAWK beacon at JSB/Arroyo Drive.	4	Low Priority	$546,000
Junipero Serra and Avalon & Avalon and Valverde	Mark high-visibility crosswalks across Valverde Drive. Construct sidewalks on the eastern (golf course) side of JSB to Westborough Boulevard from Avalon Drive. Mark a high-visibility crosswalk across the eastern approach of Avalon Drive/JSB.	4	Low Priority	$256,750
Junipero Serra and Hickey	Remove the free right turn lane at the southeast, southwest, and northwest corner. Upgrade all crosswalks to high visibility crosswalks. Provide leading pedestrian intervals for both crosswalks. Construct pedestrian refuge islands.	4	Low Priority	$1,579,500

Location	Improvement	Total Points	Implementation Category	Project Total with Contingency (30%)
Spruce and N. Canal St	Build curb extensions at the two northern corners. Straighten and upgrade all three marked crosswalks to high-visibility crosswalks.	4	Low Priority	$277,875
East Grand and Forbes	Upgrade all crosswalks to high-visibility crosswalks. Install curb extensions at all four corners. Install pedestrian refuge islands across E Grand Avenue.	3	Low Priority	$1,329,250
El Camino Real and W Orange	Straighten the southern crosswalk across ECR. Create pedestrian refuge islands for the ECR crossings. Upgrade all four crosswalks to high visibility crosswalks. Provide a leading pedestrian interval for the ECR crossing.	3	Low Priority	$429,000
Grand and Mission	Upgrade both crosswalks to high-visibility crosswalks. Extend medians and create pedestrian refuge islands.	3	Low Priority	$279,500
Grand and Orange	Upgrade all crosswalks to high-visibility crosswalks. Consider installing curb extensions at all four corners. Provide a leading pedestrian interval for the crossings of Grand Avenue.	3	Opportunity Improvement	$1,222,000

The top 11 pedestrian projects are at the following locations:

- BART Station-area recommendations (four locations)
- Grand Avenue/Airport Boulevard
- Grand Avenue/E Grand Avenue
- Grand Avenue/Spruce Avenue
- El Camino Real/Ponderosa Road
- Mission Road/Sequoia Avenue
- Orange Avenue/Railroad Avenue
- Orange Avenue/Tennis Drive
- Westborough Boulevard/Galway Drive
- Westborough Boulevard/Junipero Serra Boulevard
- Oyster Point Boulevard/Sister Cities Boulevard/Airport Boulevard

Eighteen pedestrian projects were categorized as low-priority projects, 10 were categorized as opportunity projects, 21 were categorized as long-term projects, and none were categorized as short-term projects. Some pedestrian projects (or components of some projects), however, can be implemented with shorter-term materials (paint-and-post curb extensions, for example) and can later be converted to more permanent materials (concrete) when funding becomes available.

The top priority bicycle and pedestrian projects are shown on the Map 14.

MAP 14

PRIORITY RECOMMENDATIONS

ACTIVE SOUTH CITY

Priority Recommendations

EXIST PROPOSED

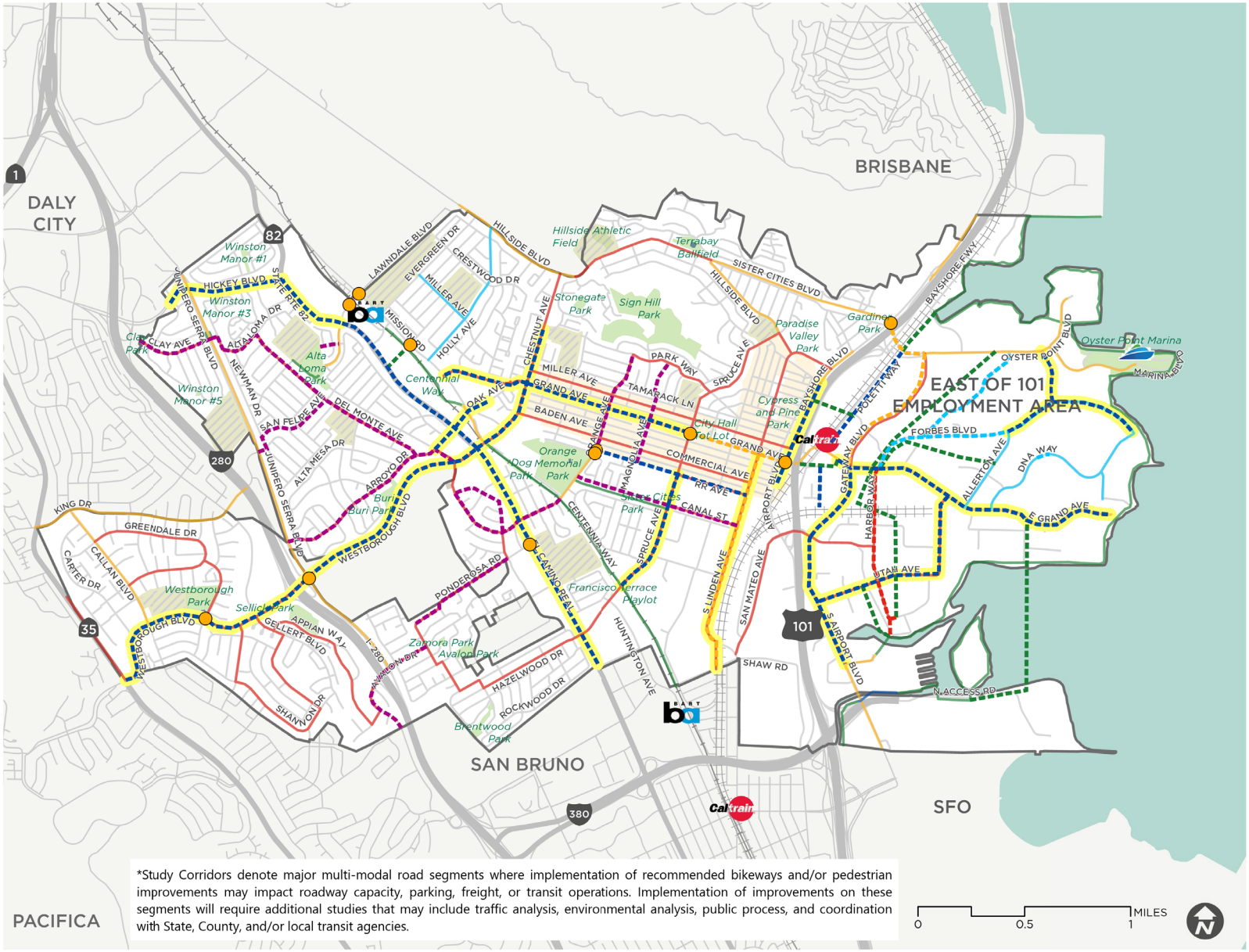
- Class I Shared-Use Path
- Class II Bicycle Lane
- Class IIB Buffered Bicycle Lane
- Class III Bicycle Route
- Class IIIB Bicycle Boulevard
- Class IV Separated Bikeway
- Study Corridor*
- Pedestrian Improvements

Transportation

- Ferry Dock
- BART Station
- Caltrain Station
- Caltrain Rail Line
- BART Line

Destinations

- Community Center
- School
- Park
- Library
- Downtown



*Study Corridors denote major multi-modal road segments where implementation of recommended bikeways and/or pedestrian improvements may impact roadway capacity, parking, freight, or transit operations. Implementation of improvements on these segments will require additional studies that may include traffic analysis, environmental analysis, public process, and coordination with State, County, and/or local transit agencies.

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Implementation Considerations

While some of the projects outlined within this plan may be implemented more quickly, other projects require further community involvement, additional study of trade-offs, or multi-jurisdictional coordination. These pieces require additional time and resources that add complexity to the project.

PROJECT DELIVERY

The City may use a combination of staff and consultant resources for project delivery phases that include Planning (conceptual project development and funding); Preliminary Engineering (environmental clearance and design); Final Design; and Construction Management (contractor oversight, inspection, and invoicing). In addition, many projects will be constructed by developers as part of their development agreements.

PROJECT STUDIES AND PHASING

A number of the projects outlined in this plan will require additional study prior to implementation. We have identified many of the major arterial segments as Study Corridors on the recommended project map (Map 14) to indicate the need for further outreach and consideration of feasibility.

Study Corridors denote major multimodal road segments where implementation of recommended bikeways or pedestrian improvements may impact roadway capacity, parking, freight, or transit operations. Implementation of improvements on these segments will require additional studies that may include traffic analysis, environmental analysis, public process, and coordination with State, County, or local transit agencies. Project designs will be informed by feasibility outcomes of the studies mentioned previously and general feasibility as determined by the City, and all projects will be considered in the context of the modal priorities established by the South San Francisco General Plan.

INTERAGENCY COORDINATION

Specific proposed projects require the City of South San Francisco to coordinate with other agencies and stakeholders to coordinate design, implementation, and funding. For example, extending the Centennial Way Trail will require coordination with BART and the San Mateo County Flood Control District. Likewise, the proposed additions to the Bay Trail will require coordination with agencies such as the Association of Bay Area Governments and the Coastal Conservancy. Improvements at and along El Camino Real and highway crossings and interchanges will require coordination with Caltrans Bay Area.

Project Funding

Appendix D provides a detailed overview of some funding sources available to help South San Francisco fund the proposed active transportation improvements. Table 8 provides a summary of the types of projects each listed funding source is eligible to fund.

Implementation Monitoring

Continuing to monitor how proposed projects and programs are implemented will help the City evaluate community benefits and impacts and hold themselves accountable for implementation. The following set of recommendations can help the City and its partners monitor progress and evaluate the effectiveness of implementation, respectively.

MONITOR PLAN IMPLEMENTATION PROGRESS

- Bring Active South City progress updates to the Bicycle and Pedestrian Advisory Commission at least biannually. Identify what progress has been made in the past six months, and where the City will focus efforts in the upcoming six months.
- Create and frequently update an online web map or dashboard of active projects so that residents and community members can see the progress of bike and pedestrian projects. For example, the Interactive Projects Map maintained by the San Francisco Metropolitan Transportation Authority shows active transportation projects in San Francisco.

PROJECT AND PROGRAM EVALUATION

- Conduct pre- and post-implementation evaluation of all large bike and pedestrian infrastructure projects to understand outcomes such as mode shift, increased biking and walking safety, other community benefits, and any unintended impacts. For example, the City of Oakland's Telegraph Avenue Progress Report examines safety and mode shift outcomes after the implementation of a parking-protected bikeway.
- Evaluate the effectiveness of program investments every two years. This program evaluation can help the City understand if programs are a good return on investment and measure outcomes and results in the near, medium, and long term. For example, the Alameda County Transportation Commission's evaluation of their Safe Routes to School program analyzes how the intended goals were reached.

TABLE 8 *Prioritized Bicycle Projects with Planning-Level Costs*

Funding Source	On-Street Bikeways	Trails	Safe Routes to School	Safe Routes to Transit	Crossings	Programs	Studies
Local and Regional Programs							
Local Sources (Impact Fees, Developer Agreements, Repaving)	•	•	•	•	•	•	
Measure A	•	•	•	•	•		
Measure M	•		•		•		
Measure W	•	•	•	•	•		
Transportation Funds for Clean Air (C/CAG & BAAQMD)	•	•	•	•	•		
Bicycle Facilities Program (BAAQMD)	•	•	•	•			
One Bay Area (MTC & C/CAG)	•	•	•	•			
Transportation Development Act, Article 3 (C/CAG)	•	•	•	•	•		
Regional Measure 3 (MTC)				•			
Competitive Grant Programs							
Active Transportation Program (CTC)	•	•	•	•	•	•	
Sustainable Transportation Planning Grants (Caltrans)							•
Highway Safety Improvement Program (Caltrans)	•		•	•	•		
Solutions for Congested Corridors (CTC)	•	•			•		
Office of Traffic Safety (CA OTS)						•	

Funding Source	On-Street Bikeways	Trails	Safe Routes to School	Safe Routes to Transit	Crossings	Programs	Studies
Recreational Trails Program (CA DPR)		•					
Affordable Housing & Sustainable Communities (CA HCD)	•			•		•	
Cultural, Community, and Natural Resources (CA NRA)		•					
Urban Greening Grants (CA NRA)	•	•	•	•			
Other State Funds							
Local Partnership Program (CTC)	•		•	•	•		
Road Maintenance and Rehabilitation Program (Controller's Office)	•		•	•			

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Appendix A: Design Guidelines

ACTIVE
SOUTH CITY

CONNECTED. HEALTHY. SAFE.

Bicycle & Pedestrian Design Guide

Context

Guidance Basis

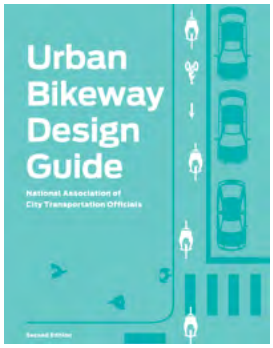
The sections that follow serve as an inventory of pedestrian and bicycle design treatments and provide guidelines for their development. These treatments and design guidelines are important because they represent the tools for creating a bicycle-friendly, safe, accessible community. The guidelines are not, however, a substitute for a more thorough evaluation by a professional engineer. The following standards and guidelines are referred to in this guide:

National Guidance

A blueprint for designing 21st century streets, the NACTO Urban Street Design Guide (2013) unveils the toolbox and tactics cities use to make streets safer, more livable, and more economically vibrant. The Guide outlines both a clear vision for complete streets and a basic road map for how to bring them to fruition. The document charts the principles and practices of the nation's foremost engineers, planners, and designers working in cities.

NCHRP's Improving Pedestrian Safety at Unsignalized Crossings Report recommends engineering treatments to improve pedestrian safety at unsignalized locations with high speeds and traffic volumes.

Separated Bike Lane Planning and Design Guide (2015) provides national guidance on the planning and design of separated bike lane facilities. Released by the Federal Highway Administration (FHWA), this guide documents best practices as demonstrated around the U.S., and offers ideas on future areas of research, evaluation, and design flexibility.



The National Association of City Transportation Officials' (NACTO) Urban Bikeway Design Guide (2012) provides cities with state-of-the-practice solutions that can help create complete streets that are safe and enjoyable for bicyclists. The designs were developed by cities for cities, since unique urban streets require innovative solutions. In August 2013, the Federal Highway Administration issued a memorandum officially supporting use of the document.

California Guidance

The California Manual on Uniform Traffic Control Devices (CAMUTCD) (2014) is an amended version of the FHWA MUTCD 2009 edition modified for use in California. While standards presented in the CA MUTCD substantially conform to the FHWA MUTCD, the state of California follows local practices, laws and requirements with regards to signing, striping and other traffic control devices.

Main Street, California: A Guide for Improving Community and Transportation Vitality (2013) reflects California's current manuals and policies that improve multi-modal access, livability and sustainability within the transportation system. The guide recognizes the overlapping and sometimes competing needs of main streets.

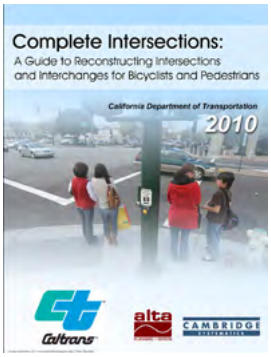

FOREWORD

The California Highway Design Manual (HDM) (Updated 2015) establishes uniform policies and procedures to carry out highway design functions for the California Department of Transportation.


Memorandum

DESIGN FLEXIBILITY IN MULTIMODAL DESIGN

The Caltrans Memo: Design Flexibility in Multimodal Design (2014) encourages flexibility in highway design. The memo stated that "Publications such as the NACTO "Urban Street Design Guide" and "Urban Bikeway Design Guide," … are resources that Caltrans and local entities can reference when making planning and design decisions on the State highway system and local streets and roads."



Complete Intersections: A Guide to Reconstructing Intersections and Interchanges for Bicyclists and Pedestrians (2010) is a reference guide that presents information and concepts related to improving conditions for bicyclists and pedestrians at major intersections and interchanges. The guide can be used to inform minor signage and striping changes to intersections, as well as major changes and designs for new intersections.


Memorandum

The Caltrans resource Class IV Bikeway Guidance (2018) provides enhanced guidance for two-way separated bikeways, with added information on transit stops and separated bikeways adjacent to street parking. It also provides a discussion of maintenance using Caltrans equipment.

User Design Dimensions

The purpose of this section is to provide the facility designer with an understanding of how bicyclists operate and how their bicycle influences that operation. Bicyclists, by nature, are much more affected by poor facility design, construction, and maintenance practices than motor vehicle drivers.

Bicyclists lack the protection from the elements and roadway hazards provided by an automobile's structure and safety features. By understanding the unique characteristics and needs of bicyclists, a facility designer can provide quality facilities and minimize user risk.

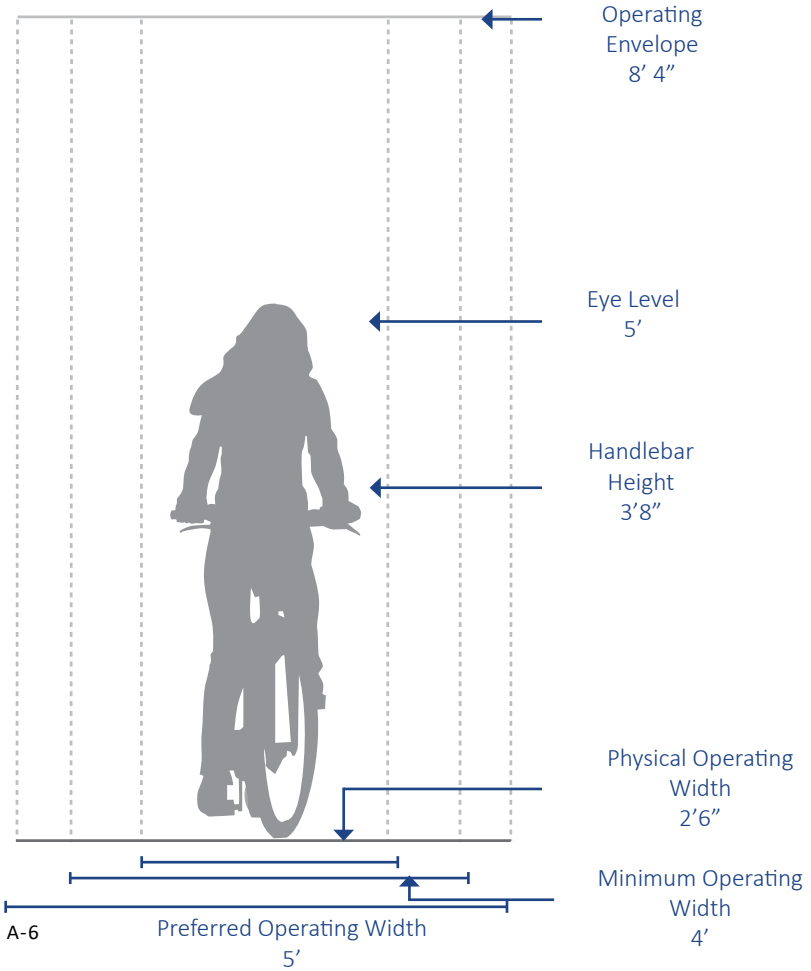
Bicycle as a Design Vehicle

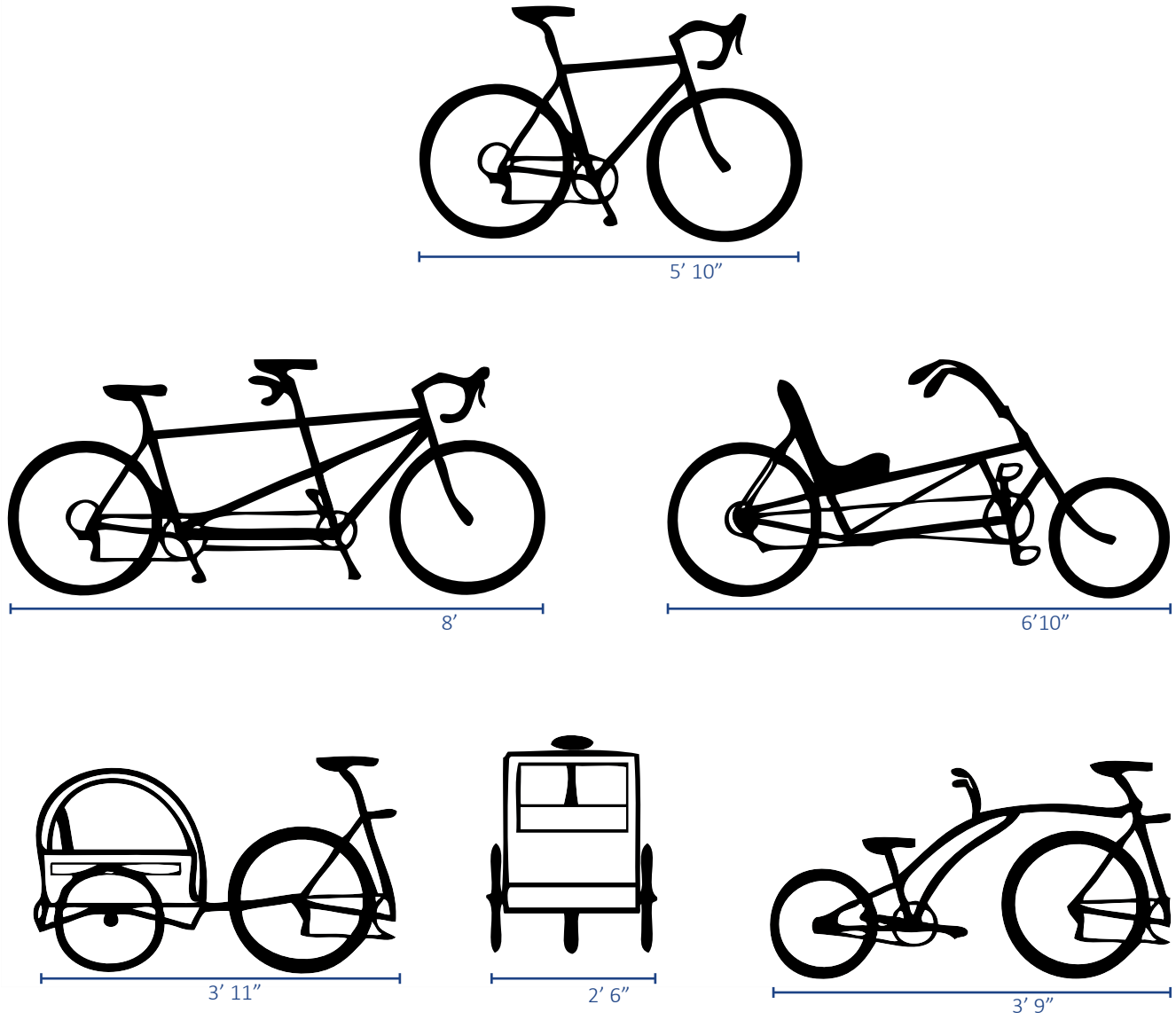
Similar to motor vehicles, bicyclists and their bicycles exist in a variety of sizes and configurations. These variations occur in the types of vehicle (such as a conventional bicycle, a recumbent bicycle or a tricycle), and behavioral characteristics (such as the comfort level of the bicyclist). The design of a bikeway should consider reasonably expected bicycle types on the facility and utilize the appropriate dimensions.

The figure to the right illustrates the operating space and physical dimensions of a typical adult bicyclist, which are the basis for typical facility design. Bicyclists require clear space to operate within a facility. This is why the minimum operating width is greater than the physical dimensions of the bicyclist. Bicyclists prefer five feet or more operating width, although four feet may be minimally acceptable.

In addition to the design dimensions of a typical bicycle, there are many other commonly used pedal-driven cycles and accessories to consider when planning and designing bicycle facilities. The most common types include tandem bicycles, recumbent bicycles, and trailer accessories. The figure to the left summarizes the typical dimensions for bicycle types.

Bicycle Rider - Typical Dimensions





Source: AASHTO Guide for the Development of Bicycle Facilities, 4th Edition

The expected speed that different types of bicyclists can maintain under various conditions also influences the design of facilities such as shared use paths. The table to the right provides typical bicyclist speeds for a variety of conditions.

Bicycle Type	Feature	Typical Speed
Upright Adult Bicyclist	**Paved level surfacing**	**8-12 mph***
	Crossing Intersections	**10 mph**
	Downhill	**30 mph**
	Uphill	**5 -12 mph**
Recumbent Bicyclist	**Paved level surfacing**	**18 mph**

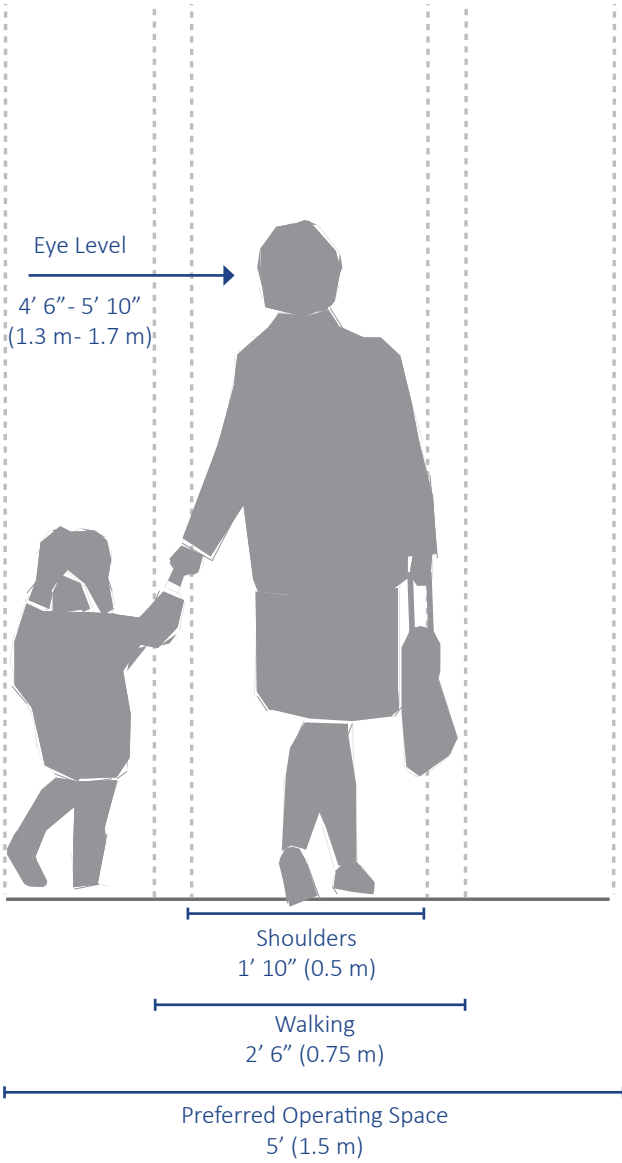
**** Typical speed for causal riders per AASHTO 2013.***

Pedestrian Design Needs

Types of Pedestrians

Pedestrians have a variety of characteristics and the transportation network should accommodate a variety of needs, abilities, and possible impairments. Age is one major factor that affects pedestrians' physical characteristics, walking speed, and environmental perception. Children have low eye height and walk at slower speeds than adults. They also perceive the environment differently at various stages of their cognitive development. Older adults walk more slowly and may require assistive devices for walking stability, sight, and hearing. The table below summarizes common pedestrian characteristics for various age groups.

The MUTCD recommends a normal walking speed of 3.5 feet per second when calculating the pedestrian clearance interval at traffic signals. The walking speed can drop to 3 feet per second for areas with older populations and persons with mobility impairments. While the type and degree of mobility impairment varies greatly across the population, the transportation system should accommodate these users to the greatest reasonable extent.



Pedestrian Characteristics by Age

Age	Characteristics
0-4	Learning to walk
	Requires constant adult supervision
	Developing peripheral vision and depth perception
5-8	Increasing independence, but still requires supervision
	Poor depth perception
9-13	Susceptible to "darting out" in roadways
	Insufficient judgment
	Sense of invulnerability
14-18	Improved awareness of traffic environment
	Insufficient judgment
19-40	Active, aware of traffic environment
41-65	Slowing of reflexes
65+	Difficulty crossing street
	Vision loss
	Difficulty hearing vehicles approaching from behind

Additional References and Guidelines

AASHTO. Guide for the Planning, Design, and Operation of Pedestrian Facilities, Exhibit 2-1. 2004.

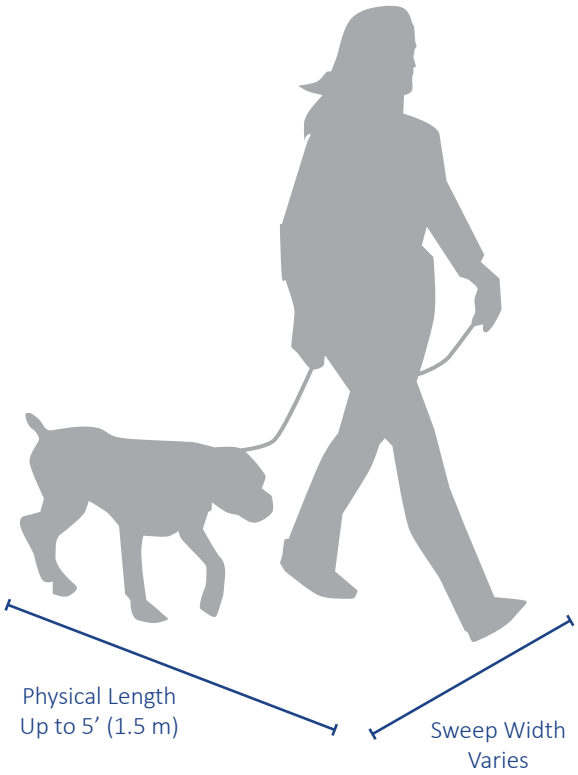
Design Needs of Dog Walkers

Dog walking is a common and anticipated use on shared use paths. Dog sizes vary largely, as does leash length and walking style, leading to wide variation in possible design dimensions.

Shared use paths designed to accommodate wheelchair users are likely to provide the necessary dimensions for the average dog walker. Amenities such as dog waste stations may enhance conditions for dog walkers.

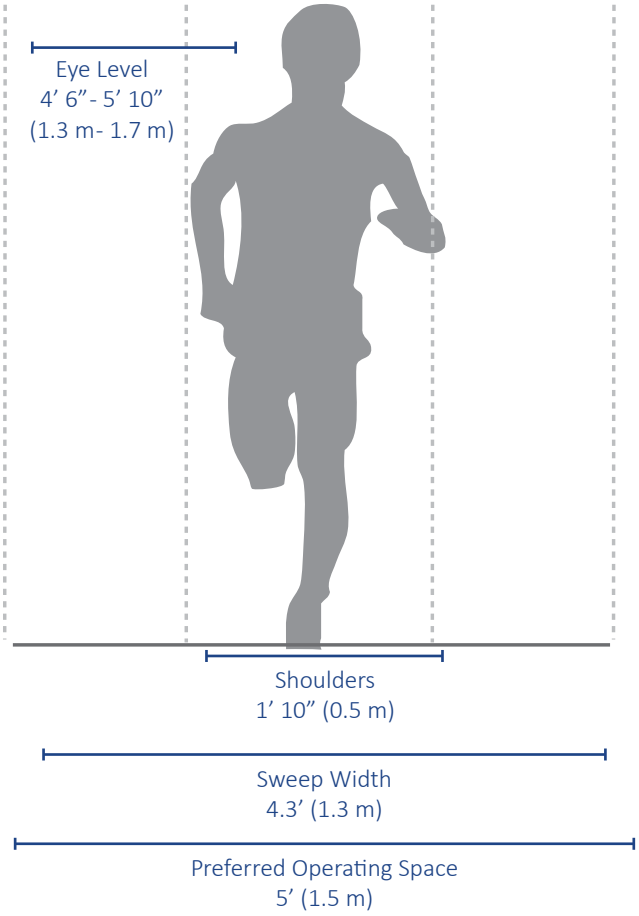
Design Needs of Runners

Running is an important recreation and fitness activity commonly performed on shared use paths. Many runners prefer softer surfaces (such as rubber, bare earth or crushed rock) to reduce impact. Runners can change their speed and direction frequently. If high volumes are expected, controlled interaction or separation of different types of users should be considered.



Runner Typical Speed

User	Typical Speed
Runner	6.2 mph



Additional References and Guidelines

FHWA. Characteristics of Emerging Road and Trail Users and Their Safety. (2004).

Design Needs of Wheelchair Users

As the American population ages, the number of people using mobility assistive devices (such as manual wheelchairs, powered wheelchairs) increases.

Manual wheelchairs are self-propelled devices. Users propel themselves using push rims attached to the rear wheels. Braking is done through resisting wheel movement with the hands or arm. Alternatively, a second individual can control the wheelchair using handles attached to the back of the chair.

Power wheelchairs user battery power to move the wheelchair. The size and weight of power wheelchairs limit their ability to negotiate obstacles without a ramp. Various control units are available that enable users to control the wheelchair movement, based on their ability (e.g., joystick control, breath controlled, etc).

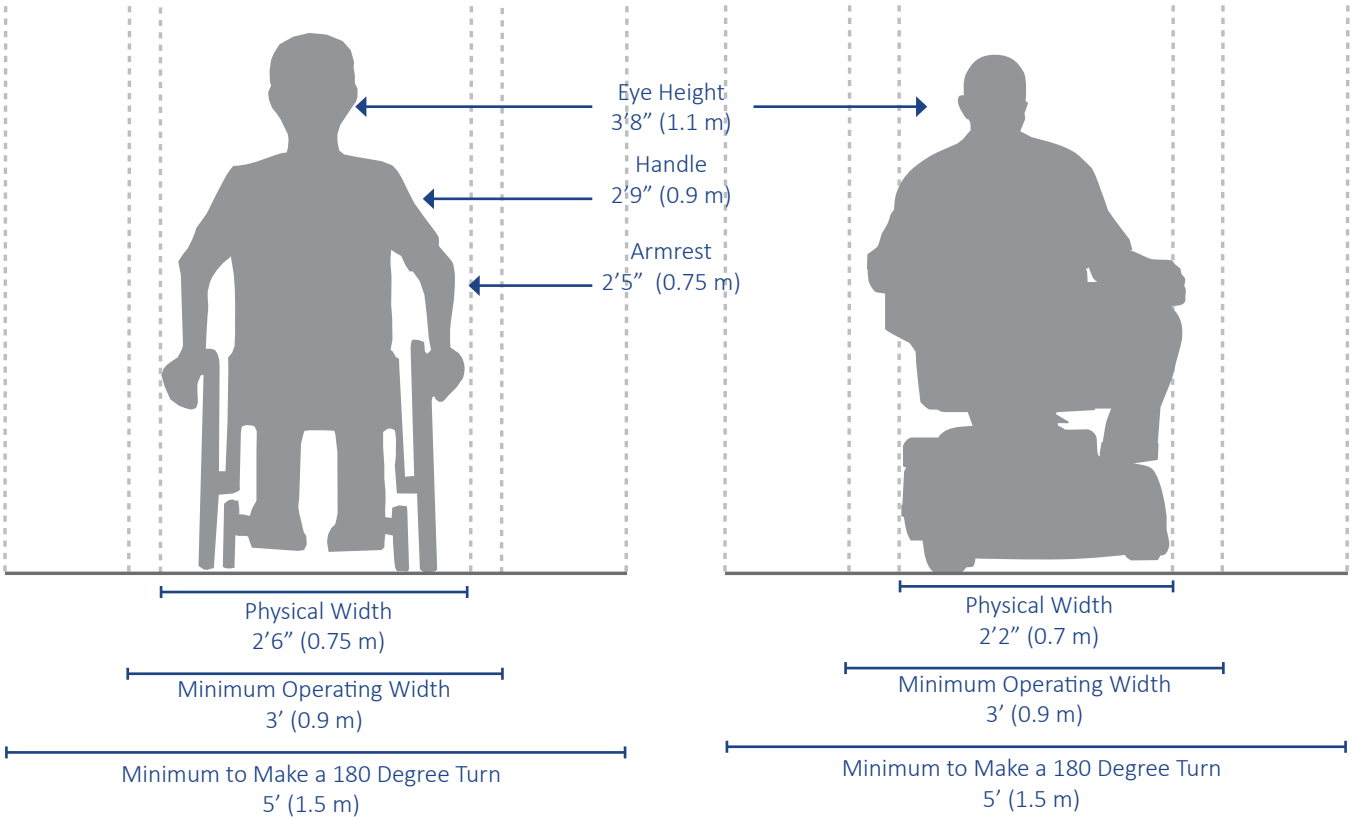
Maneuvering around a turn requires additional space for wheelchair devices. Providing adequate space for 180 degree turns at appropriate locations is an important element for accessible design.

Wheelchair User Typical Speed

User	Typical Speed
Manual Wheelchair	3.6 mph
Power Wheelchair	6.8 mph

Wheelchair User Design Considerations

Effect on Mobility	Design Solution
Difficulty propelling over uneven or soft surfaces.	Firm, stable surfaces and structures, including ramps or beveled edges.
Cross-slopes cause wheelchairs to veer downhill.	Cross-slopes of less than two percent.
Require wider path of travel.	Sufficient width and maneuvering space.



Additional References and Guidelines

FHWA. Characteristics of Emerging Road and Trail Users and Their Safety. 2004. USDOJ. 2010 ADA Standards for Accessible Design. 2010.

Bicyclist User Type

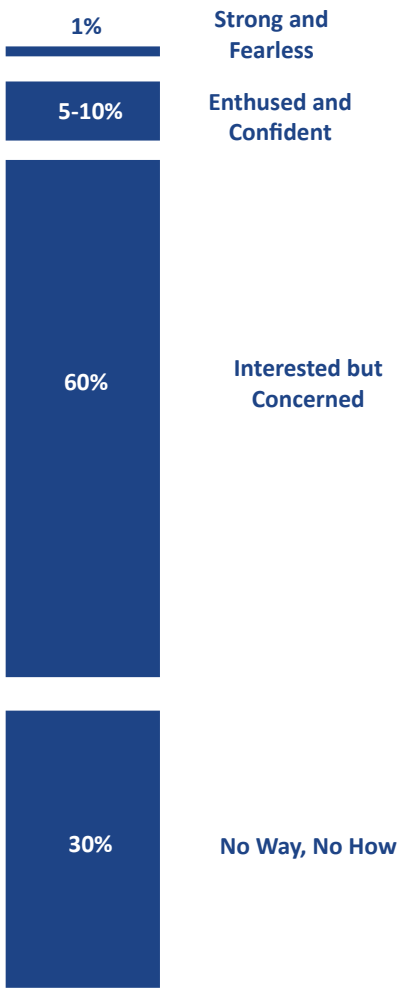
The 2012 AASHTO Guide to the Development of Bicycle Facilities encourages designers to identify their rider type based on the trip purpose (Recreational vs Transportation) and on the level of comfort and skill of the rider (Causal vs Experienced). A user-type framework for understanding a potential rider's willingness to bike is illustrated in the figure below. Developed by planners in Portland, OR and supported by research, this classification identifies four distinct types of bicyclists.

Strong and Fearless – Characterized by bicyclists that will typically ride anywhere regardless of roadway conditions or weather. These bicyclists can ride faster than other user types, prefer direct routes and will typically choose roadway connections (even if shared with vehicles) over separate bicycle facilities such as shared-use paths.

Enthused and Confident - This user group encompasses bicyclists who are fairly comfortable riding on all types of bikeways but usually choose low traffic streets or shared-use paths when available. These bicyclists may deviate from a more direct route in favor of a preferred facility type. This group includes all kinds of bicyclists such as commuters, recreationalists, racers and utilitarian bicyclists.

Interested but Concerned – This user type comprises the bulk of the cycling population and represents bicyclists who typically only ride a bicycle on low traffic streets or shared-use paths under favorable weather conditions. These bicyclists perceive significant barriers to their increased use of cycling, specifically traffic and other safety issues. These people may become "Enthused & Confident" with encouragement, education and experience.

No Way, No How – Persons in this category are not bicyclists, and perceive severe safety issues with riding in traffic. Some people in this group may eventually become more regular cyclists with time and education. A significant portion of these people will not ride a bicycle under any circumstances.



Pedestrian Facilities

Pedestrian Crossing Location and Facility Selection

Crossing Treatment Selection

The specific type of treatment at a crossing may range from a simple marked crosswalk to full traffic signals or grade separated crossings. Crosswalk lines should not typically be used by themselves, and appropriate selection of crossing enhancements should be evaluated in an engineering study. The engineering study should consider the number of lanes, the presence of a median, the distance from adjacent signalized intersections, the pedestrian volumes and delays, the average daily traffic (ADT), the posted or statutory speed limit or 85th-percentile speed, the geometry of the location, the possible consolidation of multiple crossing points, the availability of street lighting, and other appropriate factors.

Midblock Crossings

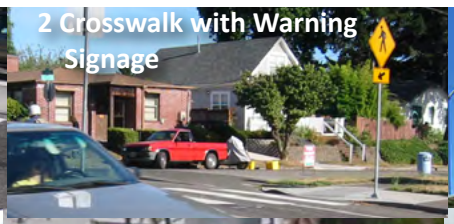
Midblock crossings are an important street design element for pedestrians. They can provide a legal crossing at locations where pedestrians want to travel, and can be safer than crossings at intersections because traffic is only moving in two directions. Locations where midblock crossings should be considered include:

- Long blocks (longer than 600 feet) with destinations on both sides of the street.
- Locations with heavy pedestrian traffic, such as schools, shopping centers.
- At midblock transit stops, where transit riders must cross the street on one leg of their journey.

PEDESTRIAN CROSSING CONTEXTUAL GUIDANCE
At unsignalized locations

	FACILITY TYPE	Local Streets 15-25 mph		Collector Streets 25-30 mph			Arterial Streets 30-45 mph							
		2 lane	3 lane	2 lane	2 lane with median refuge	3 lane	2 lane	2 lane with median refuge	3 lane	4 lane	4 lane with median refuge	5 lane	6 lane	6 lane with median refuge
1	Crosswalk Only (high visibility)	✓	✓	EJ	EJ	X	EJ	EJ	X	X	X	X	X	X
2	Crosswalk with warning signage and yield lines	EJ	✓	✓	✓	✓	EJ	EJ	EJ	X	X	X	X	X
3	Active Warning Beacon (RRFB)	X	EJ	✓	✓	✓	✓	✓	✓	X	✓	X	X	X
4	Hybrid Beacon	X	X	EJ	EJ	EJ	EJ	✓	✓	✓	✓	✓	✓	✓
5	Full Traffic Signal	X	X	EJ	EJ	EJ	EJ	EJ	EJ	✓	✓	✓	✓	✓
6	Grade separation	X	X	EJ	EJ	EJ	X	EJ	EJ	EJ	EJ	EJ	✓	✓

LEGEND	
Most Desirable	✓
Engineering Judgement	EJ
Not Recommended	X



Sidewalk Zones & Widths

Sidewalks are the most fundamental element of the walking network, as they provide an area for pedestrian travel separated from vehicle traffic. Providing adequate and accessible facilities can lead to increased numbers of people walking, improved accessibility, and the creation of social space.

Curbside Lane	Buffer Zone	Pedestrian Through Zone	Frontage Zone
The curbside lane can act as a flexible space to further buffer the sidewalk from moving traffic., and may be used for a bike lane. Curb extensions and bike corrals may occupy this space where appropriate. In the **edge zone** there should be a 6 inch wide curb.	The buffer zone, also called the furnishing or landscaping zone, buffers pedestrians from the adjacent roadway, and is also the area where elements such as street trees, signal poles, signs, and other street furniture are properly located.	The through zone is the area intended for pedestrian travel. This zone should be entirely free of permanent and temporary objects. Wide through zones are needed in downtown areas or where pedestrian flows are high.	The frontage zone allows pedestrians a comfortable "shy" distance from the building fronts. It provides opportunities for window shopping, to place signs, planters, or chairs.

Street Classification	Parking Lane/Enhancement Zone	Buffer Zone	Pedestrian Through Zone	Frontage Zone
Local Streets	Varies	4 - 6 ft	6 ft	N/A
Downtown and Pedestrian Priority Areas	Varies	4 - 6 ft	12 ft	2.5 - 10 ft
Arterials and Collectors	Varies	4 - 6 ft	6 - 8 ft	2.5 - 5 ft

Typical Application

- Wider sidewalks should be installed near schools, at transit stops, in downtown areas, or anywhere high concentrations of pedestrians exist.
- At transit stops, an 8 ft by 5 ft clear space is required for accessible passenger boarding/alighting at the front door location per ADA requirements.
- Sidewalks should be continuous on both sides of urban commercial streets, and should be required in areas of moderate residential density.
- When retrofitting gaps in the sidewalk network, locations near transit stops, schools, parks, public buildings, and other areas with high concentrations of pedestrians should be the highest priority.

Materials and Maintenance

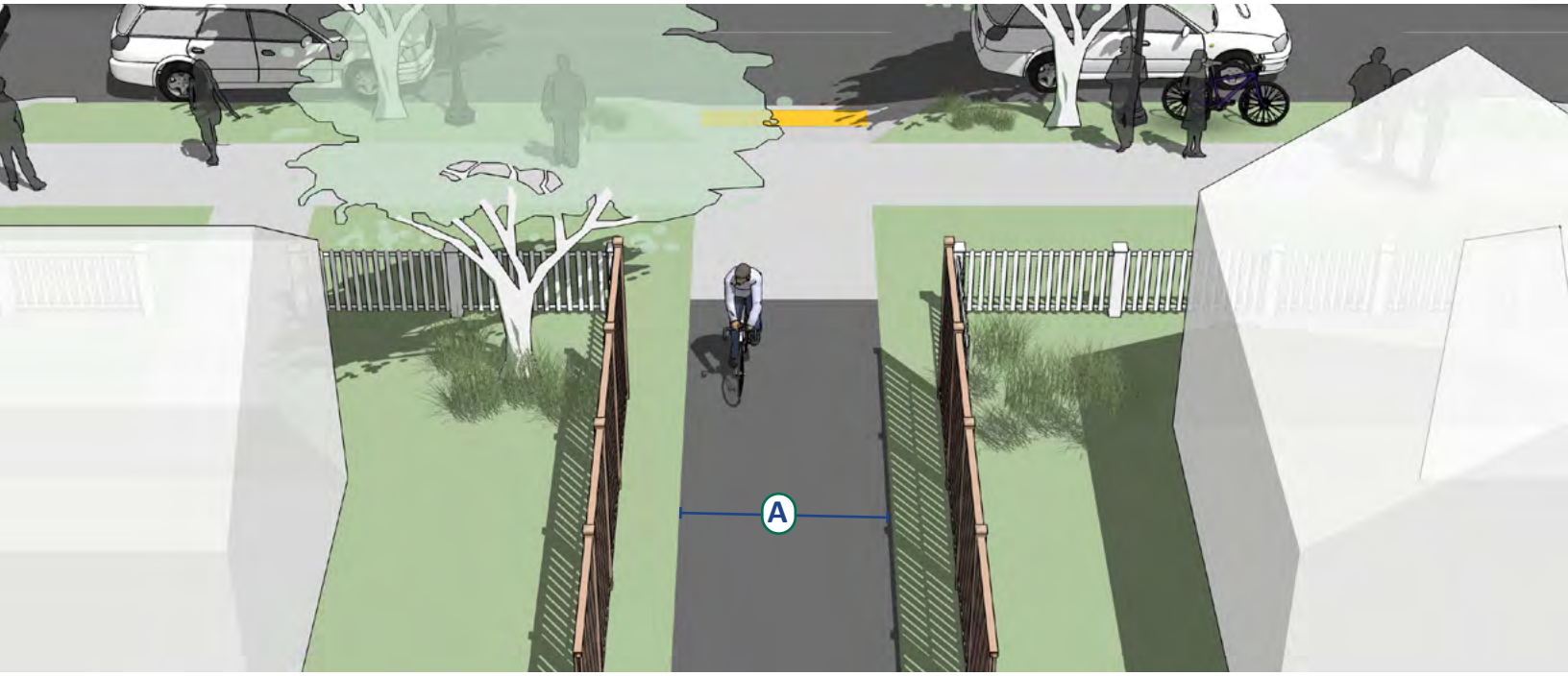
Sidewalks are typically constructed out of concrete and are separated from the roadway by a curb or gutter and sometimes a landscaped boulevard. Less expensive walkways constructed of asphalt, crushed stone, or other stabilized surfaces may be appropriate. Ensure accessibility and properly maintain all surfaces regularly. Surfaces must be firm, stable, and slip resistant. Colored, patterned, or stamped concrete can add distinctive visual appeal.

Approximate Cost

Cost of standard sidewalks range from about $25 per square foot for concrete sidewalk. This cost can increase with additional right-of-way acquisition or addition of landscaping, lighting or other aesthetic features. As an interim measure, an asphalt concrete path can be placed until such time that a standard sidewalk can be built. The cost of asphalt path can be less than half the cost of a standard sidewalk.

Neighborhood Pathways

Neighborhood accessways provide residential areas with direct bicycle and pedestrian access to parks, trails, greenspaces, and other recreational areas. They most often serve as small trail connections to and from the larger trail network, typically having their own rights-of-way and easements.



Typical Application

- Neighborhood accessways should be designed into new subdivisions at every opportunity and should be required by City/County subdivision regulations.
- For existing subdivisions, neighborhood and homeowner association groups are encouraged to identify locations where such connects would be desirable. Nearby residents and adjacent property owners should be invited to provide landscape design input.

Design Features

- Neighborhood accessways should remain open to the public.
- (A) Trail pavement shall be at least 8 feet wide to accommodate emergency and maintenance vehicles, meet ADA requirements and be considered suitable for multi-use.
- Trail widths should be designed to be less than 8 feet wide only when necessary to protect large mature native trees over 18 inches in caliper, wetlands or other ecologically sensitive areas.
- Access trails should slightly meander whenever possible the bicycle crossing time for standing bicycles.

Green Infrastructure

Green infrastructure treats and slows runoff from impervious surface areas, such as roadways, sidewalks, and buildings. Sustainable stormwater strategies may include bioretention swales, rain gardens, tree box filters, and pervious pavements (pervious concrete, asphalt and pavers). Bioswales are natural landscape elements that manage water runoff from a paved surface, reducing the risks of erosion or flooding of local streams and creeks, which can threaten natural habitats. Plants in the swale trap pollutants and silt from entering a river system.

Typical Application

- Install in areas without conventional stormwater systems that are prone to flooding to improve drainage and reduce costs compared to installing traditional gutter and drainage systems.
- Use green infrastructure to provide an ecological and aesthetic enhancement of traditional traffic speed and volume control measures, such as along a bicycle boulevard corridor.
- Bioswales and rain gardens are appropriate at curb extensions and along planting strips.
- Street trees and plantings can be placed in medians, chicanes, and other locations.
- Pervious pavers can be used along sidewalks, street furniture zones, parking lanes, gutter strips, or entire roadways. They are not likely to provide traffic calming benefit on bicycle boulevards.

Design Features

(A) Bioswales are shallow depressions with vegetation designed to capture, treat, and infiltrate stormwater runoff by reducing velocity and purifying the water while recharging the underlying groundwater table. In order to meet the minimum criteria for infiltration rates, bioswales are designed to pass 5-10 inches of rain water per hour. The overflow/bypass drain system should be approximately 6 inches above the soil surface to manage heavier rainfall. Bioswales have a typical side slope of 4:1 (maximum 3:1) to allow water to move along the surface and settles out sediments and pollutants.

(B) Pervious pavement in areas where landscaping such as swales are less desired or feasible, pervious pavement can effectively capture and treat stormwater runoff. The desired storage volume and intended drain time is determined by the depth of the pervious layer, void space,

and the infiltration rate of underlying soils. An under drain system must be used to treat the stormwater.

- Design overflow or drain excess runoff to the municipal sewer system, and allow the facility to drain within 48 hours.

Further Considerations

Pervious Pavement

- Engineering judgment and surrounding street context should be used when selecting the permeable surface, whether it is pavers, concrete or asphalt. Some decorative pavers may be more appropriate for bicycle and/or pedestrians areas due to the potential for shifting under heavy loads.

Bioswales

- The edge of the swale should be flush with the grade to accommodate sheetflow runoff, with a minimum 2-inch drop between the street grade and the finished grade of the facility. Where there are curbs, cut-outs at least 18 inches wide should be provided intermittently (3-15 feet apart) to allow runoff to enter and be treated. Low curbs, barriers, and/or hardy vegetative ground covers can be used to discourage pedestrian trampling.

Materials and Maintenance

Green infrastructure must be regularly maintained to ensure it is working properly.

Approximate Cost

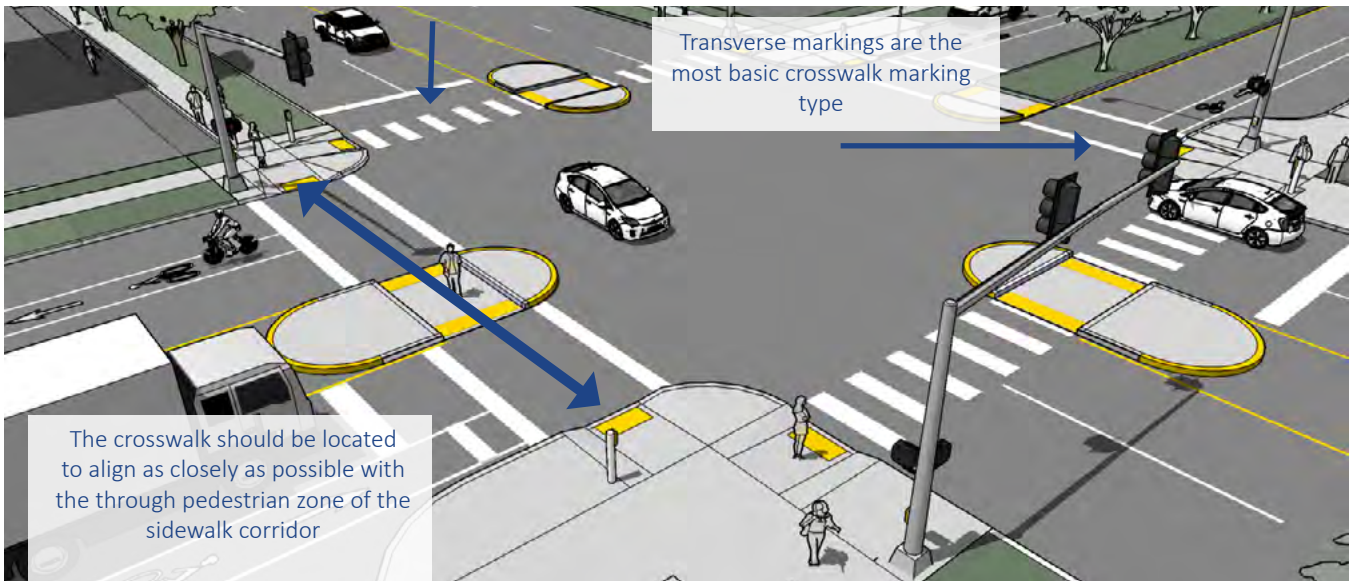
Bioswales range from $5.50-$24/square foot depending on the type of facility, with $15/square foot representing a typical rate.1Permeable pavers can range from $5.30/square foot for pavers on the low end to $11.60/square foot for concrete on the high end. The average cost tends to be around $6-7/square foot.

Pedestrian Facilities at Intersections

Marked Crosswalks

A marked crosswalk signals to motorists that they must stop for pedestrians and encourages pedestrians to cross at designated locations. Installing crosswalks alone will not necessarily make crossings safer; especially on multi-lane roadways.

At mid-block locations, crosswalks must be marked to establish a legal crossing.



Typical Application

At signalized intersections, all crosswalks should be marked. At unsignalized intersections, crosswalks may be marked under the following conditions:

- At a complex intersection, to orient pedestrians in finding their way across.
- At an offset intersection, to show pedestrians the shortest route across traffic with the least exposure to vehicular traffic and traffic conflicts.
- At an intersection with visibility constraints, to position pedestrians where they can best be seen by oncoming traffic.
- At an intersection within a school zone on a walking route.

Design Features

- Because the effectiveness of marked crossings depends entirely on their visibility, maintaining marked crossings should be a high priority.
- Thermoplastic markings offer increased durability than conventional paint.

Marked crosswalks at Stony Point Road and Stony Circle

Further Considerations

Pedestrians are sensitive to out-of-direction travel, and reasonable accommodations should be made to make crossings both convenient at locations with adequate visibility.

Continental crosswalk markings should be used at crossings with high pedestrian use or where vulnerable pedestrians are expected, including: school crossings, across arterial streets for pedestrian-only signals, at mid-block crosswalks, and at intersections where there is expected high pedestrian use and the crossing is not controlled by signals or stop signs. High-visibility crosswalks are not appropriate for all locations. Other crosswalk marking patterns are provided for in the CA MUTCD.

Some cities prohibit omitting or removing a marked crosswalk at intersections in order to require a three-stage pedestrian crossing. Intersections with three-stage crossings lead to arduous and increased crossing distances, pedestrian frustration, encourages jaywalking, and exhibits modal bias favoring motor vehicle level-of-service over other modes. There are circumstances when only three crosswalks are utilized and typically occur at or near interchanges and freeway ramps.

Materials and Maintenance

Because the effectiveness of marked crossings depends entirely on their visibility, maintaining marked crossings should be a high priority. Thermoplastic markings offer increased durability than conventional paint.

Approximate Cost

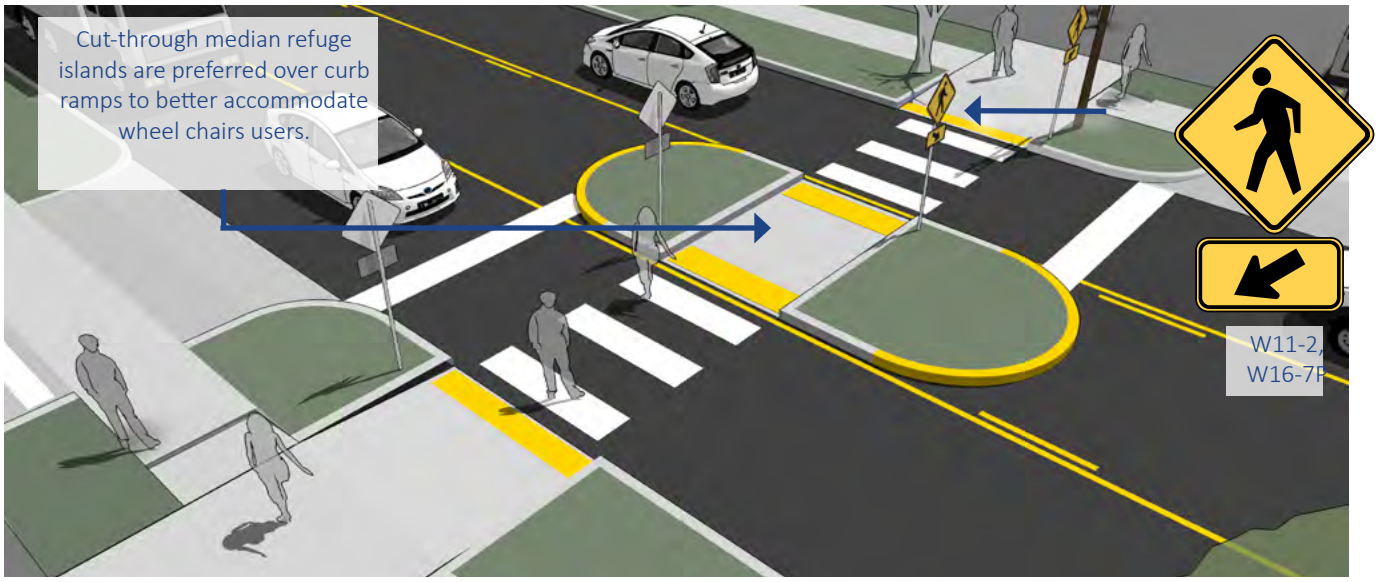
Depending on the type of material used, width of the crossing and width of the roadway, approximate installation costs are $500 for a regular striped crosswalk, $1,000 for a ladder crosswalk, and $8,000 for a patterned concrete crosswalk. In addition, the cost of a curb ramp is about $5,000-$10,000 per ramp.

Due to various number of crosswalk styles in use, signing standards, color and aesthetics, other factors will affect the final cost.

Maintenance of markings should also be considered.

Median Refuge Island

Median refuge islands are located at the mid-point of a marked crossing and help improve pedestrian safety by allowing pedestrians to cross one direction of traffic at a time. Refuge islands minimize pedestrian exposure by shortening crossing distance and increasing the number of available gaps for crossing.



Typical Application

- Can be applied on any roadway with a left turn center lane or median that is at least 6 feet wide.
- Appropriate at signalized or unsignalized crosswalks.
- On multi-lane roadways, consider configuration with active warning beacons for improved yielding compliance.

Design Features

- The refuge island must be accessible, preferably with an at-grade passage through the island rather than ramps and landings.
- The island should be at least 6 feet wide to be a legal refuge and be wider to accommodate cargo bikes or bikes with child trailers.
- The island should be at least 20 feet long.
- On streets with speeds higher than 25 mph there should also be double centerline marking, reflectors, and “KEEP RIGHT” signage (CA MUTCD R4-7a).
- If a refuge island is landscaped, the landscaping should not compromise the visibility of pedestrians crossing in the crosswalk. Shrubs and ground plantings should be no higher than 1 and a half feet.

Materials and Maintenance

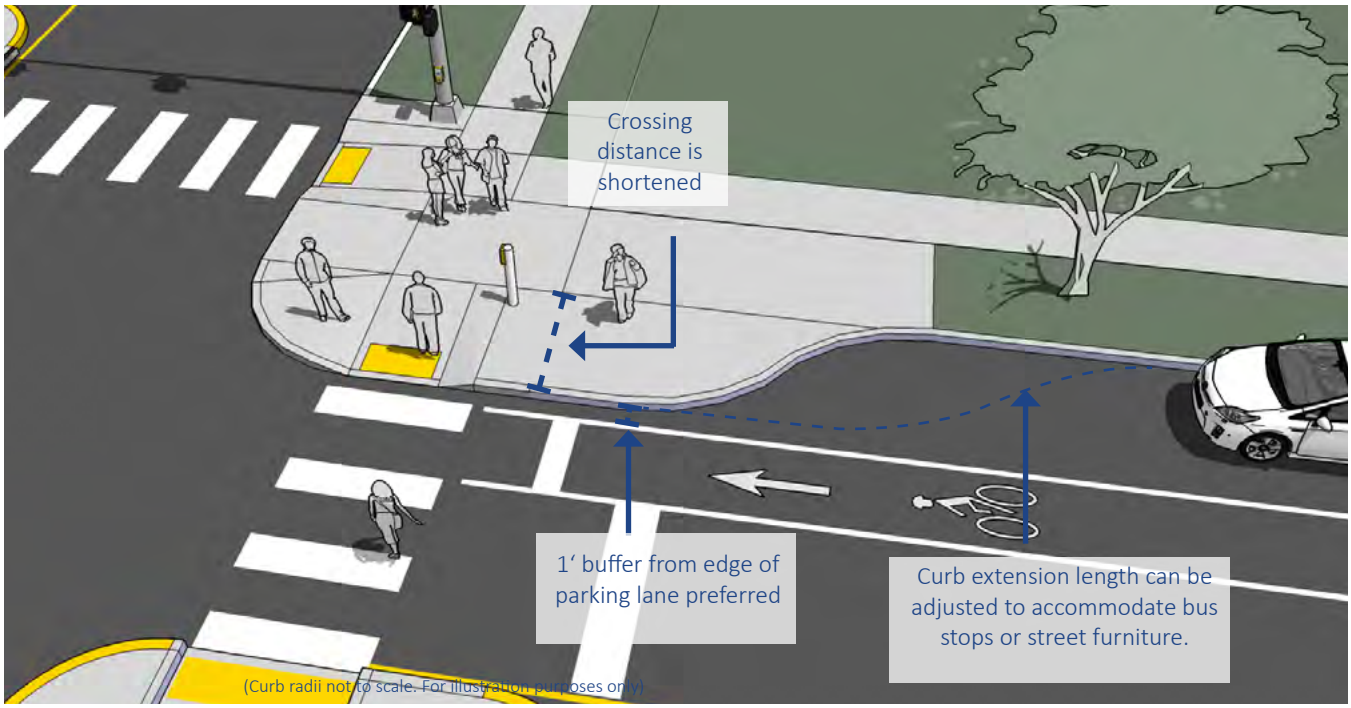
Refuge islands may require frequent maintenance of road debris. Trees and plantings in a landscaped median must be maintained so as not to impair visibility, and should be no higher than 1 foot 6 inches.

Approximate Cost

The approximate cost to install a median refuge island ranges from $500 to $1,100 per foot, or about $3,500 to $4,000, depending on the design, site conditions, landscaping, and whether the median can be added as a part of a larger street reconstruction project or utility upgrade.

Curb Extensions

Curb extensions minimize pedestrian exposure during crossing by shortening crossing distance and giving pedestrians a better chance to see and be seen before committing to crossing. They are appropriate for any crosswalk where it is desirable to shorten the crossing distance and there is a parking lane adjacent to the curb.



Typical Application

- At signalized intersections with marked crosswalks should be marked.
- At unsignalized intersections with marked crosswalks.
- At an intersection with visibility constraints, to position pedestrians where they can best be seen by oncoming traffic.
- At an intersection within a school zone on a walking route.

Design Features

- In most cases, the curb extensions should be designed to transition between the extended curb and the running curb in the shortest practicable distance.
- For purposes of efficient street sweeping, the minimum radius for the reverse curves of the transition is 10 feet and the two radii should be balanced to be nearly equal.
- Curb extensions should terminate one foot short of the parking lane to maximize bicyclist safety.
- Planted curb extensions may be designed as a bioswale, a vegetated system for stormwater management.
- Turning performance of larger vehicles including buses may be impacted by curb extensions

Materials and Maintenance

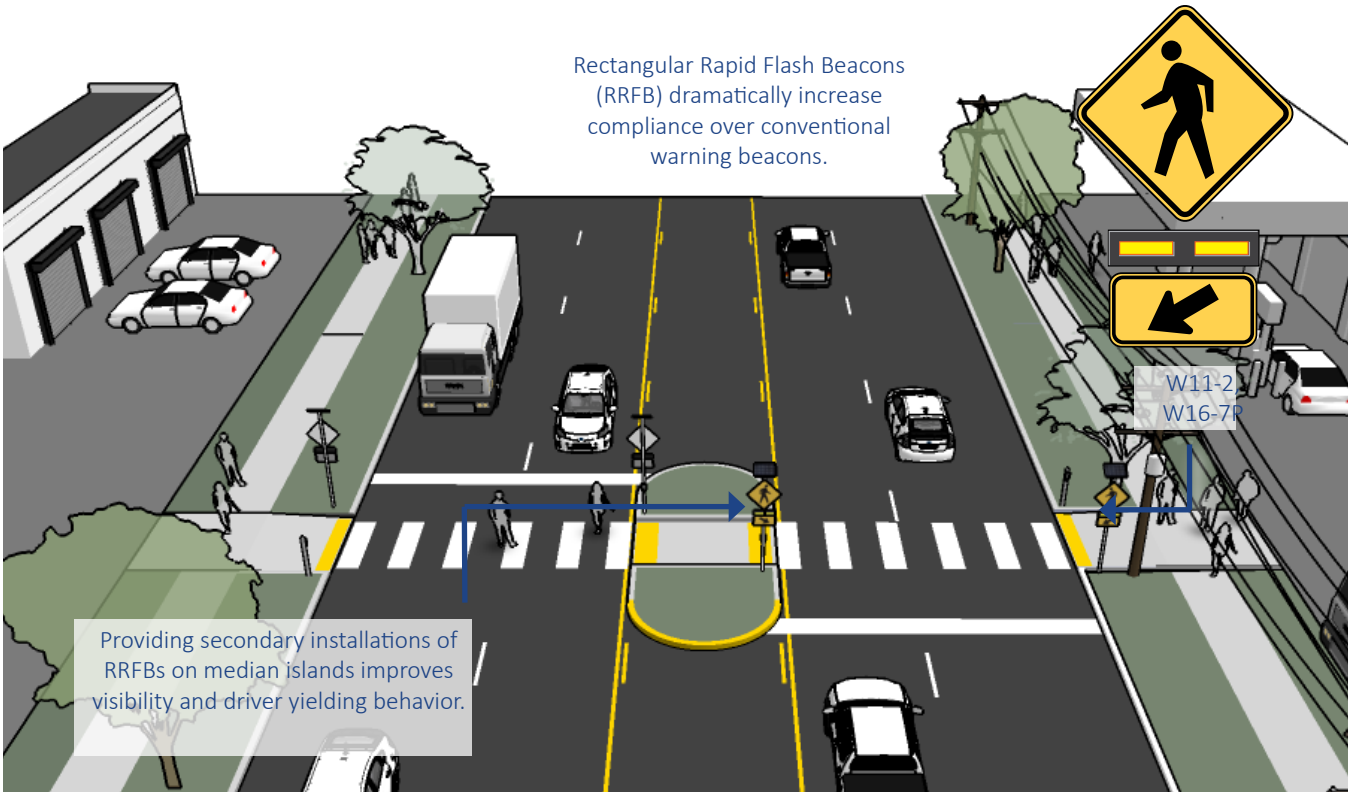
Planted curb extensions may be designed as a bioswale, a vegetated system for stormwater management. To maintain proper stormwater drainage, curb extensions can be constructed as refuge islands offset by a drainage channel or feature a covered trench drain.

Approximate Cost

The cost of a curb extension can range from $2,000 to $20,000 depending on the design and site condition, with the typical cost approximately $12,000. Green/vegetated curb extensions cost between $10,000 to $40,000.

Active Warning Beacons (RRFBs)

Active warning beacons are user actuated illuminated devices designed to increase motor vehicle yielding compliance at crossings of multi lane or high volume roadways. Types of active warning beacons include conventional circular yellow flashing beacons, in-roadway warning lights, or Rectangular Rapid Flash Beacons (RRFB).



Typical Application

- At marked crosswalks where increased pedestrian visibility is needed.
- RRFBs have the most increased compliance of all the warning beacon enhancement options. A study of the effectiveness of going from a no-beacon arrangement to a two-beacon RRFB installation increased yielding from 18 percent to 81 percent.
- RRFBs are recommended as the preferred beacon treatment.

Design Features

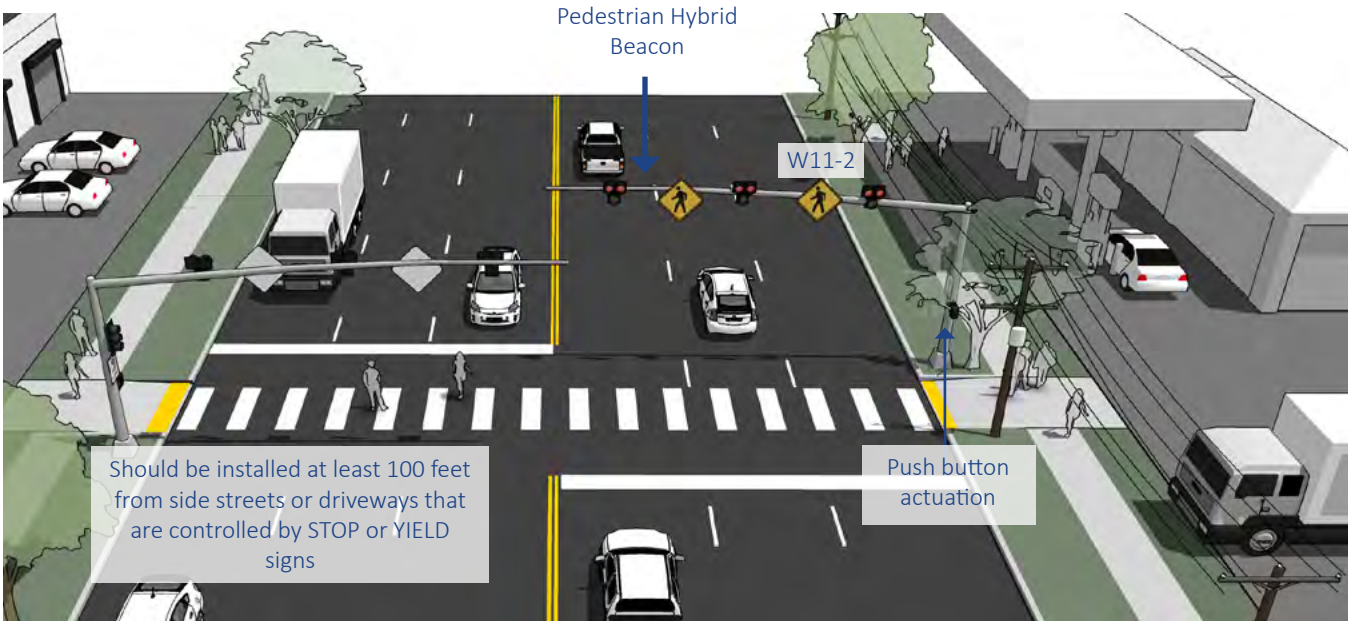
- Warning beacons shall not be used at crosswalks controlled by YIELD signs, STOP signs, or traffic signals.
- Warning beacons shall initiate operation based on pedestrian or bicyclist actuation and shall cease operation at a predetermined time after actuation or, with passive detection, after the pedestrian or bicyclist clears the crosswalk.

Approximate Cost

RRFBs vary in cost, depending on site conditions, but generally cost between $10,000 to $25,000 for two units.

Pedestrian Hybrid Beacons

Hybrid beacons are used to improve non-motorized crossings of major streets. A hybrid beacon consists of a signal-head with two red lenses over a single yellow lens on the major street, and a pedestrian signal head for the crosswalk.



Typical Application

- At unsignalized intersections with high volumes of pedestrians.
- At an intersection within a school zone on a walking route.
- Each crossing, regardless of traffic speed or volume, requires additional review by a registered engineer to identify sight lines, potential impacts on traffic progression, timing with adjacent signals, capacity, and safety.

Design Features

- Hybrid beacons have less stringent warrants than full signals.
- If installed within a signal system, signal engineers should evaluate the need for the hybrid signal to be coordinated with other signals.
- Parking and other sight obstructions should be prohibited for at least 100 feet in advance of and at least 20 feet beyond the marked crosswalk to provide adequate sight distance.
- Hybrid beacon signals are normally activated by push buttons, but may also be triggered by infrared, microwave or video detectors. The maximum delay for activation of the signal should be two minutes, with minimum crossing times determined by the width of the street
- HAWK beacons should be installed at least 100 feet from side streets or driveways that are controlled by STOP or YIELD signs. Parking and other sight obstructions should be prohibited for at least 100 feet in advance of and at least 20 feet beyond the marked crosswalk to provide adequate sight distance. (CA MUTCD 4F)

Approximate Cost

Hybrid beacons are more expensive than other beacons, ranging in costs from $50,000 to $150,000, but are generally less expensive than full signals.

Raised Pedestrian Crossings

A raised crosswalk or intersection can eliminate grade changes from the pedestrian path and give pedestrians greater prominence as they cross the street. Raised crosswalks also functions as speed tables, and encourage motorists to slow down. As such, they should be used only in cases where a special emphasis on pedestrians is desired.

Raised crosswalks are typically implemented on low-speed streets, Bike Boulevards and other areas of very high pedestrian activity. They are often paired with other treatments such as curb extensions for greater traffic calming effect.

Typical Use

Like a speed hump/table, raised crosswalks have a traffic slowing effect which may be unsuitable on high-speed streets, roadways with sharp curves, designated transit or freight routes, and in locations that would reduce access for emergency responders. Use detectable warnings at the curb edges to alert vision-impaired pedestrians that they are entering the roadway.

Approaches to the raised crosswalk may be designed to be similar to speed humps/tables.

Design Features

- Use detectable warnings at the curb edges to alert vision-impaired pedestrians that they are entering the roadway.
- Approaches to the raised crosswalk may be designed to be similar to speed humps.
- Drainage improvements may be required depending on the grade of the roadway.
- Special paving materials can be used to increase conspicuity of the crossing, and alert drivers to the presence of pedestrians.

Raised pedestrian crossing on Thomas Lake Harris Drive

Further Considerations

- The noise of vehicles traveling over raised crosswalks may be of concern to nearby residents and businesses.
- Refer to Americans with Disabilities Act (ADA) and California Building Code (CBC) for additional requirements.

Materials and Maintenance

Because the effectiveness of marked crossings depends entirely on their visibility, maintaining marked crossings should be a high priority. Ensure drainage pipes used to channel stormwater past the raised intersection are kept free of debris, to prevent stormwater from backing up and pooling.

Approximate Cost

Raised crosswalks are approximately $2,000 to $15,000, depending on drainage conditions and material used.

Bicycle Facilities

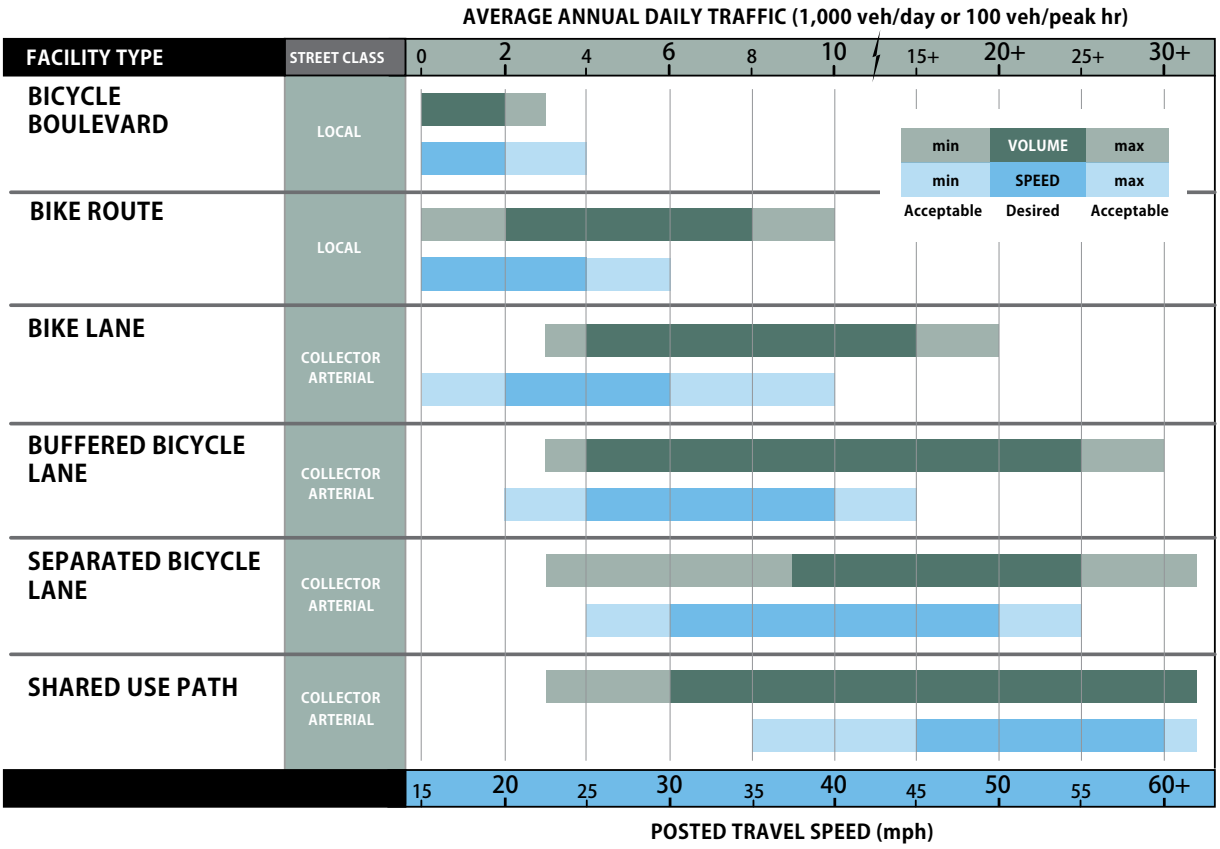
Facility Selection

Selecting the best bikeway facility type for a given roadway can be challenging, due to the range of factors that influence bicycle users' comfort and safety. There is a significant impact on bicycling comfort when the speed differential between bicyclists and motor vehicle traffic is high and motor vehicle traffic volumes are high.

Facility Selection Table

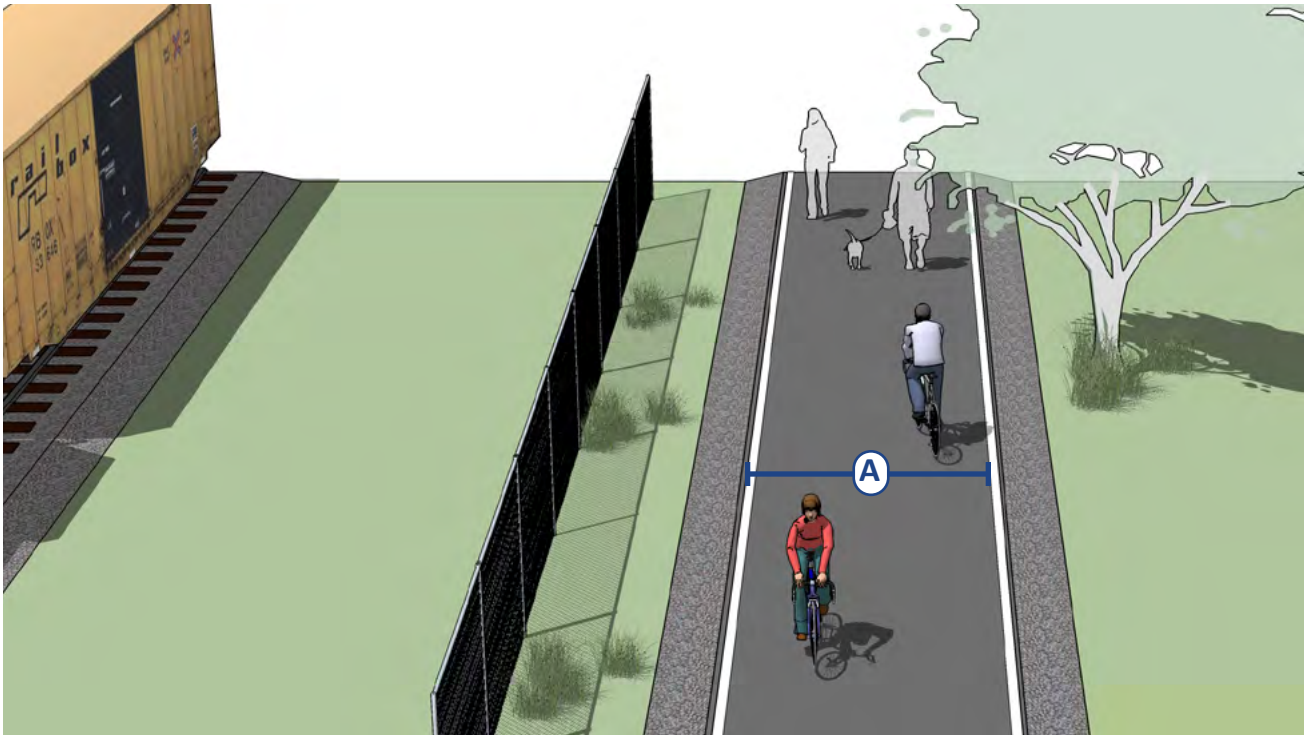
As a starting point to identify a preferred facility, the chart below can be used to determine the recommended type of bikeway to be provided in particular roadway speed and volume situations. To use this chart, identify the appropriate daily traffic volume and travel speed on or the existing or proposed roadway, and locate the facility types indicated by those key variables.

Other factors beyond speed and volume which affect facility selection include traffic mix of automobiles and heavy vehicles, the presence of on-street parking, intersection density, surrounding land use, and roadway sight distance. These factors are not included in the facility selection chart below, but should always be considered in the facility selection and design process.



Shared Use Path (Class I)

Shared use paths (Class I) are off-street facilities that can provide a desirable transportation and recreation connection for users of all skill levels who prefer separation from traffic. They often provide low-stress connections to local and regional attractions that may be difficult, or not be possible on the street network.



Typical Use

- In abandoned rail corridors (commonly referred to as Rails-to-Trails or Rail-Trails.
- In active rail corridors, trails can be built adjacent to active railroads (referred to as Rails-with-Trails.
- In utility corridors, such as powerline and sewer corridors.
- In waterway corridors, such as along canals, drainage ditches, rivers, and creeks.
- Along roadways.

Design Features

(A) 8 feet is the absolute minimum width (with 2 foot shoulders) allowed for a two-way bicycle path and is only recommended for constrained situations (Caltrans Design Manual).

- 10 feet is recommended in most situations and will be adequate for moderate to heavy use.
- 12 feet is recommended for heavy use situations with high concentrations of multiple users. A separate track (5 foot minimum) can be provided for pedestrian use.

Lateral Clearance

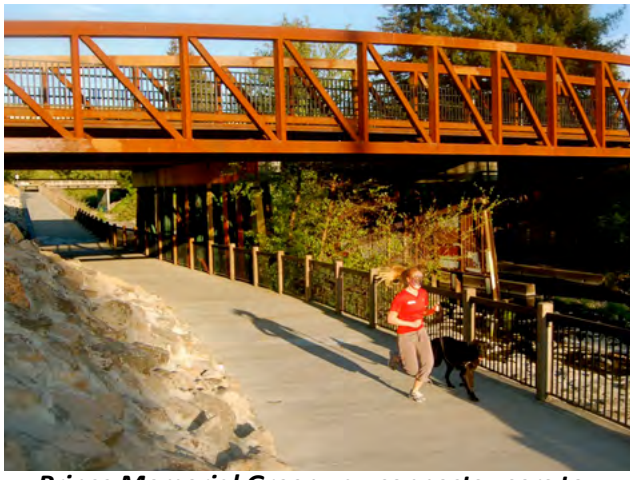
- A 2 foot or greater shoulder on both sides of the path should be provided. An additional foot of lateral clearance (total of 3 feet) is required by the MUTCD for the installation of signage or other furnishings.
- If bollards are used at intersections and access points, they should be colored brightly and/or supplemented with reflective materials to be visible at night.

Overhead Clearance

- Clearance to overhead obstructions should be an 8 foot minimum, with 10 feet recommended.

Striping

- When striping is required, use a 4 inch dashed yellow centerline stripe with 4 inch solid white edge lines.
- Solid centerlines can be provided on tight or blind corners, and on the approaches to roadway crossings.



Prince Memorial Greenway connects users to downtown Santa Rosa, CA. Source: Peter Stetson.

Materials and Maintenance

Shared use paths must be regularly maintained so that they are free of potholes, cracks, root lift, and debris. Signage and lighting should also be regularly maintained to ensure shared use path users feel comfortable, especially where visibility is limited.

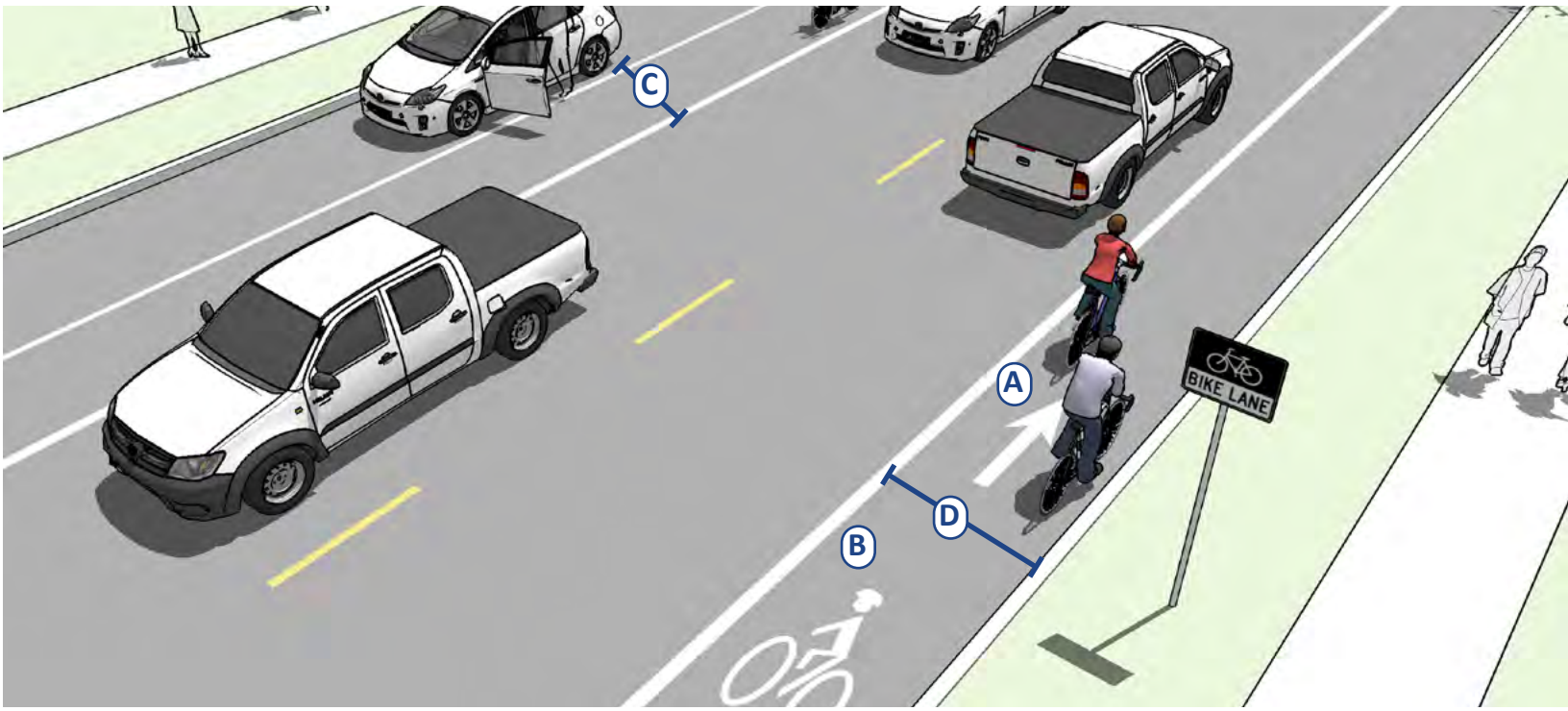
Adjacent landscaping should be regularly pruned, to allow adequate sightlines, daylight, and pedestrian-scale lighting, and so as not to obstruct the path of travel of trail users.

Approximate Cost

The cost of a shared use path can vary, but typical costs are between $65,000 per mile to $4 million per mile. These costs vary with materials, such as asphalt, concrete, boardwalk and other paving materials, lighting, and ROW acquisition.

On-Street Bicycle Lanes (Class II)

On-street bike lanes (Class II) designate an exclusive space for bicyclists through the use of pavement markings and signs. The bike lane is located directly adjacent to motor vehicle travel lanes and is used in the same direction as motor vehicle traffic. Bike lanes are typically on the right side of the street, between the adjacent travel lane and curb, road edge or parking lane.



Typical Application

- Bike lanes may be used on any street with adequate space, but are most effective on streets with moderate traffic volumes greater than or equal to 6,000 ADT (with a greater than 3,000 ADT min.).
- Bike lanes are most appropriate on streets with low to moderate speeds of 25 mph.
- Appropriate for skilled adult riders on most streets.
- May be appropriate for children when configured as 6+ feet wide lanes on lower-speed, lower-volume streets with one lane in each direction.

Design Features

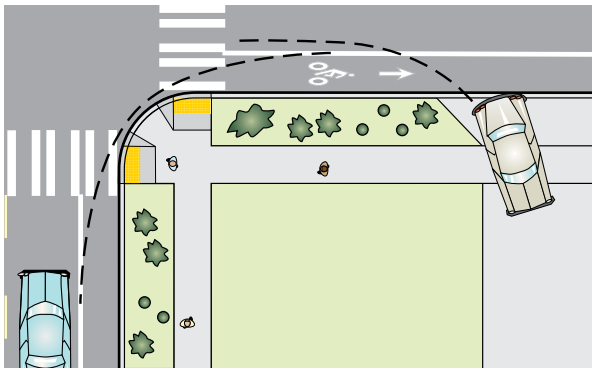
(A) Mark inside line with 6" stripe**.** Mark 4" parking lane line or "Ts".

(B) Include a bicycle lane marking **(MUTCD FIGURE 9C-3)** at the beginning of blocks and at regular intervals along the route (MUTCD 9C.04).

(C) 6 feet width preferred adjacent to on-street parking (5 feet min.).

(D) 5–6 feet preferred adjacent to curb and gutter (4 feet min.) or 4 feet more than the gutter pan width.

Place Bike Lane Symbols to Reduce Wear



Bike lane word, symbol, and/or arrow markings (MUTCD Figure 9C-3) shall be placed outside of the motor vehicle tread path in order to minimize wear from the motor vehicle path (NACTO 2012).

Bicycle Lane

Bicycle lanes provide an exclusive space, but may be subject to unwanted encroachment by motor vehicles.

Further Considerations

- On high speed streets (greater than or equal to 40 mph) the minimum bike lane should be 6 feet.
- On streets where bicyclists passing each other is to be expected, where high volumes of bicyclists are present, or where added comfort is desired, consider providing extra wide bike lanes up to 7 feet wide, or configure as a buffered bicycle lane.
- It may be desirable to reduce the width of general purpose travel lanes in order to add or widen bicycle lanes.
- On multi-lane and/or high speed streets, the most appropriate bicycle facility to provide for user comfort may be buffered bicycle lanes or physically separated bicycle lanes.

Materials and Maintenance

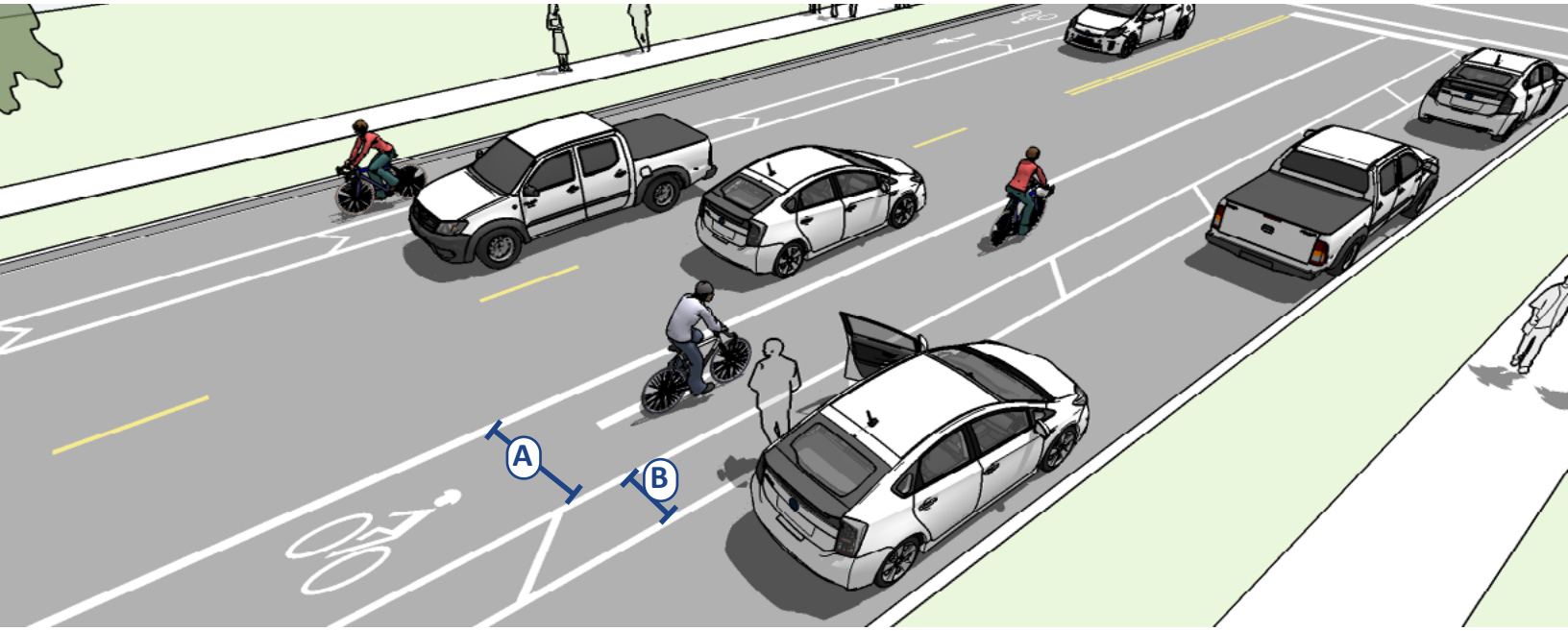
- Manhole surfaces should be manufactured with a shallow surface texture in the form of a tight, nonlinear pattern
- If manholes or other utility access boxes are to be located in bike lanes within 50 feet of intersections or within 20 feet of driveways or other bicycle access points, special manufactured permanent nonstick surfaces will be required to ensure a controlled travel surface for cyclists breaking or turning.
- Manholes, drainage grates, or other obstacles should be set flush with the paved roadway. Roadway surface inconsistencies pose a threat to safe riding conditions for bicyclists. Construction of manholes, access panels or other drainage elements will be constructed with no variation in the surface. The maximum allowable tolerance in vertical roadway surface will be 1/4 of an inch.

Approximate Cost

The cost for installing bicycle lanes will depend on the implementation approach. Typical costs are $16,000 per mile for restriping.

Buffered Bicycle Lanes (Class II)

Buffered bike lanes (Class II) are conventional bicycle lanes paired with a designated buffer space, separating the bicycle lane from the adjacent motor vehicle travel lane and/or parking lane.



Typical Application

- Anywhere a conventional bike lane is being considered.
- On streets with high speeds and high volumes or high truck volumes.
- On streets with extra lanes or lane width.
- Appropriate for skilled adult riders on most streets.

Design Features

(A) The minimum bicycle travel area (not including buffer) is 5 feet wide.

(B) Buffers should be at least 2 feet wide. If buffer area is 4 feet or wider, white chevron or diagonal markings should be used (CA MUTCD 9C-104).

- For clarity at driveways or minor street crossings, consider a dotted line.
- There is no standard for whether the buffer is configured on the parking side, the travel side, or a combination of both.

Buffered Bicycle Lanes

The use of pavement markings delineates space for cyclists to ride in a comfortable facility.

The use of pavement markings delineates space for cyclists to ride in a comfortable facility.

Further Considerations

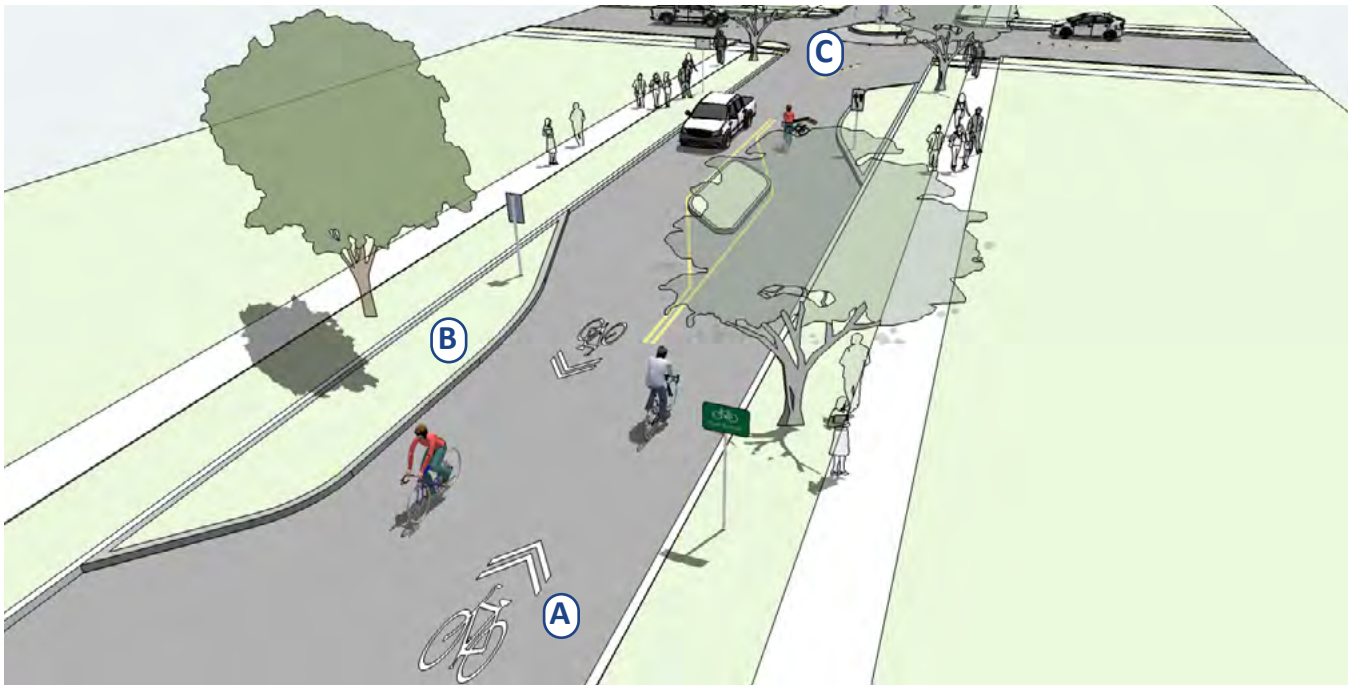
- Color may be used within the lane to discourage motorists from entering the buffered lane.
- A study of buffered bicycle lanes found that, in order to make the facilities successful, there needs to also be driver education, improved signage and proper pavement markings.
- On multi-lane streets with high vehicles speeds, the most appropriate bicycle facility to provide for user comfort may be physically separated bike lanes.
- NCHRP Report #766 recommends, when space in limited, installing a buffer space between the parking lane and bicycle lane where on-street parking is permitted rather than between the bicycle lane and vehicle travel lane.

Approximate Cost

The cost for installing buffered bicycle lanes will depend on the implementation approach. Typical costs are $16,000 per mile for restriping. However, the cost of large-scale bicycle treatments will vary greatly due to differences in project specifications and the scale and length of the treatment.

Bicycle Boulevards (Class III)

Bicycle boulevards (Class III) are low-volume, low-speed streets modified to enhance bicyclist comfort by using treatments such as signage, pavement markings, traffic calming and/or traffic reduction, and intersection modifications. These treatments allow through movements of bicyclists while discouraging similar through-trips by non-local motorized traffic.



Typical Application

- Parallel with and in close proximity to major thoroughfares (1/4 mile or less).
- Follow a desire line for bicycle travel that is ideally long and relatively continuous (2-5 miles).
- Avoid alignments with excessive zigzag or circuitous routing. The bikeway should have less than 10 percent out of direction travel compared to shortest path of primary corridor.
- Streets with travel speeds at 25 mph or less and with traffic volumes of fewer than 3,000 vehicles per day.

Design Features

(A) Signs and pavement markings are the minimum treatments necessary to designate a street as a bicycle boulevard.

(B) Implement volume control treatments based on the context of the bicycle boulevard, using engineering judgment. Target motor vehicle volumes range from 1,000 to 3,000 vehicles per day.

(C) Intersection crossings should be designed to enhance safety and minimize delay for bicyclists and pedestrians.

Bicycle Boulevards

Bicycle boulevards are established on streets that improve connectivity to key destinations and provide a direct, low-stress route for bicyclists, with low motorized traffic volumes and speeds, designated and designed to give bicycle travel priority over other modes.

Traffic Calming

Neighborhood bikeways may require additional traffic calming measures to discourage through trips by motor vehicles.

Further Considerations

- Bicycle boulevards are typically located on streets without existing signalized accommodation at crossings of collector and arterial roadways. Without treatments for bicyclists and pedestrians, these intersections can become major barriers along the bicycle boulevard and compromise safety.

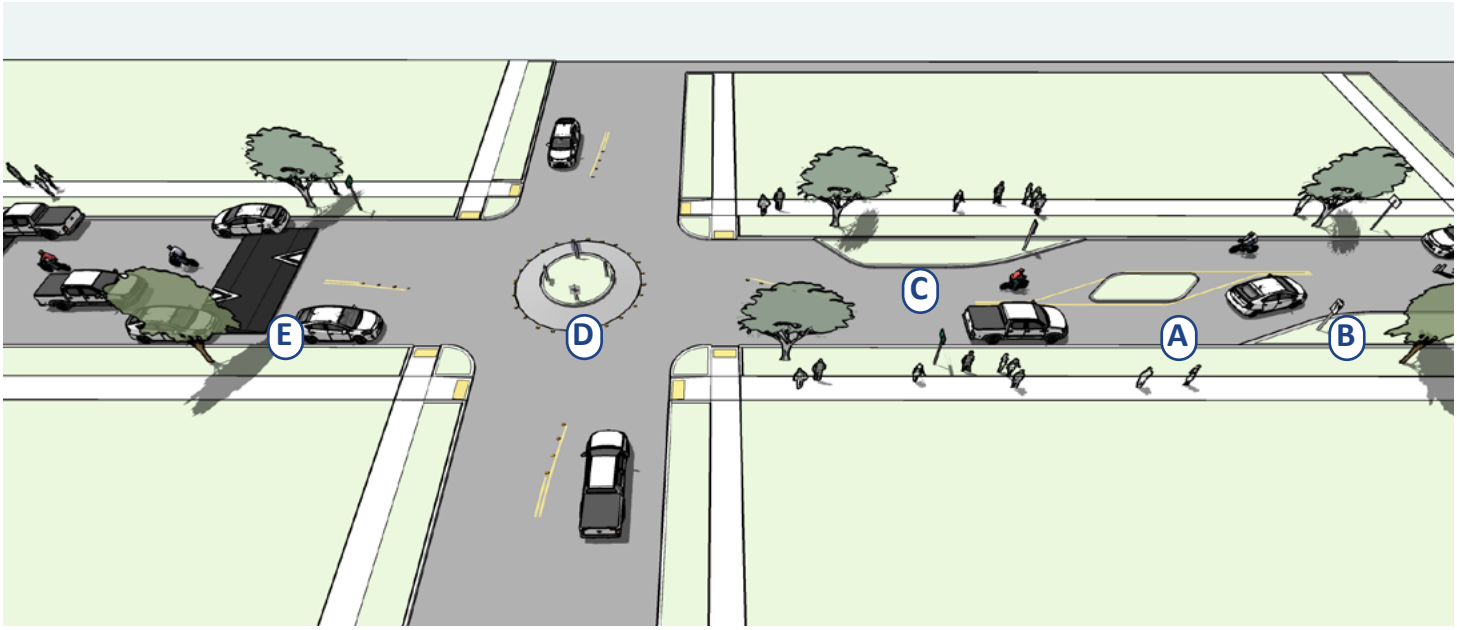
- Traffic calming can lower speeds along bicycle boulevards and even deter motorists from driving on a street. Anticipate and monitor vehicle volumes on adjacent streets to determine whether traffic calming results in inappropriate volumes. Traffic calming can be implemented on a trial basis.

Approximate Cost

Costs vary depending on the type of treatments proposed for the corridor. Simple treatments such as wayfinding signage and markings are most cost-effective, but more intensive treatments will have greater impact at lowering speeds and volumes, at a higher cost.

Traffic Calming for Bike Boulevards

Traffic calming may include elements intended to reduce the speeds of motor vehicle traffic to be closer to bicyclist travel speeds, or may include design elements that restrict certain movements for motorized travel to discourage the use of bicycle boulevard corridors for through travel by automobiles. Traffic calming treatments can cause drivers to slow down by constricting the roadway space or by requiring careful maneuvering. Such measures may reduce the design speed of a street, and can be used in conjunction with reduced speed limits to reinforce the expectation of lowered speeds. They can also lower vehicle volumes by physically or operationally reconfiguring corridors and intersections along the route.



Typical Application

- Bicycle boulevards should have a maximum posted speed of 25 mph. Use traffic calming to maintain an 85th percentile speed below 20 mph (25 mph maximum). Bikeways with average speeds above this limit should be considered for traffic calming measures.
- Maintain a minimum clear width of 14 feet with a constricted length of at least 20 feet in the direction of travel.
- Bring traffic volumes down to 1,500 cars per day (4,000 cars per day maximum). Bikeways with daily volumes above this limit should be considered for traffic calming measures.

Design Features: Speed Reduction

(A) Median islands create pinchpoint for traffic in the center of the roadway and offers shorter crossing distances for pedestrians when used in tandem with a marked crossing.

(B) Chicanes slow drivers by requiring vehicles to shift laterally through narrowed lanes and which avoids uninterrupted sightlines.

(C) Pinchpoints, chokers, or curb extensions restrict motorists from operating at high speeds on local streets by visually narrowing the roadway.

(D) Neighborhood traffic circles reduce speed of traffic at intersections by requiring motorists to move cautiously through conflict points.

- Street trees narrow a driver's visual field, subconsciously queuing drivers to slow down.

(E) Speed humps slow drivers through vertical deflection. To minimize impacts to bicycles, use a sinusoidal profile and leave a gap along curb so that bicyclists may bypass the hump when appropriate. Speed cushions operate in a similar fashion to speed humps, but allow for unimpeded travel by emergency vehicles.

Design Features: Volume Reduction

- Partial closure diverters allows bicyclists to proceed straight across the intersection but forces motorists to turn left or right. All turns from the major street onto the bikeway are prohibited. Can incorporate curb extensions with stormwater management features and/ora mountable island.

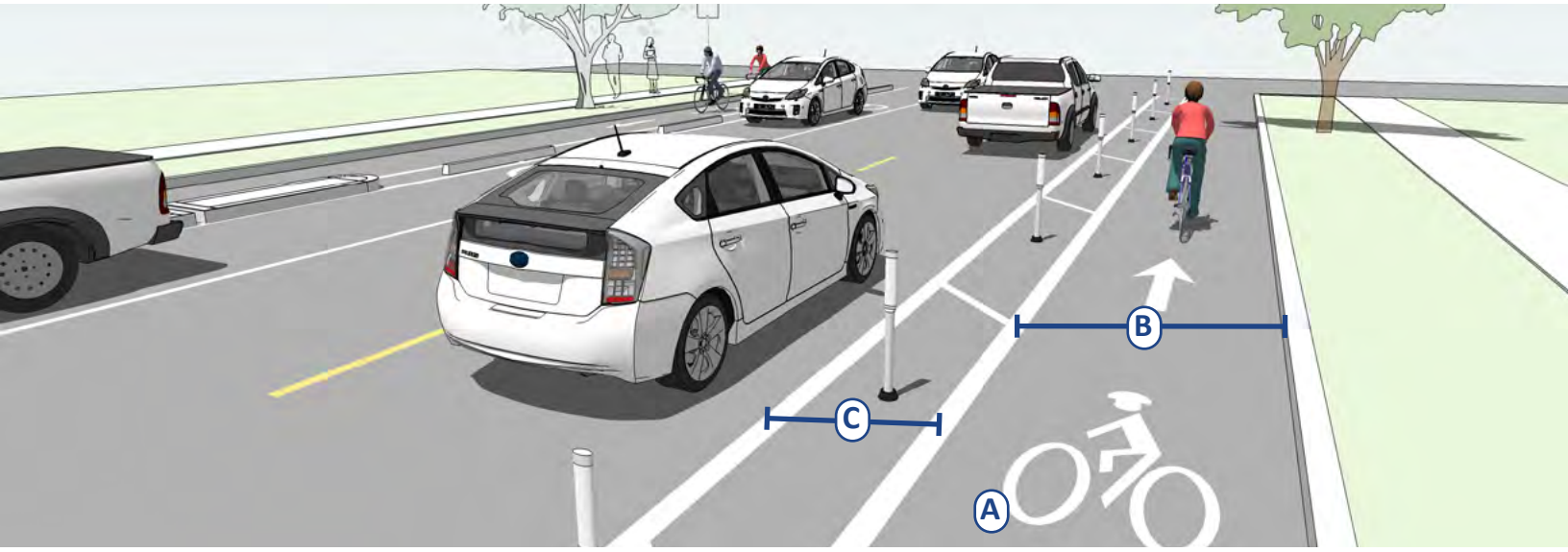
- Right-in/right-out diverters force motorists to turn right while bicyclists can continue straight through the intersection. The island can provide a through bike lane or bicycle access to reduce conflicts with-right-turning vehicles. Left turns from the major street onto the bikeway are prohibited, while right turns are still allowed.

- Median refuge island diverters restrict through and left-turn vehicle movements along the bikeway while providing refuge for bicyclists to cross one direction of traffic at a time. This treatment prohibits left turns from the major street onto the bikeway, while right turns are still allowed.

- Full diverters block all motor vehicles from continuing on a neighborhood bikeway, while bicyclists can continue unrestricted. Full closures can be constructed to be permeable to emergency vehicles.

One-Way Separated Bikeways (Class IV)

When retrofitting separated bike lanes onto existing streets, a one-way street-level design may be most appropriate. This design provides protection through physical barriers and can include flexible delineators, curbs, on-street parking or other barriers. A street level separated bike lane shares the same elevation as adjacent travel lanes..



Typical Application

- Street retrofit projects with limited funds for relating curbs and drainage.
- Streets with high motor vehicle volumes and/or speeds and high bicycle volumes.
- Streets for which conflicts at intersections can be effectively mitigated using parking lane setbacks, bicycle markings through the intersection, and other signalized intersection treatments.
- Appropriate for most riders on most streets.

Design Features

(A) Pavement markings, symbols and/or arrow markings must be placed at the beginning of the separated bike lane and at intervals along the facility (CA MUTCD 9C.04).

(B) 7 foot width preferred to allow passing (5 foot minimum).

(C) 3 foot minimum buffer width adjacent to parking. 18 inch minimum adjacent to travel lanes. Channelizing devices should be placed in the buffer area (NACTO, 2012).

- If buffer area is 4 feet or wider, white chevron or diagonal markings should be used.

Street Level Separated Bicycle Lanes can be separated from the street with parking, planters, bollards, or other design elements.

Further Considerations

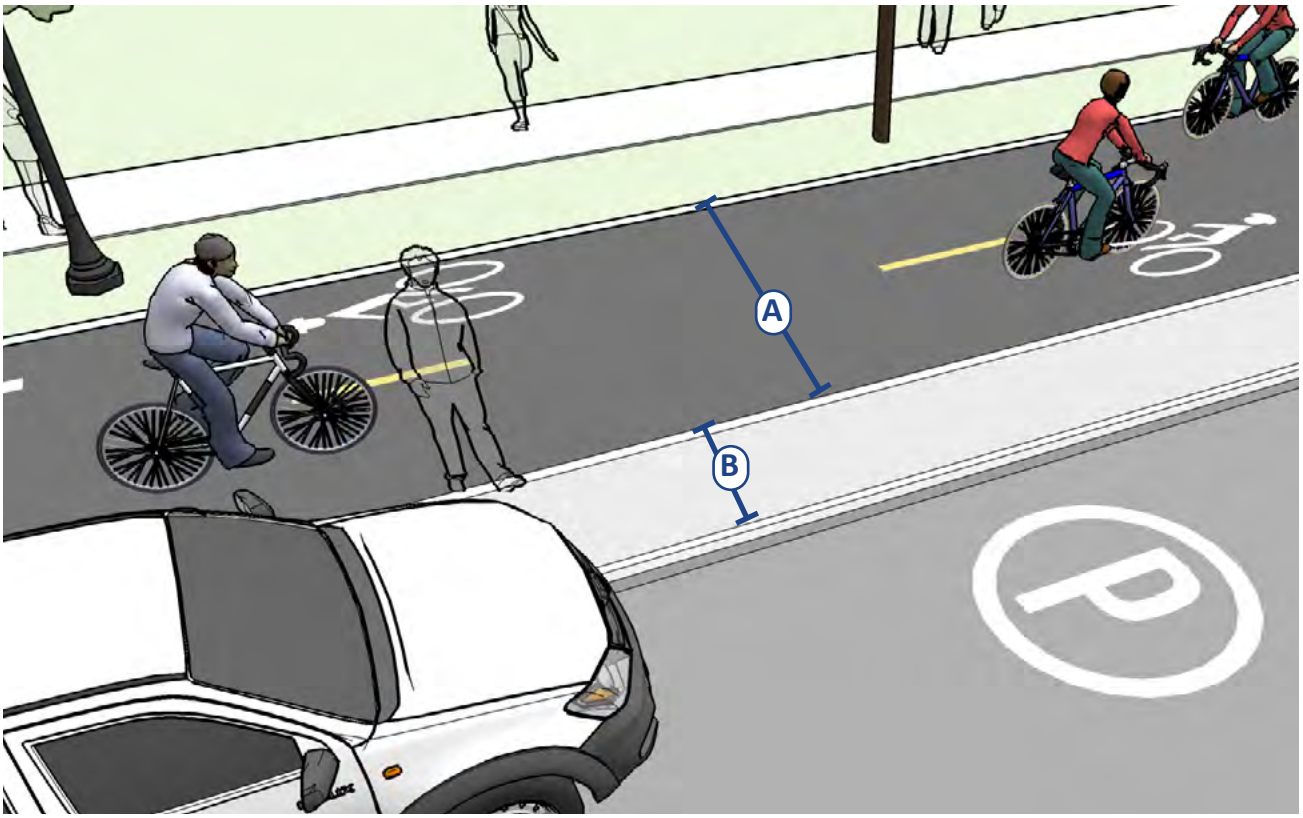
- Separated bike lane buffers and barriers are covered in the CA MUTCD as preferential lane markings (section 3D.01) and channelizing devices (section 3H.01). Curbs may be used as a channeling device, see the section on islands (section 3I.01).
- A retrofit separated bike lane has a relatively low implementation cost compared to road reconstruction by making use of existing pavement and drainage and by using parking lane as a barrier.
- Gutters, drainage outlets and utility covers should be designed and configured as not to impact bicycle travel.
- Special consideration should be given at transit stops to manage bicycle and pedestrian interactions.

Approximate Cost

The implementation cost is low if the project uses existing pavement and drainage, but the cost significantly increases if curb lines need to be moved. A parking lane is the low-cost option for providing a barrier. Other barriers might include concrete medians, bollards, tubular markers, or planters.

Two-Way Separated Bikeways (Class IV)

Two-Way Separated Bikeways are bicycle facilities that allow bicycle movement in both directions on one side of the road. Two-way separated bikeways share some of the same design characteristics as one-way separated bikeways, but often require additional considerations at driveway and side-street crossings, and intersections with other bikeways.



Typical Application

- Works best on the left side of one-way streets.
- Streets with high motor vehicle volumes and/or speeds
- Streets with high bicycle volumes.
- Streets with a high incidence of wrong-way bicycle riding.
- Streets with few conflicts such as driveways or cross-streets on one side of the street.
- Streets that connect to shared use paths.

Design Features

(A) 12 foot operating width preferred (10 ft minimum) width for two-way facility.

- In constrained locations an 8 foot minimum operating width may be considered (HDM 1003.1(1)).

(B) Adjacent to on-street parking a 3 foot minimum width channelized buffer or island shall be provided to accommodate opening doors (NACTO, 2012) (CA MUTCD 3H.01, 3I.01).

- A separation narrower than 5 feet may be permitted if a physical barrier is present (AASHTO, 2013).
- Additional signalization and signs may be necessary to manage conflicts.

Two-Way Separated Bikeway

A two-way facility can accommodate cyclists in two directions of travel.

Further Considerations

- On-street bikeway buffers and barriers are covered in the CA MUTCD as preferential lane markings (section 3D.01) and channelizing devices, including flexible delineators (section 3H.01). Curbs may be used as a channeling device, see the section on islands (section 3I.01).
- A two-way separated bikeway on one way street should be located on the left side.
- A two-way separated bikeway may be configured at street level or as a raised separated bikeway with vertical separation from the adjacent travel lane.
- Two-way separated bikeways should ideally be placed along streets with long blocks and few driveways or mid-block access points for motor vehicles.
- See Caltrans Design Information Bulletin No. 89 for more details.

Materials and Maintenance

Bikeway striping and markings will require higher maintenance where vehicles frequently traverse over them at intersections, driveways, parking lanes, and along curved or constrained segments of roadway. Green conflict striping (if used) will also generally require higher maintenance due to vehicle wear.

Bikeways should be maintained so that there are no pot holes, cracks, uneven surfaces or debris.

Access points along the facility should be provided for street sweeper vehicles to enter/exit the separated bikeway.

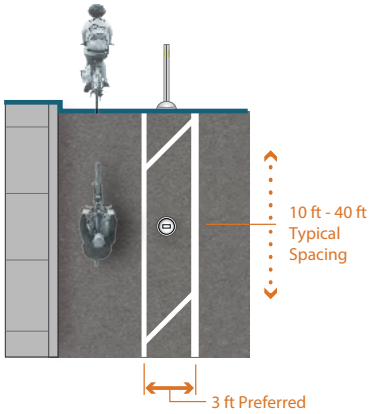
Approximate Cost

Separated bikeway construction costs can vary drastically depending on the type of separation used, the amount of new curb and gutter, stormwater mitigation, and crossing treatments. On the lower end of the scale, construction of a striped parking protected bikeway with delineators or other vertical elements can cost as little as $15,000-$30,000 per mile.

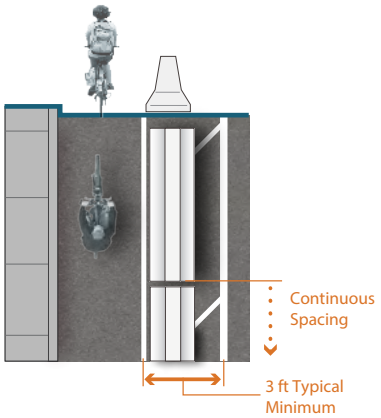
Separation Methods

Separated bikeways may use a variety of vertical elements to physically separate the bikeway from adjacent travel lanes. Barriers may be robust constructed elements such as curbs, or may be more interim in nature, such as flexible delineator posts.

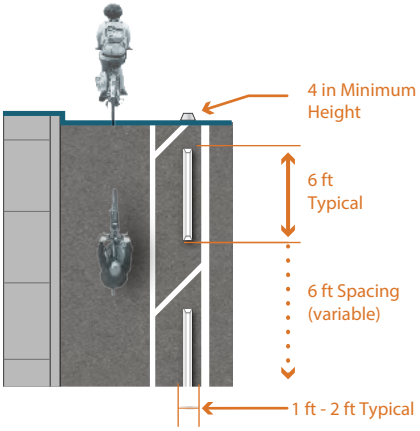
Delineator Posts



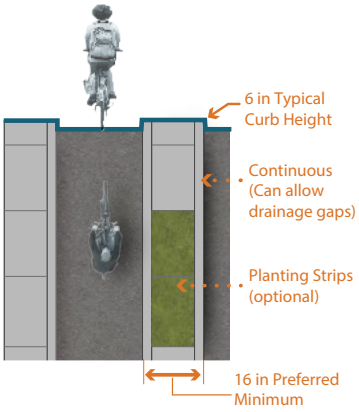
Concrete Barrier



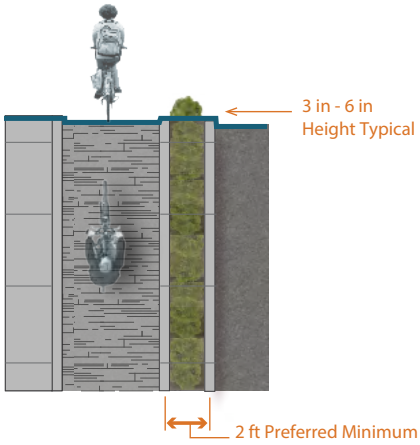
Curbing



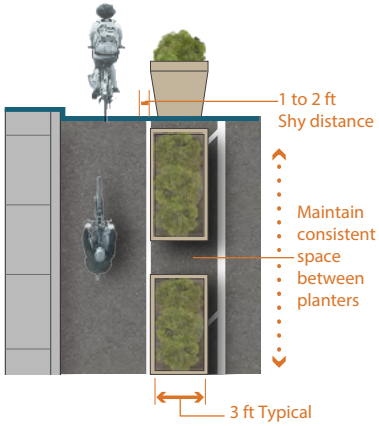
Raised Median



Raised Lane



Planters



Typical Application

Appropriate barriers for retrofit projects:

- Parked Cars
- Flexible delineators
- Bollards
- Planters
- Parking stops

Appropriate barriers for reconstruction projects:

- Curb separation
- Medians
- Landscaped Medians
- Raised separated bike lane with vertical or mountable curb
- Pedestrian Safety Islands

Bikeway Separation Methods

Raised separated bikeways are bicycle facilities that are vertically separated from motor vehicle traffic.

Design Features

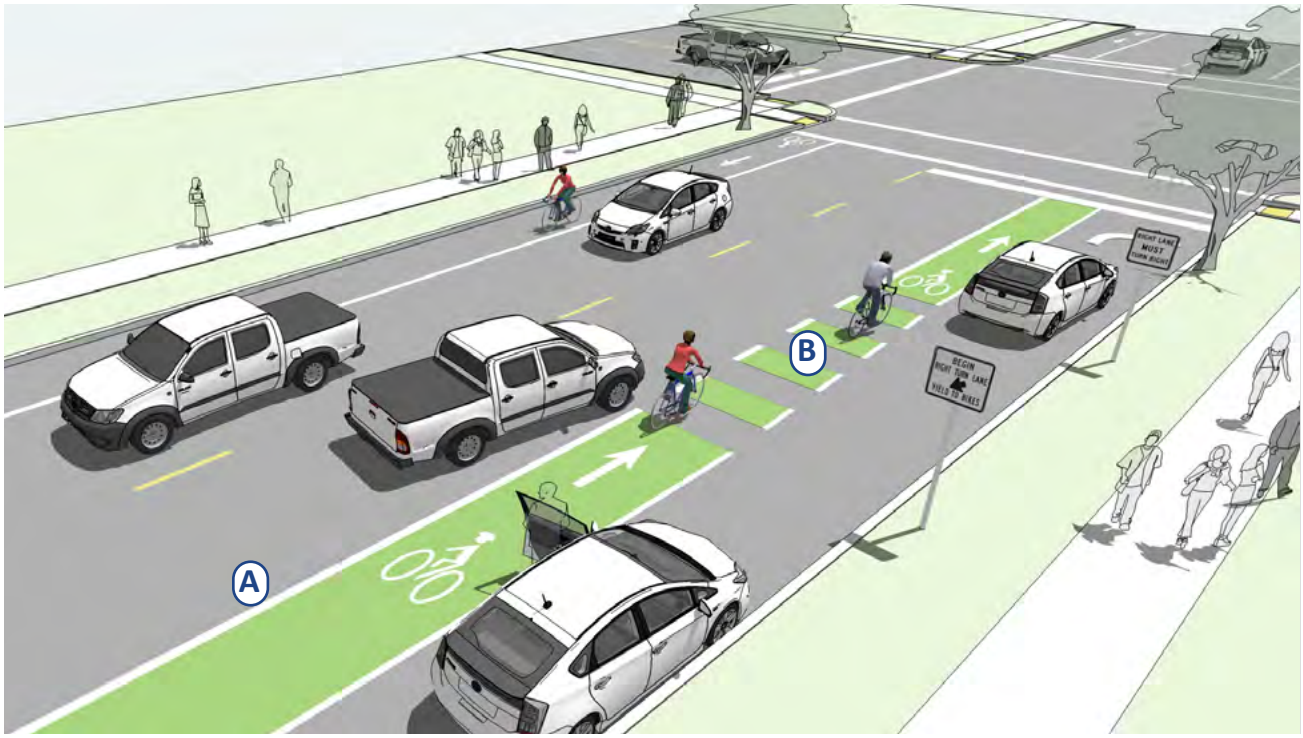
- Maximize effective operating space by placing curbs or delineator posts as far from the through bikeway space as practicable.
- Allow for adequate shy distance of 1 to 2 feet from vertical elements to maximize useful space.
- When next to parking allow for 3 feet of space in the buffer space to allow for opening doors and passenger unloading.
- The presences of landscaping in medians, planters and safety islands increases comfort for users and enhances the streetscape environment.

Further Considerations

- Separated bikeway buffers and barriers are covered in the MUTCD as preferential lane markings (section 3D.01) and channelizing devices (section 3H.01). Curbs may be used as a channeling device, see the section on islands (section 3I.01).
- With new roadway construction a raised separated bikeway can be less expensive to construct than a wide or buffered bicycle lane because of shallower trenching and sub base requirements.
- Parking should be prohibited within 30 feet of the intersection to improve visibility.

Non-Intersection Conflict Markings

Colored pavement within a bicycle lane may be used to increase the visibility of the bicycle facility, raise awareness of the potential to encounter bicyclists, and reinforce priority of bicyclists in conflict areas.



Typical Application

- Within a weaving or conflict area to identify the potential for bicyclist and motorist interactions and assert bicyclist priority.
- Across intersections, driveways and Stop or Yield-controlled cross-streets.
- At bike boxes and two-stage turn boxes

Design Features

(A) Typical white bike lane striping (solid or dotted 6 inch stripe) is used to outline the green colored pavement.

(B) In weaving or turning conflict areas, preferred striping is dashed, to match the bicycle lane line extensions.

- The colored surface should be skid resistant and retro-reflective (MUTCD 9C.02.02).
- In exclusive use areas, such as bike boxes, color application should be solid green.

Green colored conflict striping indicates the path of travel of people on bicycles, and alerts people intending to turn across the bike lane to yield when bicyclists are present. Pictured left: green conflict striping on Santa Rosa Ave.

Further Considerations

- Green colored pavement shall be used in compliance with FHWA Interim Approval (FHWA IA-14.10).
- While other colors have been used (red, blue, yellow), green is the recommended color in the US.

Materials and Maintenance

As intended, paint or thermoplastic are placed in locations that are trafficked by vehicles, and are subject to high vehicle wear. Colored pavement treatments will experience higher rates of wear at locations with higher turning vehicles, buses, and heavy trucks. At these locations, green coloring will require more frequent replacement over time.

The life of the green coloring will depend on vehicle volumes and turning movements, but thermoplastic is generally a more durable material than paint.

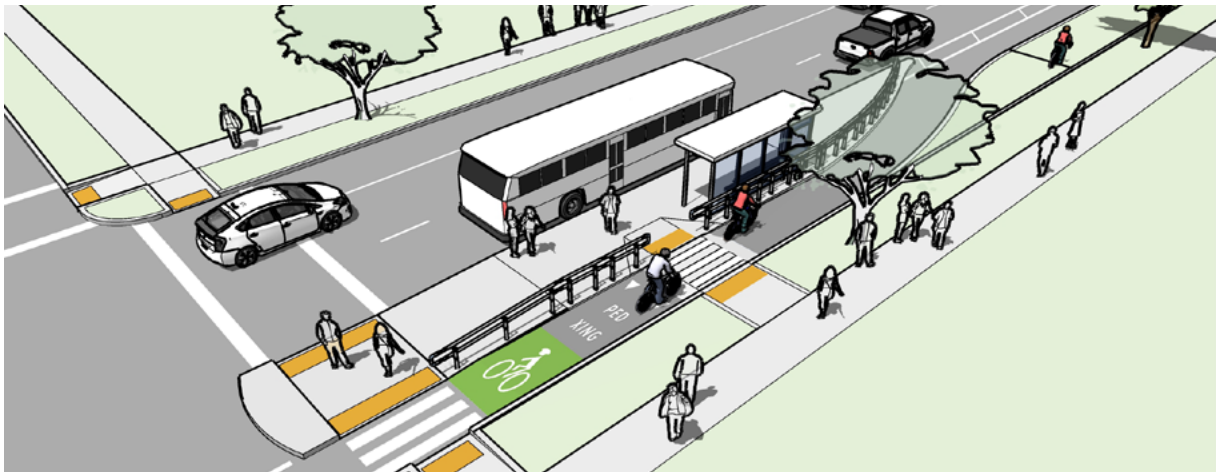
Approximate Cost

The cost for installing colored pavement markings will depend on the materials selected and implementation approach. Typical costs range from $1.20/sq. ft installed for paint to $14/sq. ft installed for thermoplastic.

Bicycle Facilities at Intersections

Transit Stop Design

Bus platforms or waiting areas serve as the critical transition point for pedestrians as transit passengers. As such, bus platforms, shelters, and shelter amenities need to be designed to the benefit of people boarding, alighting, waiting, and passing through. Transit platforms and shelters should be designed to be comfortable and safe, accessible for people with disabilities, sized appropriately based on ridership and demand, use space efficiently, and to minimize delay and conflicts with other modes such as bicycles, and competing sidewalk uses. The transit stop configuration depicted here is known as a side boarding island, or "floating bus stop," and is one of several typical transit-bike-pedestrian station typologies possible. Careful consideration of potential conflicting movements, accessibility design elements, and street context is critical in determining the appropriate station typology, on a station-by-station basis.



Typical Application

- Bus stops can range from simple curbside stops with a pole and seating, to in-roadway platforms with shelters and other shelter amenities depending on demand, adjacent land use, and available right of way.
- Typically, bus stop shelters and amenities occupy an area of the sidewalk, either in the furnishing zone, or a reserved space in the frontage zone. They can also be located on transit islands which accommodates bicycle through traffic, or in medians for center running alignments.
- Shelters can face toward the roadway or away from the roadway. Shelters facing toward the roadway provide better sightlines, but may compete with other sidewalk uses and adjacent property access and circulation.

Design Features

- Bus shelters should be designed to minimize potential for conflicts between the bus, and people walking and bicycling through the area.
- Site visibility is a critical safety and security factor. The bus operator needs to be able to see waiting passengers, and waiting passengers need to be able to see approaching buses. The shelter, street trees, and other vertical elements must not obstruct visibility. The stop and shelter should be adequately illuminated at night for safety and security.
- The shelter should maximize use of materials that maximize visibility for waiting passengers, and minimize incentive for vandalism.
- The shelter canopy should be sized to provide sufficient coverage based on stop demand.

Intersection Crossing Markings

Bicycle pavement markings through intersections guide bicyclists on a safe and direct path through the intersection and provide a clear boundary between the paths of through bicyclists and vehicles in the adjacent lane.

Typical Application

- Streets with conventional, buffered, or separated bike lanes.
- At direct paths through intersections.
- Streets with high volumes of adjacent traffic.
- Where potential conflicts exist between through bicyclist and adjacent traffic.

Design Features

(A) Intersection markings should be the same width and in line with leading bike lane.

- Dotted lane line extensions should be 2 foot line segments with 2 to 6 foot gaps between them (CAMUTCD 3B.08).
- All markings should be white, skid resistant and retro reflective (CAMUTCD 9C.02.02).

(B) Dotted lines may be enhanced with solid green, or dashed green with the same extents as the dotted line itself.

Intersection Crossing Markings

Intersection crossing markings can be used at signalized intersections or high volume minor street and driveway crossings.

Further Considerations

The National Committee on Uniform Traffic Control Devices has submitted a request to include additional options for bicycle lane extensions through intersections as a part of future MUTCD updates. Their proposal includes the following options for striping elements within the crossing:

- Bicycle lane markings
- Double chevron markings, indicating the direction of travel.
- Green colored pavement.

Approximate Cost

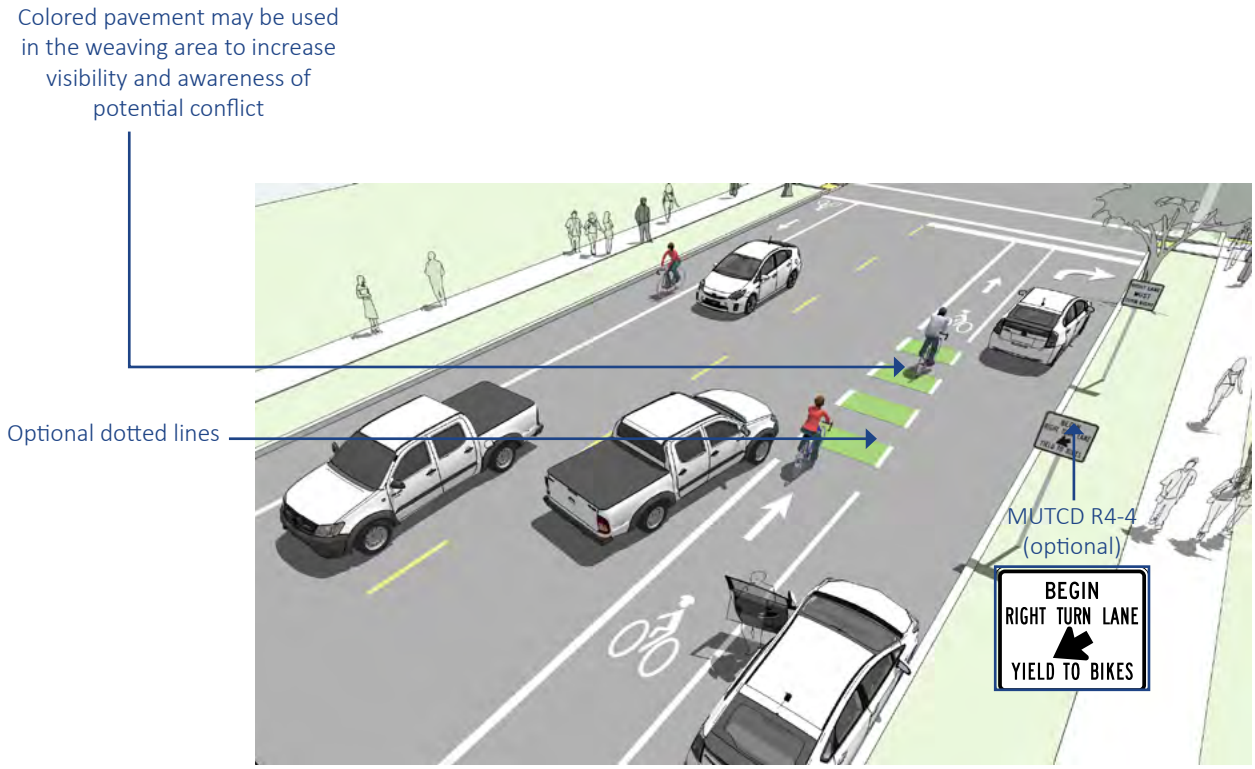
The cost for installing intersection crossing markings will depend on the implementation approach. On roadways with adequate width for reconfiguration or restriping, costs may be negligible when provided as part of routine overlay or repaving projects.

Typical thermoplastic shared lane markings cost $180 each.

Bike Lanes at Right Turn Lanes

The appropriate treatment at right-turn lanes is to place the bike lane between the right-turn lane and the right-most through lane or, where right-of-way is insufficient, to use a shared bike lane/turn lane.

The design (below) illustrates conflict markings, with signage indicating that motorists should yield to bicyclists through the conflict area.



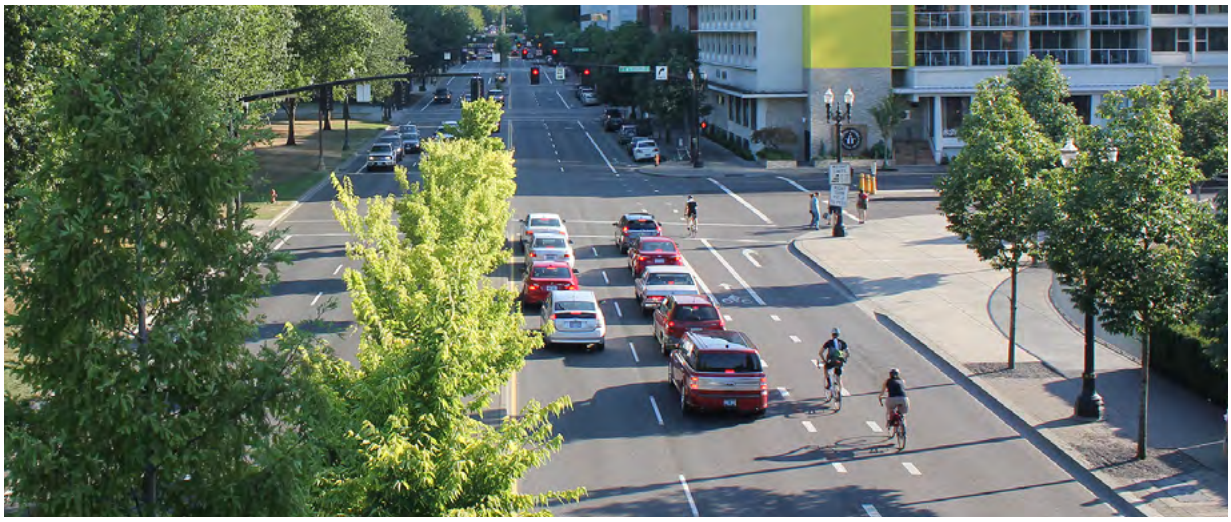
Design Features

At auxiliary right turn only lanes (add lane):

- Continue existing bike lane width; standard width of 5 to 6 feet or 4 feet in constrained locations.
- Use signage to indicate that motorists should yield to bicyclists through the conflict area.
- Consider using colored conflict areas to promote visibility of the mixing zone.

Where a through lane becomes a right turn only lane:

- Do not define a dotted line merging path for bicyclists.
- Drop the bicycle lane in advance of the merge area.
- Use shared lane markings to indicate shared use of the lane in the merging zone.



Drivers wishing to enter the right turn lane must transition across the bicycle lane in advance of the turn.

Further Considerations

- The bicycle lane maintains a straight path, and drivers must weave across, providing clear right-of-way priority to bicyclists.
- Maintaining a straight bicycle path reinforces the priority of bicyclists over turning cars. Drivers must yield to bicyclists before crossing the bike lane to enter the turn lane.
- Through lanes that become turn only lanes are difficult for bicyclists to navigate and should be avoided.
- The use of dual right-turn-only lanes should be avoided on streets with bike lanes (AASHTO, 2013). Where there are dual right-turn-only lanes, the bike lane should be placed to the left of both right-turn lanes; however, this merge is uncomfortable for most bicyclists. Keeping the bike lane to the right of the turn lanes is possible if a bicycle signal phase is implemented to separate bicyclists from turning vehicles.

Materials and Maintenance

Because the effectiveness of markings depends entirely on their visibility, maintaining the visibility of markings should be a high priority.

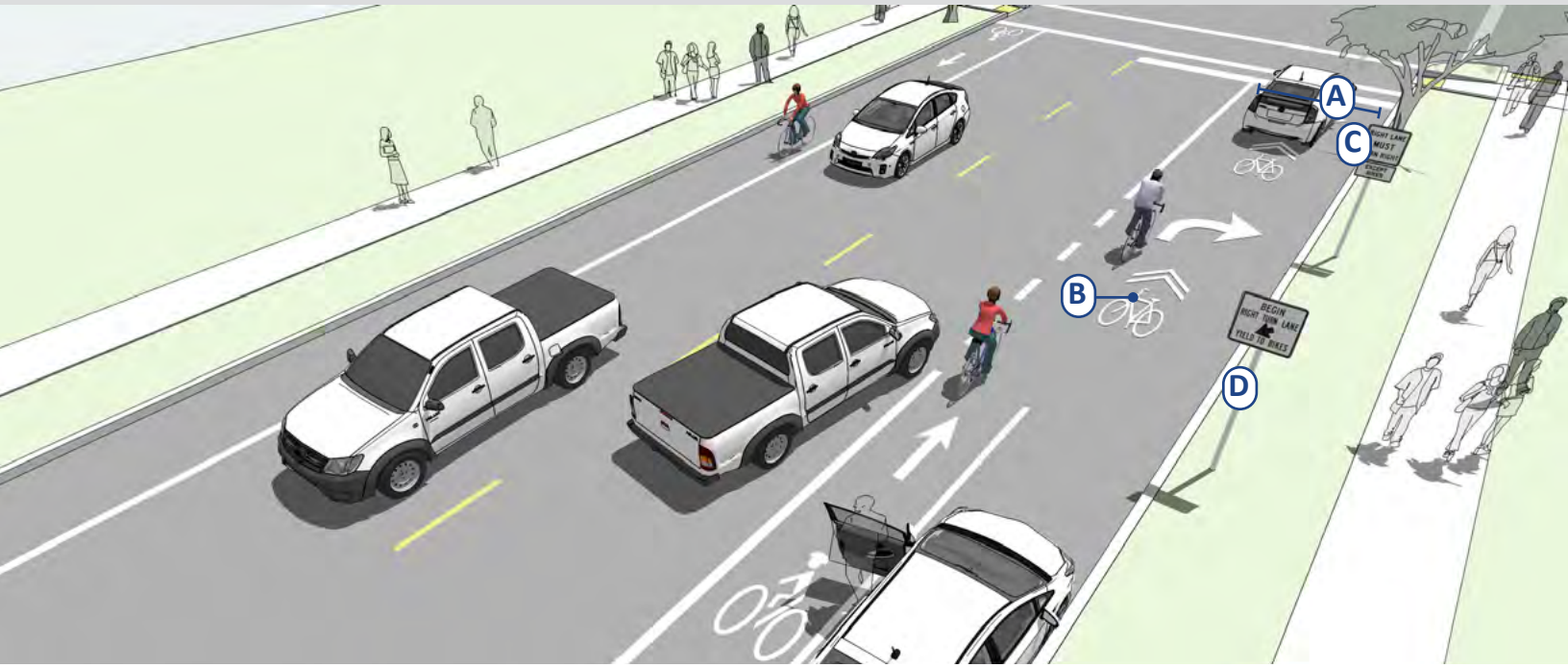
Approximate Cost

The cost for installing bicycle lanes will depend on the implementation approach. On roadways with adequate width for reconfiguration or restriping, costs may be negligible when provided as part of routine overlay or repaving projects.

Typical costs are $16,000 per mile for restriping.

Combined Bike Lane/Turn Lane

Where there isn't room for a conventional bicycle lane and turn lane a combined bike lane/turn lane creates a shared lane where bicyclists can ride and turning motor vehicles yield to through traveling bicyclists. The combined bicycle lane/turn lane places shared lane markings within a right turn only lane.



Typical Application

- Most appropriate in areas with lower posted speeds (30 MPH or less) and with lower traffic volumes (10,000 ADT or less).
- May not be appropriate for high speed arterials or intersections with long right turn lanes.
- May not be appropriate for intersections with large percentages of right-turning heavy vehicles.

Design Features

(A) Maximum shared turn lane width is 13 feet; narrower is preferable (NACTO, 2012).

(B) Shared Lane Markings should indicate preferred positioning of bicyclists within the combine lane.

(C) A "Right Lane Must Turn Right" (CA MUTCD R3-7R) sign with an "EXCEPT BIKES" plaque may be needed to permit through bicyclists to use a right turn lane.

(D) Use "Begin Right Turn Lane Yield To Bikes" signage (CA MUTCD R4-4) to indicate that motorists should yield to bicyclists through the conflict area.

- There should be a receiving bicycle lane or shoulder on the far side of the intersection.

Combined Bike Lane/Turn Lane (Billings, MT)

Shared lane markings and signs indicate that bicyclists should right in the left side of this right turn only lane.

Further Considerations

- This treatment is recommended at intersections lacking sufficient space to accommodate both a standard through bike lane and right turn lane.
- Not recommended at intersections with high peak motor vehicle right turn movements.
- Combined bike lane/turn lane creates safety and comfort benefits by negotiating conflicts upstream of the intersection area.

Materials and Maintenance

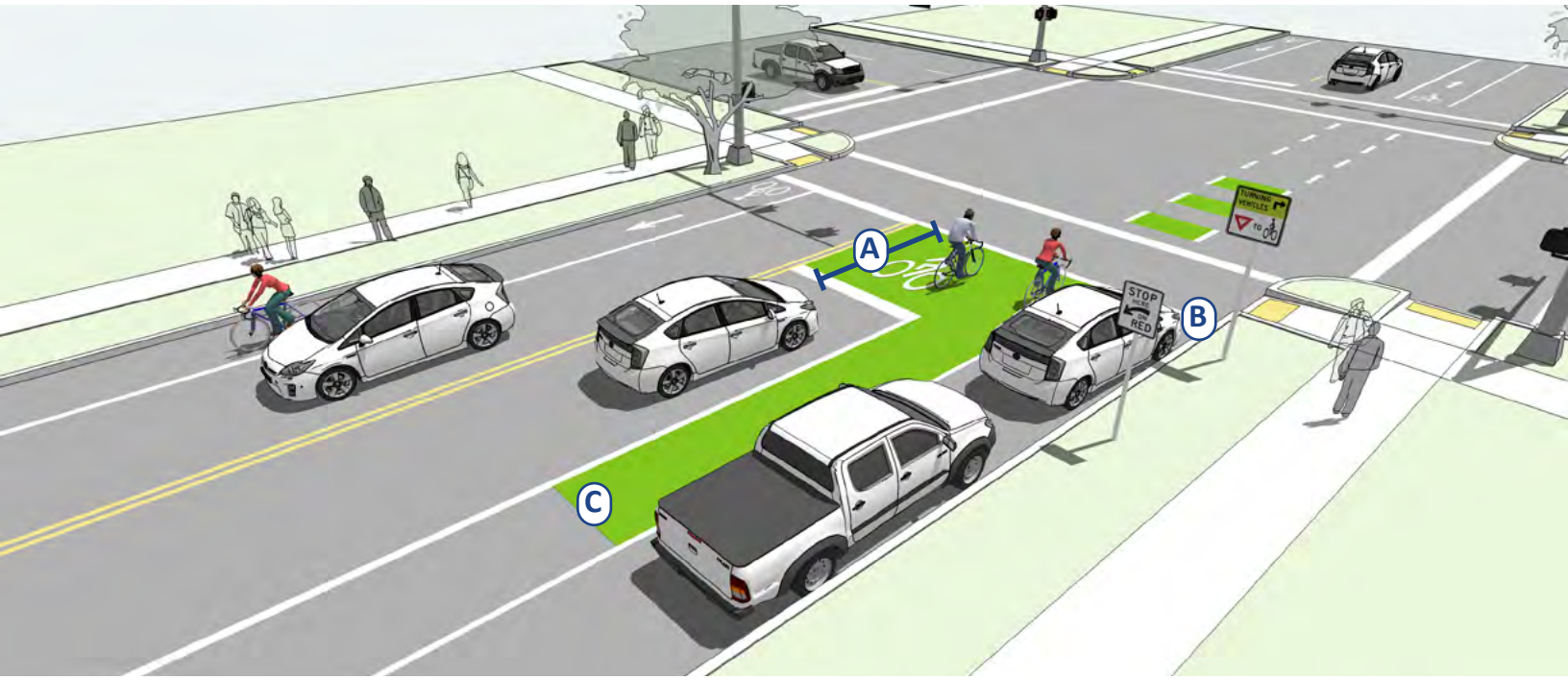
Because the effectiveness of markings depends entirely on their visibility, maintaining the visibility of markings should be a high priority.

Approximate Cost

- The cost for installing a combined will depend on the implementation approach. On roadways with adequate width for reconfiguration or restriping, costs may be negligible when provided as part of routine overlay or repaving projects. Some roadways can be retrofitted with simple shared lane markings and accompanying signage.

Bike Box

A bike box is a designated area located at the head of a traffic lane at a signalized intersection that provides bicyclists with a safe and visible space to get in front of queuing traffic during the red signal phase. Motor vehicles must queue behind the white stop line at the rear of the bike box. On a green signal, all bicyclists can quickly clear the intersection.



Typical Application

- At potential areas of conflict between bicyclists and turning vehicles, such as a right or left turn locations.
- At signalized intersections with high bicycle volumes.
- At signalized intersections with high vehicle volumes.

Design Features

(A) 14 foot minimum depth from back of crosswalk to motor vehicle stop bar (NACTO, 2012).

(B) A “No Turn on Red” (CA MUTCD R10-11) sign shall be installed overhead to prevent vehicles from entering the Bike Box. A “Stop Here on Red” (CA MUTCD R10-6) sign should be post mounted at the stop line to reinforce observance of the stop line.

- A 50 foot ingress lane should be used to provide access to the box.

(C) Use of green colored pavement is optional but recommended.

Bike Box

A bike box allows for cyclists to wait in front of queuing traffic, providing high visibility, and a head start over motor vehicle traffic.

Further Considerations

- This treatment positions bicycles together and on a green signal, all bicyclists can quickly clear the intersection, minimizing conflict and delay to transit or other traffic.
- Pedestrians also benefit from bike boxes, as they experience reduced vehicle encroachment into the crosswalk.
- Two stage turn boxes are better treatments to facilitate bicycle turns as they are available for queuing during a parallel green signal indication.

Materials and Maintenance

Because the effectiveness of markings depends entirely on their visibility, maintaining the visibility of markings should be a high priority.

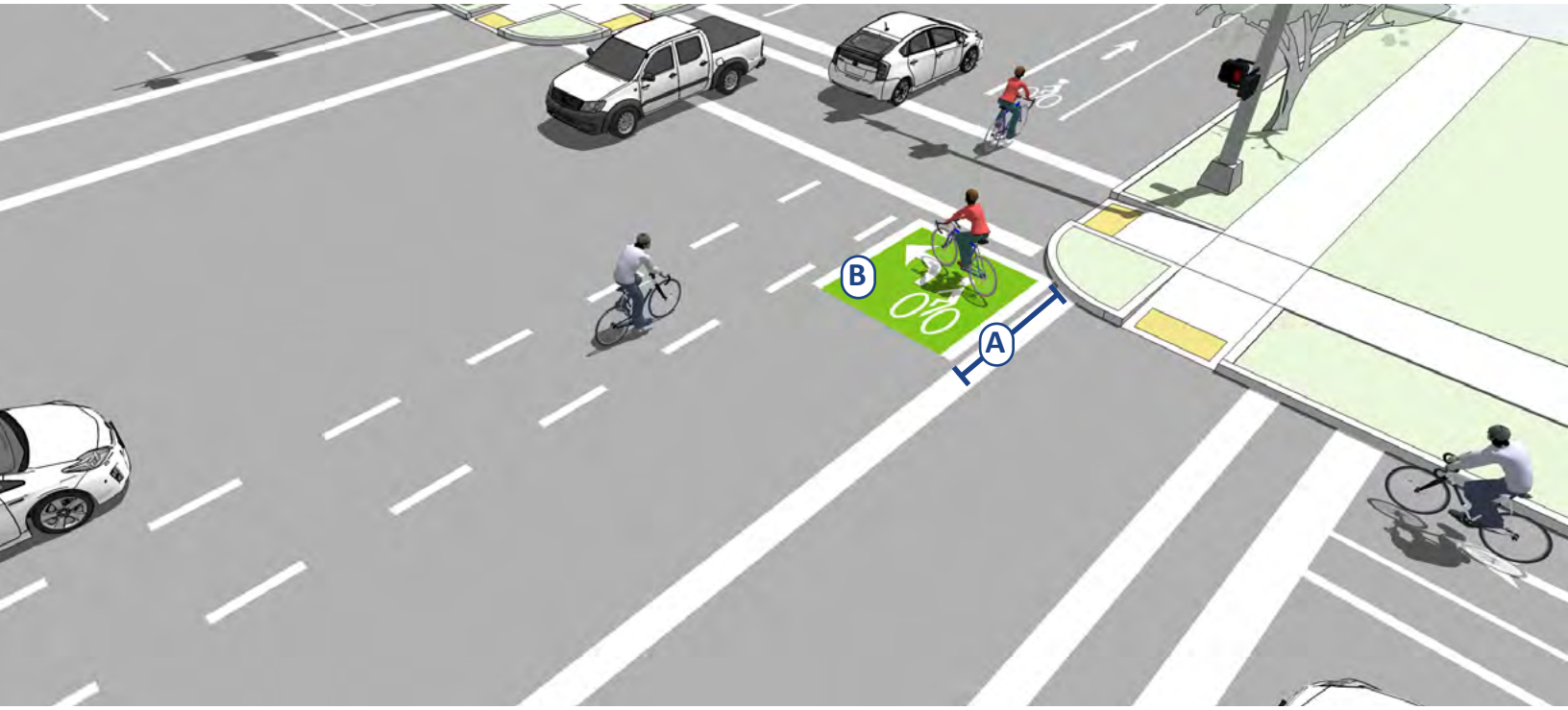
Approximate Cost

Costs will vary due to the type of paint used and the size of the bike box, as well as whether the treatment is added at the same time as other road treatments.

The typical cost for painting a bike box is $11.50 per sq. foot.

Two-Stage Turn Boxes

Two- stage turn boxes offer bicyclists a safe way to make turns at multi-lane signalized intersections from a physically separated or conventional bike lane. On physically separated bike lanes, bicyclists are often unable to merge into traffic to turn due to physical separation, making the provision of two-stage turn boxes critical.



Typical Application

- Streets with high vehicle speeds and/or traffic volumes.
- At intersections locations of multi-lane roads with signalized intersections.
- At signalized intersections with a high number of bicyclists making a left turn from a right side facility.

Design Features

- The two-stage turn box shall be placed in a protected area. Typically this is within the shadow of an on-street parking lane or separated bike lane buffer area and should be placed in front of the crosswalk to avoid conflict with pedestrians.

(A) 6.5 feet deep by 10 feet wide is the required minimum dimensions of the box to accommodate three bicyclists side by side (FHWA).

(B) Bicycle stencil and turn arrow pavement markings shall be used to indicate proper bicycle direction and positioning (NACTO, 2012).

Jughandle Turn Box

This MUTCD compliant design carves a jughandle out of the sidewalk to provide space for waiting bicyclists.

Separated Bike Lane Turn Box

On separated bike lanes, the two-stage turn box can be located in the protected buffer/parking area.

Further Considerations

- Provide a "No Turn on Red" sign (MUTCD R10-11) on the cross street if turning vehicles come into conflict with the placement of the turn box.
- This design formalizes a maneuver called a "box turn" or "pedestrian style turn."
- Design guidance for two-stage turns apply to both bike lanes and separated bike lanes.
- Two-stage turn boxes reduce conflicts in multiple ways; from keeping bicyclists from queuing in a bike lane or crosswalk and by separating turning bicyclists from through bicyclists.
- Bicyclist capacity of a two-stage turn box is influenced by physical dimension (how many bicyclists it can contain) and cycle length (how frequently the box clears).
- More information on two stage turn boxes is available:
    - FHWA Separated Bike Lane Planning and Design Guide
    - NACTO. Urban Bikeway Design Guide. 2012
    - FHWA Interim Approval-20

Materials and Maintenance

Because the effectiveness of markings depends entirely on their visibility, maintaining the visibility of markings should be a high priority.

Approximate Cost

Costs will vary due to the type of paint used and the size of the two-stage turn box, as well as whether the treatment is added at the same time as other road treatments.

The typical cost for painting a two-stage turn box is $11.50 per square foot.

Bicycle Detection and Actuation

At fully signalized intersections, bicycle crossings are typically accomplished through the use of a standard green signal indication for Class II and III bikeways. A number of traffic signal enhancements can be made to improve detection and actuation and better accommodate bicyclists. An exclusive bicycle phase provided by bicycle signals offers the highest level of service and protection, especially for Class I and IV bikeways, but feature the same detection and actuation devices used at intersections with standard traffic signals. For more information on bicycle signals, see Protected Bicycle Signal Phase.

Typical Application

- Bicycle detection and actuation is used to alert the signal controller of bicycle crossing demand on a particular approach. Proper bicycle detection should meet at least two primary criteria: 1) accurately detect bicyclists, and 2) provide clear guidance to bicyclists on how to actuate detection (e.g. what button to push or where to stand). Additionally, new technologies are being developed to provide feedback to bicyclists once they have been detected to increase the likelihood of stop compliance.
- Detection mechanisms can also provide bicyclists with an extended green time before the signal turns yellow so that bicyclists of all abilities can reach the far side of the intersection.
- All new or modified traffic signals in California must be equipped for bicyclist detection, or be placed on permanent recall or fixed time operation (CalTrans Traffic Operations Policy Directive 09-06).
- Detection shall be place where bicyclists are intended to travel and/or wait.
- On bicycle priority corridors with on-street bike lanes or separated bikeways, consider the use of advance detection placed 100-200 feet upstream of the intersection to provide an early trigger to the signal system and reduce bicyclist delay.

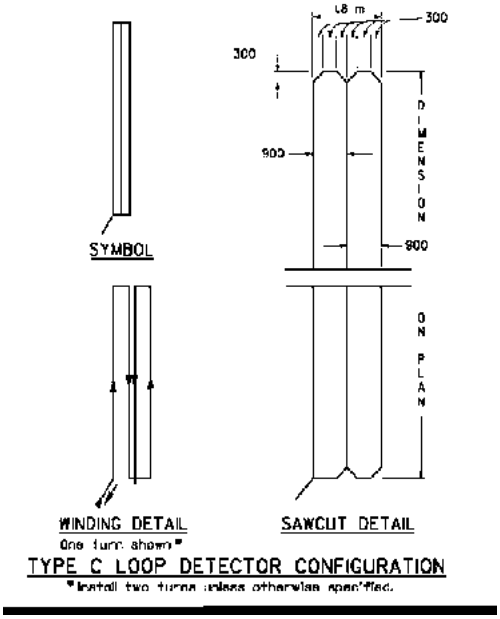
Design Features

- Bicycle detection and actuation systems include user-activated buttons mounted on a pole facing the street, in-pavement loop detectors that trigger a change in the traffic signal when a bicycle is detected, video detection cameras that use digital image processing to detect a change in the image at a location, and/or Remote Traffic Microwave Sensor Detection (RTMS) which uses frequency modulated continuous wave radio signals to detect objects in the roadway.
- 6 foot by 6 foot Type C loop conductors should be used.
- A linear pavement marking should be used to indicate where cyclists should stand to acuate the signal.
- Signal heads should depict green, yellow, and red cyclist icons to communicate when the exclusive bicycle phase is in progress.

Push Button Actuation

Bicycle push button actuators are positioned to allow bicycle riders in roadway to stop traffic on busy cross-streets.

Type C Loop Detector



Type C loop detector have been shown to most reliably detect bicyclists at all points over their surface.

Further Considerations

- The location of pushbuttons should not require bicyclists to dismount or be rerouted out of the way or onto the sidewalk to activate the phase. Signage should supplement the signal to alert bicyclists of the required activation to prompt the green phase.
- In-pavement Type C Loop detectors are induction circuits installed within the roadway surface to detect bicyclists as they wait for the signal. This allows the bicyclists to stay within the lane of travel. Loop detectors should be sufficiently sensitive to detect bicyclists and be marked with pavement markings instructing bicyclists on where to stand. CAMUTCD provides guidance on stencil markings and signage related to loop detectors.
- Remote Traffic Microwave Sensor Detection (RTMS) is unaffected by temperature and lighting which can affect standard video detection.
- Bicyclists typically need more time to travel through an intersection than motor vehicles. Green light times should be determined using the bicycle crossing time for standing bicycles.

Materials and Maintenance

Bicycle signal detection equipment should be inspected and maintained regularly, especially if detection relies on manual actuation. Pushbuttons and loop detectors will tend to have higher maintenance needs than other passive detection equipment.

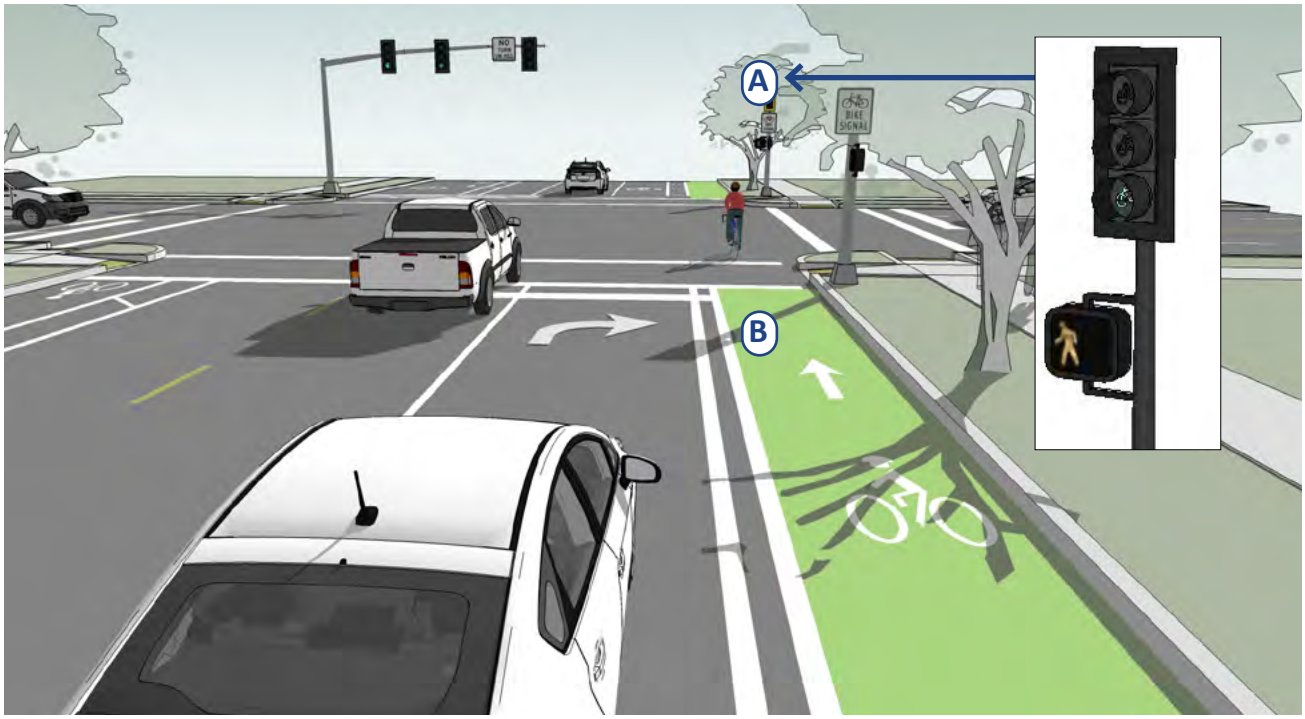
Approximate Cost

Costs vary depending on the type of technology used, but bicycle loop detectors embedded in the pavement typically cost from $1,000-$2,000. Video detection camera systems typically range from $20,000 to $30,000 per intersection.

Other traffic signal programming enhancements can be made to existing traffic signal hardware with relatively little to no additional hardware costs.

Separated Bicycle Signal Phase

Separated bicycle lane crossings of signalized intersections can be accomplished through the use of a bicycle signal phase which reduces conflicts with motor vehicles by separating bicycle movements from any conflicting motor vehicle movements. Bicycle signals are traditional three lens signal heads with green, yellow and red bicycle stenciled lenses.



Typical Application

- Two-way protected bikeways where contraflow bicycle movement or increased conflict points warrant protected operation.
- Bicyclists moving on a green or yellow signal indication in a bicycle signal shall not be in conflict with any simultaneous motor vehicle movement at the signalized location
- Right (or left) turns on red should be prohibited in locations where such operation would conflict with a green bicycle signal indication.

Design Features

(A) An additional “Bicycle Signal” sign should be installed below the bicycle signal head.

(B) Designs for bicycles at signalized crossings should allow bicyclists to trigger signals via pushbutton, loop detectors, or other passive detection, to navigate the crossing.

- On bikeways, signal timing and actuation shall be reviewed and adjusted to consider the needs of bicyclists (CA MUTCD 9D.02).

A bicycle signal head at a signalized crossing creates a protected phase for cyclists to safely navigate an intersection.

A bicycle detection system triggers a change in the traffic signal when a bicycle is detected.

Further Considerations

- A bicycle signal should be considered for use only when the volume/collision or volume/geometric warrants have been met (CA MUTCD 4C.102).
- The Federal Highway Administration (FHWA) has approved bicycle signals for use, if they comply with requirements from Interim Approval 16 (I.A. 16). Bicycle Signals are not approved for use in conjunction with Pedestrian Hybrid Beacons.
- Bicyclists typically need more time to travel through an intersection than motor vehicles. Green light times should be determined using the bicycle crossing time for standing bicycles.
- Bicycle detection and actuation systems include user-activated buttons mounted on a pole, loop detectors that trigger a change in the traffic signal when a bicycle is detected and video detection cameras, that use digital image processing to detect a change in the image at a location.

Materials and Maintenance

Bicycle signal detection equipment should be inspected and maintained regularly, especially if detection relies on manual actuation. Pushbuttons and loop detectors will tend to have higher maintenance needs than other passive detection equipment.

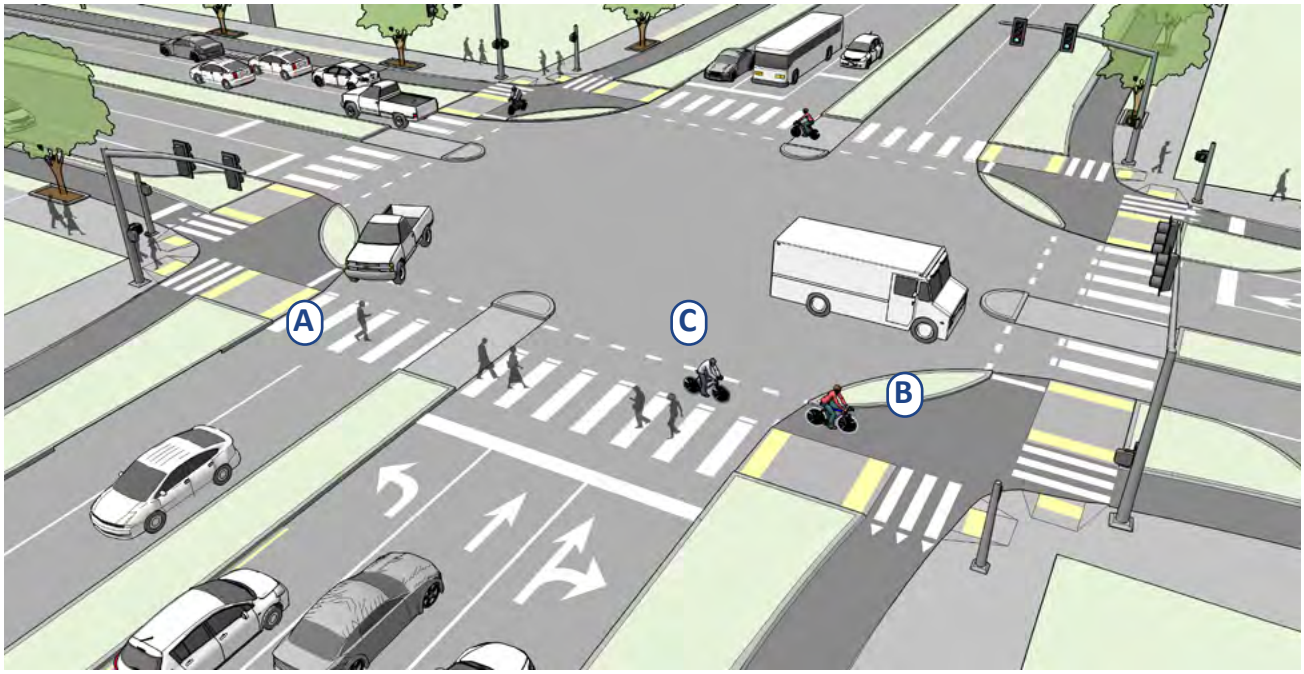
Approximate Cost

Bicycle signal heads have an average cost of $12,800.

Video detection camera system costs range from $15,000 to $25,000 per intersection.

Protected Intersection

A protected intersection, or “Bend Out” uses a collection of intersection design elements to maximize user comfort within the intersection and promote a high rate of motorists yielding to people bicycling. The design maintains a physical separation within the intersection to define the turning paths of motor vehicles, slow vehicle turning speed, and offer a comfortable place for people bicycling to wait at a red signal.



Typical Use

- Streets with separated bikeways protected by wide buffer or on-street parking.
- Where two separated bieways intersect and two-stage left-turn movements can be provided for bicycle riders.
- Helps reduce conflicts between right-turning motorists and bicycle riders by reducing turning speeds and providing a forward stop bar for bicycles.
- Where it is desirable to create a curb extension at intersections to reduce pedestrian crossing distance.

Design Features

(A) Setback bicycle crossing of 19.5 feet allows for one passenger car to queue while yielding. Smaller setback distance is possible in slow-speed, space constrained conditions.

(B) Corner island with a 15-20 foot corner radius slows motor vehicle speeds. Larger radius designs may be possible when paired with a deeper setback or a protected signal phase, or small mountable aprons. Two-stage turning boxes are provided for queuing bicyclists adjacent to corner islands.

(C) Use intersection crossing markings.

Protected intersections feature a corner safety island and intersection crossing markings.

Protected intersections incorporate queuing areas for two-stage left turns.

Further Considerations

- Pedestrian crosswalks may need to be further set back from intersections in order to make room for two-stage turning queue boxes.
- Wayfinding and directional signage should be provided to help bicycle riders navigate through the intersection.
- Colored pavement may be used within the corner refuge area to clarify use by people bicycling and discourage use by people walking or driving.
- Intersection approaches with high volumes of right turning vehicles should provide a dedicated right turn only lane paired with a protected signal phase. Protected signal phasing may allow different design dimensions than are described here.

Materials and Maintenance

- Green conflict striping (if used) will also generally require higher maintenance due to vehicle wear.
- Bikeways should be maintained so that there are no pot holes, cracks, uneven surfaces or debris.
- Bikeways protected by concrete islands or other permanent physical separation, can be swept by street sweeper vehicles with narrow widths.

Approximate Cost

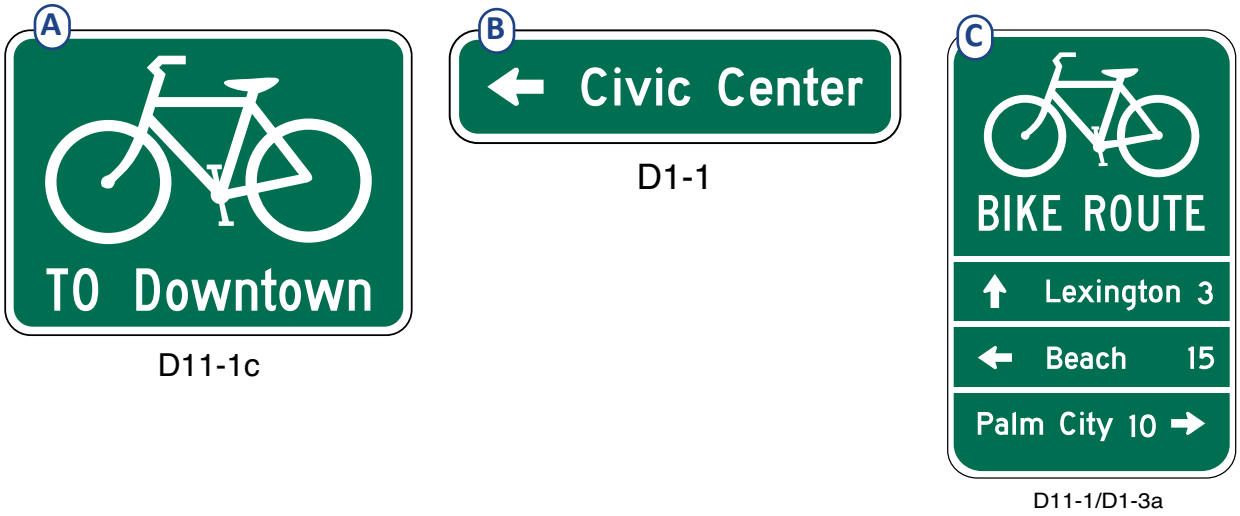
The cost of protected intersection elements vary depending on materials used and degree of implementation desired.

- Complete reconstruction costs comparable to a full intersection.
- Retrofit implementation may be possible at lower costs if existing curbs and drainage are maintained. Inexpensive materials can used, such as paint, concrete planters, and bollards.

Bicycle Facility Amenities

Wayfinding Sign Types

The ability to navigate through a city is informed by landmarks, natural features, and other visual cues. Signs throughout the city should indicate to bicyclists the direction of travel, the locations of destinations and the travel time/distance to those destinations. A bicycle wayfinding system consists of comprehensive signing and/or pavement markings to guide bicyclists to their destinations along preferred bicycle routes.



Typical Application

- Wayfinding signs will increase users' comfort and accessibility to the bicycle network.
- Signage can serve both wayfinding and safety purposes including:
- Helping to familiarize users with the bicycle network
- Helping users identify the best routes to destinations
- Helping to address misperceptions about time and distance
- Helping overcome a "barrier to entry" for people who are not frequent bicyclists (e.g., "interested but concerned" bicyclists)

Design Features

(A) Confirmation signs indicate to bicyclists that they are on a designated bikeway. Make motorists aware of the bicycle route. Can include destinations and distance/time but do not include arrows.

(B) Turn signs indicate where a bikeway turns from one street onto another street. These can be used with pavement markings and include destinations and arrows.

(C) Decisions signs indicate the junction of two or more bikeways and inform bicyclists of the designated bike route to access key destinations. These include destinations, arrows and distances. Travel times are optional but recommended.

Community Logos on Signs

Wayfinding signs can include a local community identification logo, as this example from Oakland, CA.

Custom Street Signs (Berkeley, CA)

Custom street signs can also act as a type of confirmation sign, to let all users know the street is prioritized for bicyclists.

Further Considerations

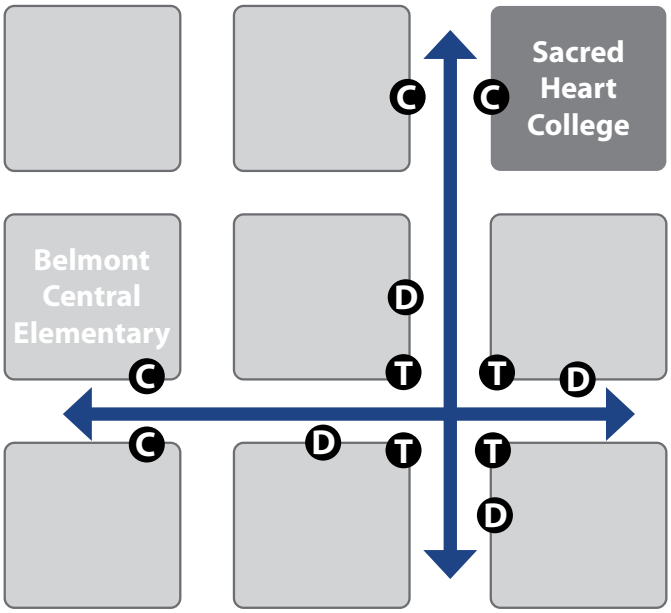
- Bicycle wayfinding signs also visually cue motorists that they are driving along a bicycle route and should use caution. Signs are typically placed at key locations leading to and along bicycle routes, including the intersection of multiple routes.
- Too many road signs tend to clutter the right-of-way, and it is recommended that these signs be posted at a level most visible to bicyclists rather than per vehicle signage standards.
- A community-wide bicycle wayfinding signage plan would identify:
    - Sign locations
    - Sign type – what information should be included and design features
    - Destinations to be highlighted on each sign – key destinations for bicyclists
    - Approximate distance and travel time to each destination
- Green is the color used for directional guidance and is the most common color of bicycle wayfinding signage in the US, including those in the MUTCD.
- Check wayfinding signage along bikeways for signs of vandalism, graffiti, or normal wear and replace signage along the bikeway network as-needed.

Approximate Cost

Wayfinding signs range from $150 to $500

Wayfinding Sign Placement

Signs are placed at decision points along bicycle routes – typically at the intersection of two or more bikeways and at other key locations leading to and along bicycle routes.



Typical Application

Confirmation Signs

- Placed every ¼ to ½ mile on off-street facilities and every 2 to 3 blocks along on-street bicycle facilities, unless another type of sign is used (e.g., within 150 feet of a turn or decision sign).
- Should be placed soon after turns to confirm destination(s). Pavement markings can also act as confirmation that a bicyclist is on a preferred route.

Turn Signs

- Near-side of intersections where bike routes turn (e.g., where the street ceases to be a bicycle route or does not go through).
- Pavement markings can also indicate the need to turn to the bicyclist.

Decision Signs

- Near-side of intersections in advance of a junction with another bicycle route.
- Along a route to indicate a nearby destination.

Design Features

- MUTCD guidelines should be followed for wayfinding sign placement, which includes mounting height and lateral placement from edge of path or roadway.
- Pavement markings can be used to reinforce routes and directional signage.

Wayfinding Pavement Markings

Some cities use pavement markings to indicate required turns along the bicycle route.

Further Considerations

- It can be useful to classify a list of destinations for inclusion on the signs based on their relative importance to users throughout the area. A particular destination's ranking in the hierarchy can be used to determine the physical distance from which the locations are signed. For example, primary destinations (such as the downtown area) may be included on signage up to 5 miles away. Secondary destinations (such as a transit station) may be included on signage up to two miles away. Tertiary destinations (such as a park) may be included on signage up to one mile away.

Approximate Cost

The cost of a wayfinding sign placement plan depends on the scale and scope of the approach. Trail wayfinding signage range from $500-$2000.

Bike Parking

Bicyclists expect a safe, convenient place to secure their bicycle when they reach their destination. This may be short-term parking of two hours or less, or long-term parking for employees, students, residents, and commuters

Typical Application

- Bicycle parking facilities shall be located in highly visible well-lighted areas. In order to maximize security, whenever possible short-term bicycle parking facilities shall be located in areas highly visible from the street and from the interior of the building they serve (i.e. placed adjacent to windows).

- Bike racks provide short-term bicycle parking and is meant to accommodate visitors, customers, and others expected to depart within two hours. It should be an approved standard rack, appropriate location and placement, and weather protection.

- On-street bike corrals (also known as on-street bicycle parking) consist of bicycle racks grouped together in a common area within the street traditionally used for automobile parking. Bicycle corrals are reserved exclusively for bicycle parking and provide a relatively inexpensive solution to providing high-volume bicycle parking. Bicycle corrals can be implemented by converting one or two on-street motor vehicle parking spaces into on-street bicycle parking. Each motor vehicle parking space can be replaced with approximately 6-10 bicycle parking spaces.

Design Features

- All bicycle facilities shall provide a minimum 4 foot aisle to allow for unobstructed access to the designated bicycle parking area.
- Bicycle parking facilities within auto parking facilities shall be protected from damage by cars by a physical barrier such as curbs, wheel stops, poles, bollards, or other similar features capable of preventing automobiles from entering the designated bicycle parking area.
- Bicycle parking facilities should be securely anchored so they cannot be easily removed and shall be of sufficient strength and design to resist vandalism and theft.

Bike Racks

(A) 2 foot minimum from the curb face to avoid 'dooring.'

(B) 4 feet between racks to provide maneuvering room.

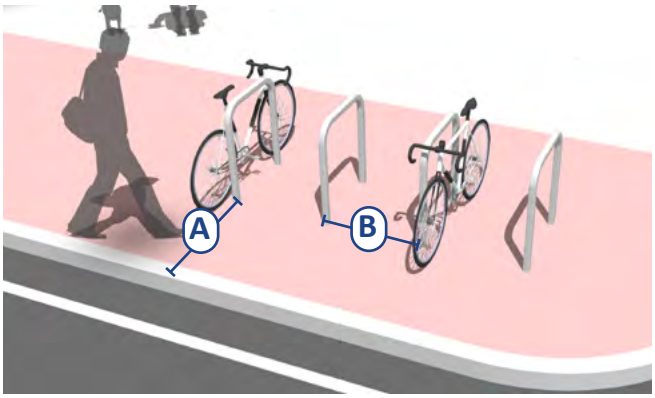
- Locate close to destinations; 50 foot maximum distance from main building entrance.
- Minimum clear distance of 6 feet should be provided between the bicycle rack and the property line.

Bike Corrals

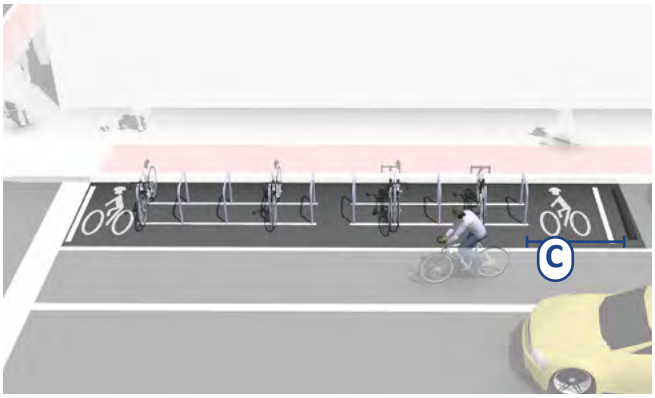
(C) Bicyclists should have an entrance width from the roadway of 5-6 feet for on-street corrals.

- Can be used with parallel or angled parking.
- Parking stalls adjacent to curb extensions are good candidates for on-street bicycle corrals since the concrete extension serves as delimitation on one side.
- Off-street bike corrals are appropriate where there is a wide sidewalk furnishing zone (7 feet or greater), or as part of a curb extension.

Perpendicular Bike Racks



Bike Corral

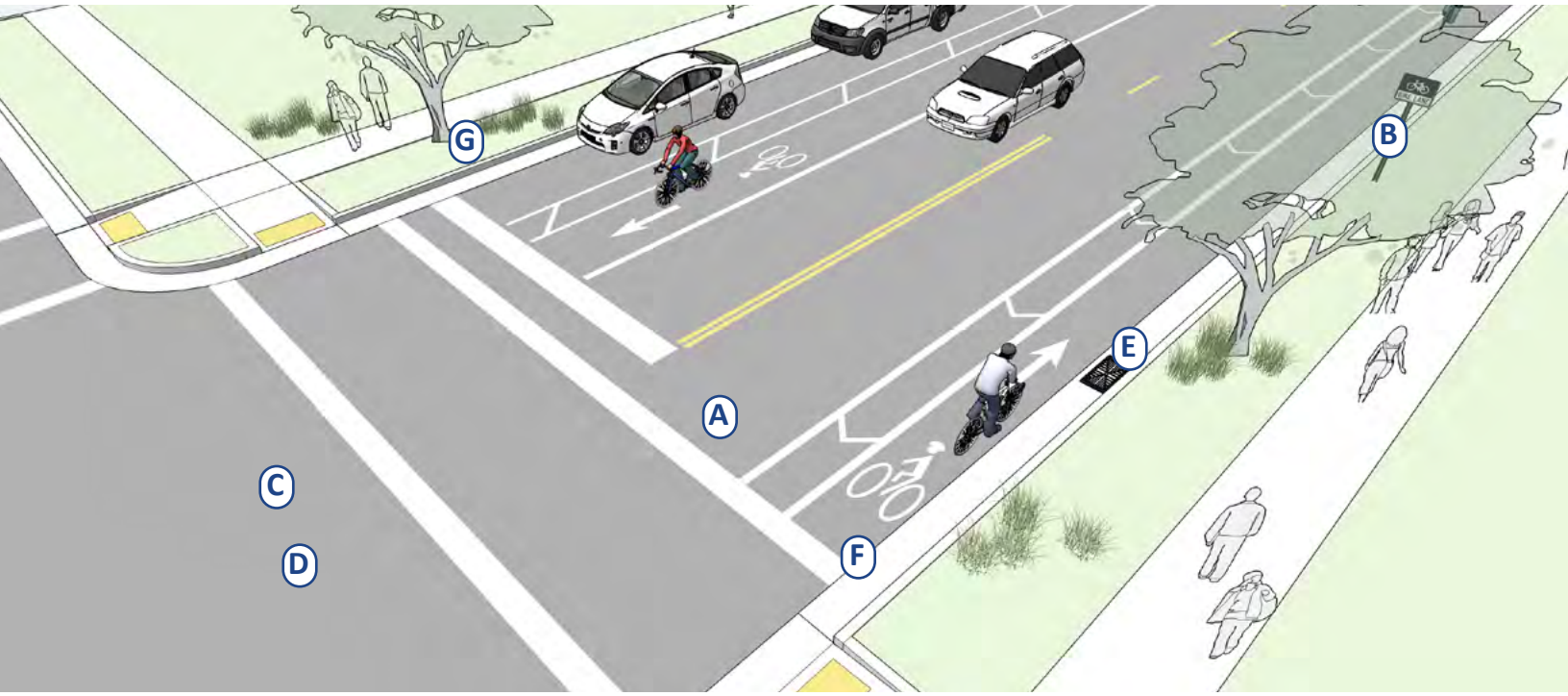


Approximate Cost

Costs can vary based on the design and materials used. Bicycle rack costs can range from approximately $60 to $3,600, depending on design and materials used. On average the cost is approximately $660. Bicycle lockers costs range from $1,280 to $2,680.

Bikeway Maintenance

Regular bicycle facility maintenance includes sweeping, maintaining a smooth roadway, ensuring that the gutter-to-pavement transition remains relatively flush, and installing bicycle-friendly drainage grates. Pavement overlays are a good opportunity to improve bicycle facilities. The following recommendations provide a menu of options to consider to enhance a maintenance regimen.



MAINTENANCE

A Sweeping

- Establish a seasonal sweeping schedule that prioritizes roadways with major bicycle routes.
- Sweep walkways and bikeways whenever there is an accumulation of debris on the facility.
- In curbed sections, sweepers should pick up debris; on open shoulders, debris can be swept onto gravel shoulders.

B Signage

- Check regulatory and wayfinding signage along bikeways for signs of vandalism, graffiti, or normal wear.
- Replace signage along the bikeway network as-needed.
- Perform a regularly-scheduled check on the status of signage with follow-up as necessary.
- Create a Maintenance Management Plan.

C Roadway Surface

- Maintain a smooth pothole-free surface.
- Ensure that on new roadway construction, the finished surface on bikeways does not vary more than ¼ inch.
- Maintain pavement so ridge buildup does not occur at the gutter-to-pavement transition or adjacent to railway crossings.
- Inspect the pavement 2 to 4 months after trenching construction activities are completed to ensure that excessive settlement has not occurred.

D Pavement Overlays

- Extend the overlay over the entire roadway surface to avoid leaving an abrupt edge.
- If the shoulder or bike lane pavement is of good quality, it may be appropriate to end the overlay at the shoulder or bike lane stripe provided no abrupt ridge remains.
- Ensure that inlet grates, manhole and valve covers are within ¼ inch of the finished pavement surface and are made or treated with slip resistant materials.

E Drainage Grates

- Require all new drainage grates be bicycle-friendly, including grates that have horizontal slats on them so that bicycle tires and assistive devices do not fall through the vertical slats.
- Create a program to inventory all existing drainage grates, and replace hazardous grates as necessary – temporary modifications such as installing rebar horizontally across the grate should not be an acceptable alternative to replacement.

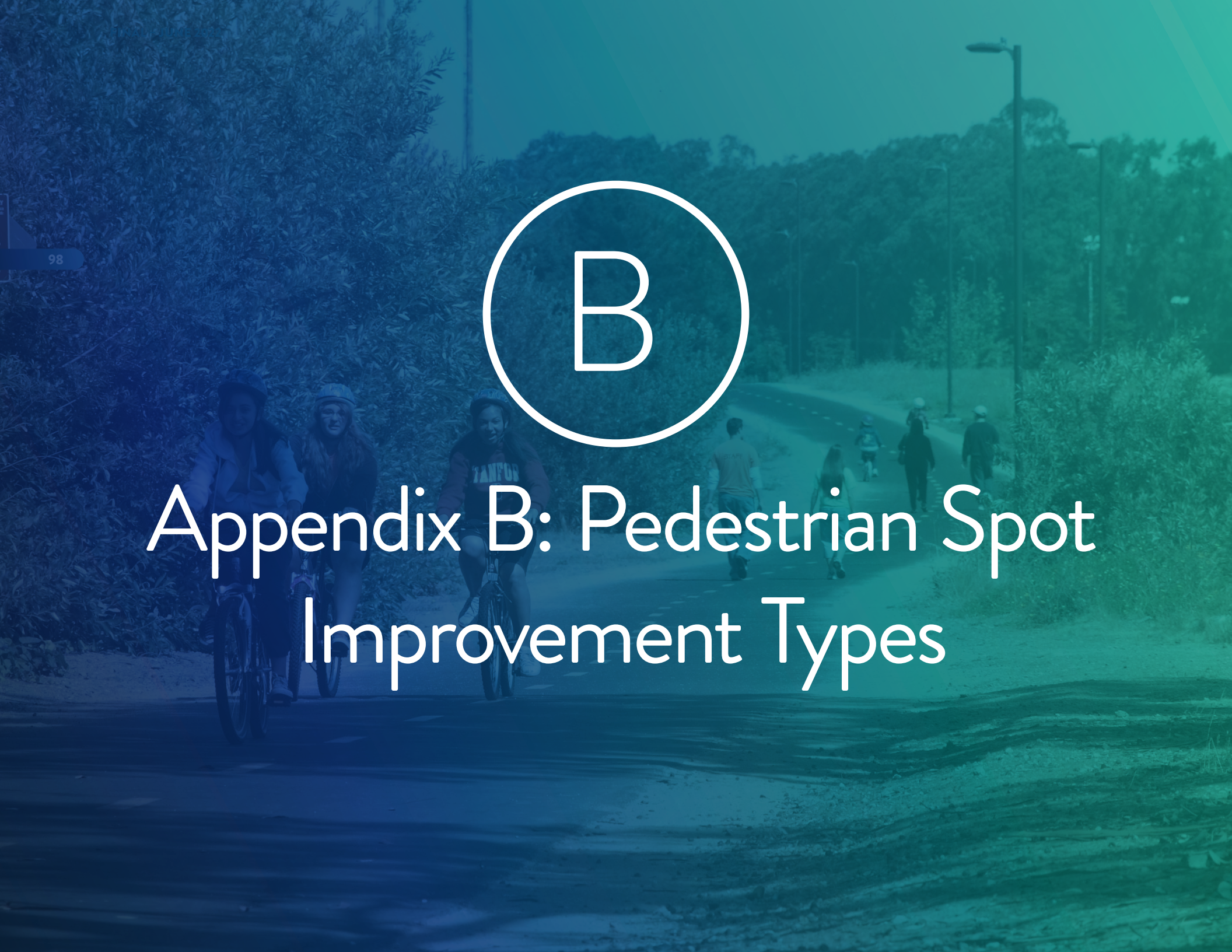
F Gutter to Pavement Transition

- Ensure that gutter-to-pavement transitions have no more than a ¼ inch vertical transition.
- Examine pavement transitions during every roadway project for new construction, maintenance activities, and construction project activities that occur in streets.

G Landscaping

- Ensure that shoulder plants do not hang into or impede passage along bikeways
- After major damage incidents, remove fallen trees or other debris from bikeways as quickly as possible
- Maintenance Management Plan
- Provide fire and police departments with map of system, along with access points to gates/ bollards
- Enforce speed limits and other rules of the road
- Enforce all trespassing laws for people attempting to enter adjacent private properties

Maintenance Activity	Frequency
Inspections	Seasonal – at beginning and end of Summer
Pavement sweeping/blowing	As needed, with higher frequency in the early Spring and Fall
Pavement sealing	5 - 15 years
Pothole repair	1 week – 1 month after report
Culvert and drainage grate inspection	Before Winter and after major storms
Pavement markings replacement	As needed
Signage replacement	As needed
Shoulder plant trimming (weeds, trees, brambles)	Twice a year; middle of growing season and early Fall
Tree and shrub plantings, trimming	1 – 3 years
Major damage response (washouts, fallen trees, flooding)	As soon as possible



B

Appendix B: Pedestrian Spot Improvement Types

Pedestrian Spot Improvement Types

Pedestrian Priority Areas

Identified Pedestrian Priority Areas highlight important corridors in the city that support walking and are currently considered high stress. These areas are identified on Map 15, and specify areas where the City will focus on sidewalk and other pedestrian infrastructure improvements.

Pedestrian Spot Improvements

This Plan identified 40 spot improvements, crossing, and area locations mainly within the Pedestrian Priority Areas that require investment to improve the comfort and safety for pedestrians.

These improvements have been delineated by the following categories:

PEDESTRIAN SIGNAL IMPROVEMENTS

Signal improvements include changing existing signal timing and features to create protected walking times when pedestrians are crossing the street.

PEDESTRIAN SCHOOL AREA IMPROVEMENTS

These improvements highlight spots that would improve walking routes for families and students to reach neighborhood schools.

PEDESTRIAN CROSSING IMPROVEMENTS

These crossing improvements focus on challenging street crossings where enhanced facilities would increase the visibility of people walking.

WALKING ENVIRONMENT IMPROVEMENTS

Improvements to the walking environment include additions such as sidewalk improvements, public art, parklets, landscaping, and light that improve the comfort and visual interest of a walking route.

PEDESTRIAN TRANSIT ACCESS IMPROVEMENTS

Transit access improvements look to improve the waiting areas around transit stops to increase the comfort of community members who walk to their local transit stop.

MAP 15

PEDESTRIAN SPOT LOCATIONS AND FOCUS AREAS

ACTIVE SOUTH CITY

Pedestrian Improvements

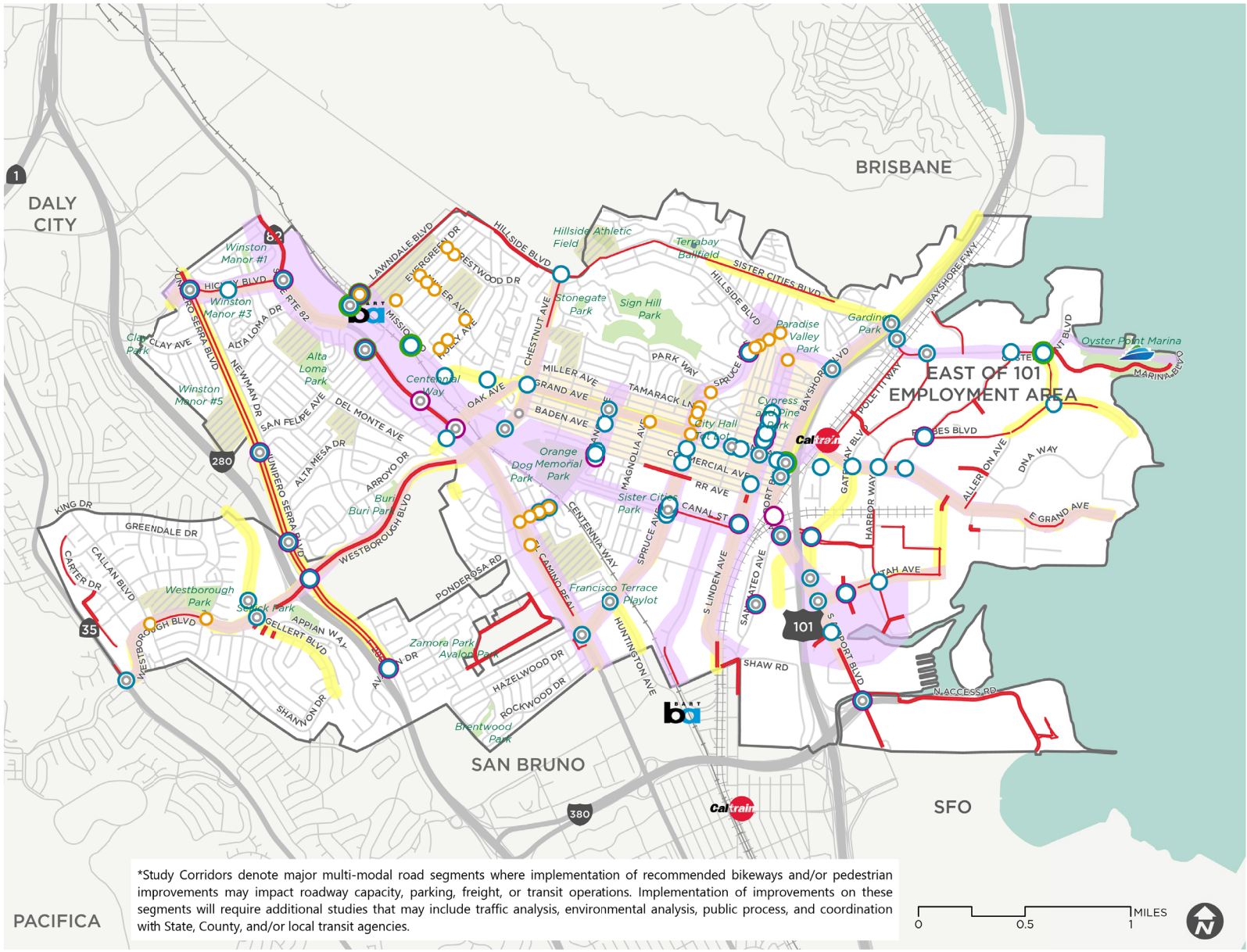
- Pedestrian Signal Improvements
- Pedestrian School Area Improvements
- Pedestrian Crossing Improvements
- Walking Environment Improvements
- Pedestrian Transit Access Improvements
- Pedestrian Focus Areas
- Recommended Sidewalk Project
- Study Corridor*

Transportation

- Ferry Dock
- BART Station
- Caltrain Station
- Caltrain Rail Line
- BART Line

Destinations

- Community Center
- School
- Park
- Library
- Downtown



*Study Corridors denote major multi-modal road segments where implementation of recommended bikeways and/or pedestrian improvements may impact roadway capacity, parking, freight, or transit operations. Implementation of improvements on these segments will require additional studies that may include traffic analysis, environmental analysis, public process, and coordination with State, County, and/or local transit agencies.

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C

Appendix C: Pedestrian Improvement Intersection Typologies

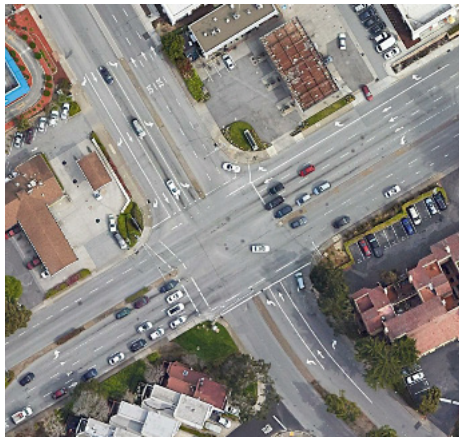
Pedestrian Improvement Intersection Typologies

Typology Types

- Typology A: Signalized Intersections
- Typology B: Major Street/Minor Street (the major street is uncontrolled)
- Typology C: Minor Street/Minor Street (one or both streets are controlled)
- Typology D: Trail Crossings and Mid-block Crossings
- Typology E: High-volume Pedestrian Areas
- Typology F: Freeway Interchanges/ Highway Crossings

Signalized intersection

Typically major street at major street



COMMON CHALLENGES

- High vehicle speeds
- High vehicle volumes
- Free right-turn lanes
- Left-turn pedestrian conflicts
- Cars stop too close to the crosswalk

TOOLS

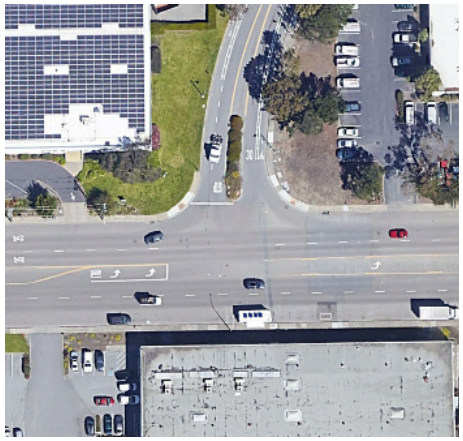
- Curb extensions
- No right on red
- Crosswalks and curb ramps
- Slip lane removal
- Leading pedestrian intervals
- Conflict markings
- Bicycle detection
- Signage and lighting
- Traffic circles

IDENTIFIED SPOT IMPROVEMENTS

- Chestnut Avenue/Grand Avenue
- Forbes Boulevard/Gull Drive
- Junipero Serra Boulevard/King Drive

Major street/minor street

Major street uncontrolled



COMMON CHALLENGES

- Failure to yield to pedestrians
- Unmarked crosswalks
- Lighting
- High vehicle speeds
- High vehicle volumes
- Long blocks without controlled crossings

TOOLS

- Curb extensions
- Signage and lighting
- Crosswalks and curb ramps
- Pedestrian crossing beacons
- Conflict markings and advance stop/ yield pavement markings
- Bicycle detection
- Traffic circles

IDENTIFIED SPOT IMPROVEMENTS

- Oyster Point Boulevard/Eccles Avenue
- S Airport Boulevard/Marco Way
- Utah Avenue/Harbor Way

Minor street/minor street

Controlled or uncontrolled intersection

COMMON CHALLENGES

- Failure to yield to pedestrians
- Unmarked crosswalks
- Parking too close to the corner (visibility)
- Incomplete stops (rolling stops)

TOOLS

- Curb extensions
- Signage and lighting
- Crosswalks and curb ramps
- Pedestrian crossing beacons
- Conflict markings and advance stop/ yield pavement markings
- Red curb

IDENTIFIED SPOT IMPROVEMENTS

- Miller Avenue / Holly Avenue
- Evergreen Drive / Baywood Avenue

Midblock crossings

Uncontrolled mid-block crossings and trail crossings

COMMON CHALLENGES

- Uncontrolled crossings
- Vehicles have priority
- Lack of driver awareness
- Unmarked crosswalks

TOOLS

- Curb extensions
- Signage and lighting
- Crosswalks and curb ramps
- Pedestrian crossing beacons
- Bicycle detection
- Wayfinding signs

IDENTIFIED SPOT IMPROVEMENTS

- S Airport Boulevard/N Access Road
- Spruce Avenue/Mayfair Way

High volume pedestrian areas

Schools, transit centers, and commercial centers

COMMON CHALLENGES

- Impatient and aggressive drivers
- Limited sidewalk space
- Competing curbside uses
- Limited pedestrian queuing space

TOOLS

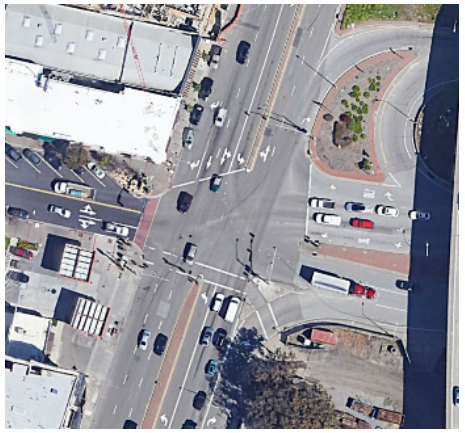
- Curb extensions
- Crossing guards or traffic control
- High-visibility crosswalks
- Leading pedestrian intervals
- Pedestrian-only signal phase
- Extended crossing time

IDENTIFIED SPOT IMPROVEMENTS

- Gellert Boulevard/Westborough Boulevard
- Crestwood Drive/Ferndale Avenue
- Evergreen Drive/Baywood Avenue

Freeway interchanges

Freeway interchanges, highway crossings, overpass connections



COMMON CHALLENGES

- High vehicle speeds
- High vehicle volumes
- Drivers not expecting pedestrians
- Missing sidewalks
- Unmarked crossings
- Lighting
- Limited alternative routes

TOOLS

- Marked crosswalks
- Signs
- Pavement markings
- Sidewalks
- Lighting
- Slip lane removal

IDENTIFIED SPOT IMPROVEMENTS

- Oyster Point Boulevard/Dubuque Avenue
- S Airport Boulevard/Wondercolor Lane
- Airport Boulevard/San Mateo Avenue

TABLE 9 *Pedestrian Spot Recommendations*

Intersection	Intersection Typology	Higher Priority Recommendations
Airport and Baden	B	
Airport and Gateway	See high priority recommendations	Upgrade existing crosswalks to high-visibility crosswalks. Construct median refuge islands at the west, east, and south approaches. Remove the slip lane from the southern approach.
Airport Blvd and San Mateo Ave	A/F	
Arroyo and Alta Loma	See high priority recommendations	Construct curb extensions on both sides of the crosswalk. Construct a median refuge island. Install an RRFB. Install a high visibility crosswalk across Alta Loma Drive.
BART Area Recommendations	See high priority recommendations	^ Mission and Lawndale/McLellan: Upgrade all crosswalks to high-visibility crosswalks. Construct curb extensions at all four corners. Provide leading pedestrian intervals for all crossings. Construct sidewalks on the west side of McLellan south of Mission Rd. ^ El Camino Real and McLellan: Upgrade all crosswalks to high-visibility crosswalks. Install a high-visibility crosswalk at the western ECR approach. Provide a leading pedestrian interval for the ECR crossings. Consider installing curb extensions at all four corners. Construct curb extensions. ^ El Camino Real and BART: Straighten the crosswalk across the northern approach. Upgrade both crosswalks to high-visibility crosswalks. Provide a leading pedestrian interval. ^ McLellan and BART: Upgrade existing crosswalks to high-visibility crosswalks. Install leading pedestrian intervals at all crossings. Build a curb extension at the eastern corners.
Chestnut and Commercial	See high priority recommendations	Upgrade all crosswalks to high-visibility. Remove the slip lane from the southeast corner and construct a curb extension; straighten both crosswalks from this corner.
Chestnut and Grand	A	
Chestnut and Hillside	A	
Chestnut and Mission	A	
Crestwood/Evergreen	C/E	
Crestwood/Ferndale	C/E	

Intersection	Intersection Typology	Higher Priority Recommendations
Crestwood/Gardenside	See high priority recommendations	Install a neighborhood traffic circle. Upgrade all crosswalks to high-visibility crosswalks.
E Grand and Poletti Way	See high priority recommendations	Mark crosswalks across E Grand Avenue and Industrial Way to enhance Caltrain and Grand Avenue access. Tighten corner radii to square-up intersection approaches. Provide the proposed trail with an enhanced crossing.
East Grand and Forbes	See high priority recommendations	Upgrade all crosswalks to high-visibility crosswalks. Install curb extensions at the northwest, northeast, and southeast corners. Install a curb extension at the southwest corner. Install pedestrian refuge islands across E Grand Avenue.
El Camino Real and Arroyo & Arroyo and Del Paso	See high priority recommendations	Remove the crosswalk at Del Paso Drive across Arroyo Drive; close gap in the median, and remove yield paddle. At ECR, upgrade all crosswalks to high visibility crosswalks. Provide a leading pedestrian interval for ECR crossings. Consider curb extensions at the northern and southeast corners.
El Camino Real and Kaiser	See high priority recommendations	Construct sidewalks on the south side of ECR from the bus stop to the bend in Del Paso Drive. Build sidewalk between ECR and Del Paso. At the Kaiser driveway, upgrade all crosswalks to high visibility crosswalks. Redesign the pedestrian refuge island in the western ECR crossing. Provide a leading pedestrian interval for the ECR crossing.
El Camino Real and Orange	See high priority recommendations	Straighten the southern crosswalk across ECR. Create pedestrian refuge islands for the ECR crossings. Upgrade all four crosswalks to high visibility crosswalks. Provide a leading pedestrian interval for the ECR crossing.
El Camino Real and Spruce	See high priority recommendations	Upgrade all four crosswalks to high-visibility crosswalks. Construct pedestrian refuge islands for the two ECR crossings. Provide a leading pedestrian interval for the ECR crossings. Consider curb extensions at all four corners.
El Camino Real and Ponderosa	See high priority recommendations	Construct sidewalks on the eastern side of ECR between Country Club Drive and Ponderosa. Upgrade all three marked crosswalks to high-visibility crosswalks. Provide a leading pedestrian interval for the ECR crossings. Construct median refuge islands for the ECR crossings.
Evergreen/Baywood	C/E	
Forbes and Eccles	A	
Forbes and Gull	A	

Intersection	Intersection Typology	Higher Priority Recommendations
Gellert and Westborough Square access	E	
Grand and Airport Blvd	See high priority recommendations	Remove free eastbound right turn lane. Upgrade two marked crossings to high-visibility. Consider a pedestrian-only signal phase. Construct a pedestrian refuge island at the Airport Boulevard approach.
Grand and Cypress	See high priority recommendations	Install advance yield markings and signs for the Grand Avenue crossings.
Grand and Gateway	See high priority recommendations	Upgrade all crosswalks to high-visibility crosswalks. Remove free right turn lanes at northwest and southeast corners. Install pedestrian refuge islands in all crossings. Install curb extensions at all four corners.
Grand and Linden	See high priority recommendations	Install advance stop markings at all approaches. Provide a leading pedestrian interval for all crossings.
Grand and Magnolia	A/E	
Grand and Maple	See high priority recommendations	Install advance stop markings at all approaches. Provide a leading pedestrian interval for all crossings.
Grand and Mission	See high priority recommendations	Upgrade both crosswalks to high-visibility crosswalks. Extend medians and create pedestrian refuge islands.
Grand and Orange	See high priority recommendations	Upgrade all crosswalks to high-visibility crosswalks. Consider installing curb extensions at all four corners. Provide a leading pedestrian interval for the crossings of Grand Avenue.
Grand and Roebling	B	
Grand and Walnut	See high priority recommendations	Install advance yield pavement markings and signs.
Grand and Willow	C	
Grand Avenue and E Grand Avenue	See high priority recommendations	Upgrade two existing crosswalks to high-visibility crosswalks. Remove the free right turn lane at the southeast corner. Install pedestrian refuge island in the E Grand Avenue crossing. Install curb extensions at the northeast, southwest, and southeast corners. Add a leading pedestrian interval for the E Grand Avenue crossing.
Grand mid-block crossings between Linden and Maple	See high priority recommendations	Install advance yield pavement markings and signs.

Intersection	Intersection Typology	Higher Priority Recommendations
Hickey and El Camino Real	See high priority recommendations	Upgrade all crosswalks to high-visibility crosswalks. Straighten the northern ECR crosswalk. Install a high-visibility crosswalk across the southern ECR approach (push back the northbound stop bar and median to create a straight crossing). Provide a leading pedestrian interval for the ECR crossings.
Hickey and Hilton	B	
Hillside and Arden	See high priority recommendations	Refresh the two existing high-visibility crosswalks. Construct curb extensions at the two eastern corners. Install advance stop/yield markings.
Hillside and Belmont	See high priority recommendations	Shift the crossing of Hillside Boulevard to the western approach to improve site lines. Install curb extensions at all three corners with a crosswalk. Install an RRFB for the Hillside crosswalk. Install advance yield markings.
Holly Ave and Westview	C	
Holly and Crestwood	See high priority recommendations	Upgrade all crossings to high-visibility crosswalks. Consider installing a neighborhood traffic circle.
Junipero Serra and Arroyo	See high priority recommendations	Construct sidewalks on the western (highway) side of Junipero Serra Boulevard to Arroyo Drive. Install a HAWK beacon at JSB/Arroyo Drive.
Junipero Serra and Avalon & Avalon and Valverde	See high priority recommendations	Mark high-visibility crosswalks across Valverde Drive. Construct sidewalks on the eastern (golf course) side of JSB to Avalon Drive. Mark a high-visibility crosswalk across the eastern approach of Avalon Drive at JSB.
Junipero Serra and Hickey	See high priority recommendations	Remove the free right turn lane at the southeast, southwest, and northwest corner. Upgrade all crosswalks to high visibility crosswalks. Provide leading pedestrian intervals for both crosswalks. Construct pedestrian refuge islands.
Junipero Serra and King	A	
Linden and 6th Ln	C	
Linden and Airport Blvd	A	
Linden and Armour	C/E	
Linden and California	C	
Linden and Commercial	C	
Linden and Lux	C	
Linden and Miller	C	

Intersection	Intersection Typology	Higher Priority Recommendations
Linden and N Canal	See high priority recommendations	Construct sidewalks on one or both sides of the Colma Creek bridge. Install appropriate curb ramps. Mark a crosswalk across S Canal street if sidewalks are present on the west side.
Linden and Tamarack	C	
Maple and School	C	
Miller and Holly	C/E	
Miller and Oakcrest	See high priority recommendations	Construct curb extensions at the southeast, southwest, and northwest corners. Install advance stop/yield pavement markings. Consider installing an RRFB.
Miller and Westview	See high priority recommendations	Construct curb extensions at the southeast, southwest, and northwest corners. Straighten the crosswalk across Miller. Install advance stop/yield pavement markings. Consider installing an RRFB.
Miller/Evergreen	C/E	
Miller/Ferndale	C/E	
Miller/Gardenside	C/E	
Mission and Sequoia	See high priority recommendations	Install a crosswalk on the northern approach. Upgrade all crosswalks to high-visibility crosswalks. Construct curb extensions.
Neighborhood Path	See high priority recommendations	Create a stair channel along the existing stairs to improve bicycle access. Remove the gate at Alta Loma/Cymbidium to open stair access to both neighborhoods. At ECR, upgrade crosswalk to high visibility and straighten the crosswalk. Provide a leading pedestrian interval.
Neighborhood Path	D	
Orange and A	C/E	
Orange and Baden	C	
Orange and Commercial	C	
Orange and Railroad	See high priority recommendations	Upgrade the transverse crosswalk across Railroad Avenue to high-visibility and construct a curb extension at the southeast corner.
Orange and Tennis Dr	See high priority recommendations	Construct curb extensions for the crossings of Orange Avenue and Tennis Drive. Install a high-visibility crosswalk across Tennis Drive.
Oyster Point and Airport	See high priority recommendations	Construct curb extensions at the north, west, and south corners. Upgrade two marked crosswalks to high-visibility crosswalks and realign to be straight. Implement a leading pedestrian interval for both crosswalks.

Intersection	Intersection Typology	Higher Priority Recommendations
Oyster Point and Dubuque	F	
Oyster Point and Eccles	B	
Oyster Point and Gateway	A/F	
Oyster Point and Gull	A	
S Airport and Marco	B	
S Airport and Utah	See high priority recommendations	Consistent with proposed Utah overcrossing of 101, install high visibility crosswalks at all four approaches. Provide a leading pedestrian interval.
S Airport and Wondercolor	F	
S Airport/N Access Rd	A/D	
School and Olive	C	
Spruce and Baden	A	
Spruce and Beech	C	
Spruce and Commercial	C	
Spruce and Grand	See high priority recommendations	Install yellow transverse markings around the decorative crosswalk. Upgrade three remaining crosswalks to high-visibility. Consider installing curb extensions at all corners.
Spruce and Hemlock	C	
Spruce and Hillside	See high priority recommendations	Construct curb extensions at the two northern and southeastern corners. Mark high-visibility crosswalks across Spruce Avenue and School Street.
Spruce and Huntington	A	
Spruce and Lux	C	
Spruce and Mayfair	B/D	
Spruce and Miller	A	
Spruce and N. Canal St	See high priority recommendations	Build curb extensions at the two northern corners. Straighten and upgrade all three marked crosswalks to high-visibility crosswalks.
Spruce and Park Way	See high priority recommendations	Upgrade the two existing crosswalks across Park Way to high-visibility crosswalks. Install high-visibility crosswalks across both Spruce approaches. Install advance stop markings. Paint/refresh red curb at all corners.

Intersection	Intersection Typology	Higher Priority Recommendations
Spruce and S Canal Way	See high priority recommendations	Straighten the crosswalk across S Canal Street. Upgrade both crosswalks to high-visibility crosswalks. Construct a curb extension at the southeast corner. Add trail wayfinding information. Consider leading pedestrian intervals for Spruce Avenue crossing.
Spruce and Tamarack	C	
Sunnyside/Holly	C	
Utah and Corey	B	
Utah and Harbor Way	B	
Utah Ave/San Mateo Ave	See high priority recommendations	Install a protected intersection with high visibility crosswalks.
Westborough and Callan	See high priority recommendations	Upgrade all four crosswalks to yellow high-visibility crosswalks. Construct pedestrian refuge islands on the Westborough and Callan crossings. Update/add school zone signs.
Westborough and Galway	See high priority recommendations	Upgrade all four crosswalks to yellow high-visibility crosswalks. Construct pedestrian refuge islands on the Westborough crossings. Construct curb ramps at all corners. Install curb extensions to tighten corner radii. Update/add school zone signs.
Westborough and Gellert	See high priority recommendations	Upgrade the three marked, and install on the fourth approach high-visibility crosswalks. Build out the necessary corners to straighten all crosswalks. Construct pedestrian refuge islands at all crosswalks. Provide a leading pedestrian interval for the northern Westborough crosswalk.
Westborough and Junipero Serra Blvd	See high priority recommendations	Construct sidewalks on the southern side of Westborough Boulevard through the interchange area to Junipero Serra. Install/upgrade high visibility crosswalks at all interchange crossing locations. Install with appropriate signs and pavement markings.
Westborough and Skyline		
Westborough/Chestnut and El Camino Real	See high priority recommendations	Upgrade all crosswalks to high-visibility crosswalks. Straighten the northern crosswalk across Chestnut. Provide a leading pedestrian interval for all crossings. Consider installing curb extensions at all corners. Extend all four medians to create pedestrian refuge islands.

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Appendix D: Funding Strategies

Funding Strategies

A variety of sources exist to fund bicycle and pedestrian infrastructure projects, programs, and studies. Local and regional funding sources that can be used for construction or maintenance of bicycle or pedestrian improvements, along with competitive grant programs, are described below.

Local and Regional Funding Sources

SOUTH SAN FRANCISCO TRANSPORTATION IMPACT FEE

The City of South San Francisco requires developers to pay a fair share of the cost of transportation improvements through a Citywide Transportation Impact Fee. Adopted in 2020 the citywide fee replaces the East of 101 and Bicycle and Pedestrian Impact Fees, and is intended to be used toward a range of multimodal transportation improvements in all areas of the city. These fees apply to all residential and non-residential development.

MEASURE A

The Pedestrian and Bicycle Program of Measure A provides funding to projects that improve bicycling and walking accessibility and safety in San Mateo County, helping to encourage more residents to participate in active transportation, and 3% of Measure A funds are dedicated to pedestrian and bicycle facilities. Funds are distributed through a competitive call for projects process; calls occur biennially.

Funds are programmed by the San Mateo County Transportation Authority (SMCTA).

MEASURE M

Passed in 2010, Measure M imposes an annual fee of $10 dollars on motor vehicles registered in San Mateo County for transportation-related traffic congestion and water pollution mitigation programs. Half of the funds are allocated to cities/County for local streets and roads. The other half is allocated for countywide programs, including safe routes to schools, transit, congestion management, and others.

Countywide funds are programmed by City/County Association of Governments of San Mateo County (C/CAG).

MEASURE W

San Mateo County voters passed Measure W in 2018, a half-cent sales tax for transportation in San Mateo County. Half of Measure W funds are administered by SamTrans for public transportation. The other half is managed by SMCTA. Of that 50%, 5% is allocated for bicycle and pedestrian projects. SMCTA is still finalizing project evaluation criteria for money that they allocate.

Funds are programmed by SamTrans and SMCTA.

TRANSPORTATION FUNDS FOR CLEAN AIR

Money in the Transportation Funds for Clean Air program, established by Assembly Bill 434, is generated by a $4 vehicle registration surcharge in the nine Bay Area counties. The funds may be used on projects that reduce vehicle emissions, including bicycle and pedestrian projects, and can also be used as a match for competitive state or federal programs.

Funds are programmed by the Bay Area Air Quality Management District (BAAQMD) and C/CAG.

BICYCLE FACILITIES GRANT PROGRAM

Throughout the nine-county Bay Area, the Bicycle Facilities Grant program strives to reduce emissions from on-road vehicles and improve air quality by helping residents and commuters shift modes to bicycling and walking as alternatives to driving for short distances and first-and-last mile trips. BAAQMD has grant programs that fund both on-street facilities and bicycle parking facilities.

Funds are programmed by the BAAQMD.

ONE BAY AREA GRANT

The program emphasizes funding for projects within Priority Development Areas in the region that are in-line with housing and land-use goals.

Funds are programmed by the Metropolitan Transportation Commission (MTC) and C/CAG.

TRANSPORTATION DEVELOPMENT ACT ARTICLE 3

Transportation Development Act Article 3 (TDA 3) provides funding annually for bicycle and pedestrian projects, and 2% of TDA funds collected within the county are used for TDA 3 projects. Metropolitan Transportation Commission policies require that all projects be reviewed by a BPAC or similar body before approval.

Funds are programmed by C/CAG.

REGIONAL MEASURE 3

Regional Measure 3 uses toll revenue from the Bay Area's seven state-owned toll bridges. The money from Regional Measure 3 funds a variety of highway and transit projects throughout the region.

Funds are programmed by MTC.

Competitive Grant Programs

CALIFORNIA ACTIVE TRANSPORTATION PROGRAM

California's Active Transportation Program (ATP) funds infrastructure and programmatic projects that support the program goals of shifting trips to walking and bicycling, reducing greenhouse gas emissions, and improving public health. Competitive application cycles occur every one to two years, typically in the spring or early summer. Eligible projects include the construction of bicycling and walking facilities, new or expanded programmatic activities, or projects that include a combination of infrastructure and non-infrastructure components. Typically, no local match is required, though extra points are awarded to applicants who do identify matching funds.

Funds are programmed by the California Transportation Commission (CTC).

SUSTAINABLE TRANSPORTATION PLANNING GRANTS

Caltrans Sustainable Transportation Planning Grants are available to communities for planning, study, and design work to identify and evaluate projects, including conducting outreach or implementing pilot projects. Communities are typically required to provide an 11.47% local match, but staff time or in-kind donations are eligible to be used for the match provided the required documentation is submitted.

Funds are programmed by Caltrans.

HIGHWAY SAFETY IMPROVEMENT PROGRAM

Caltrans offers Highway Safety Improvement Program (HSIP) grants every one to two years. Projects on any publicly owned road or active transportation facility are eligible, including bicycle and pedestrian improvements. HSIP focuses on projects that explicitly address documented safety challenges through proven countermeasures, are implementation-ready, and demonstrate cost-effectiveness.

Funds are programmed by Caltrans.

SOLUTIONS FOR CONGESTED CORRIDORS PROGRAM

Funded by SB1, the Congested Corridors Program strives to reduce congestion in highly-traveled and congested through performance improvements that balance transportation improvements, community impacts, and environmental benefits. This program can fund a wide array of improvements, including bicycle facilities and pedestrian facilities. Eligible projects must be detailed in an approved corridor-focused planning document. These projects must include aspects that benefit all modes of transportation using an array of strategies that can change travel behavior, dedicate right of way for bikes and transit, and reduce vehicle miles traveled.

Funds are programmed by the CTC.

OFFICE OF TRAFFIC SAFETY

Under the Fixing America's Surface Transportation (FAST) Act, 5% of Section 405 funds are dedicated to addressing non-motorized safety. These funds may be used for law enforcement training related to pedestrian and bicycle safety, enforcement campaigns, and public education and awareness campaigns.

Funds are programmed by the California Office of Traffic Safety.

RECREATIONAL TRAILS PROGRAM

The Recreational Trails Program helps provide recreational trails for both motorized and non-motorized trail use. Eligible products include trail maintenance and restoration, trailside and trailhead facilities, equipment for maintenance, new trail construction, and more.

Funds are programmed by the California Department of Parks and Recreation.

AFFORDABLE HOUSING AND SUSTAINABLE COMMUNITIES PROGRAM

The AHSC program funds land-use, housing, transportation, and land preservation projects that support infill and compact development that reduces greenhouse gas emissions. Projects must fall within one of three project area types: transit-oriented development, integrated connectivity project, or rural innovation project areas. Fundable activities include affordable housing developments, sustainable transportation infrastructure, transportation-related amenities, and program costs.

Funds are programmed by the Strategic Growth Council and implemented by the Department of Housing and Community Development.

CULTURAL, COMMUNITY, AND NATURAL RESOURCES GRANT PROGRAM – PROPOSITION 68

Proposition 68 authorizes the legislature to appropriate $40 million to the California Natural Resources Agency to protect, restore, and enhance California's cultural, community, and natural resources. One type of eligible project that this program can fund is projects that develop future recreational opportunities, including creation or expansion of trails for walking, bicycling, and/or equestrian activities and development or improvement of trailside and trailhead facilities, including visitor access to safe water supplies.

Funds are programmed by the California Natural Resources Agency.

URBAN GREENING GRANTS

Urban Greening Grants support the development of green infrastructure projects that reduce GHG emissions and provide multiple benefits. Projects must include one of three criteria, most relevantly: reduce commute vehicle miles travels by constructing bicycle paths, bicycle lanes, or pedestrian facilities that provide safe routes for travel between residences, workplaces, commercial centers, and schools. Eligible projects include green streets and alleyways and non-motorized urban trails that provide safe routes for travel between residences, workplaces, commercial centers, and schools.

Funds are programmed by the CA NRA.

Other State Funds

SENATE BILL 1: LOCAL PARTNERSHIP PROGRAM

This program provides local and regional agencies that have passed sales tax measures, developer fees, or other transportation-imposed fees to fund road maintenance and rehabilitation, sound walls, and other transportation improvement projects. Jurisdictions with these taxes or fees are then eligible for a formulaic annual distribution of no less than $100,000. These jurisdictions are also eligible for a competitive grant program. Local Partnership Program funds can be used for a wide variety of transportation purposes, including roadway rehabilitation and construction, transit capital and infrastructure, bicycle and pedestrian improvements, and green infrastructure.

Funds are programmed by CTC.

SENATE BILL 1: ROAD MAINTENANCE AND REHABILITATION PROGRAM

Senate Bill 1 created the Road Maintenance and Rehabilitation Program (RMRP) to address deferred maintenance on state highways and local road systems. Program funds can be spent on both design and construction efforts. On-street active transportation-related maintenance projects are eligible if program maintenance and other thresholds are met. Funds are allocated to eligible jurisdictions.

Funds are programmed by the State Controller's Office.