FINAL DRAFT • 02-01-19

City of Santa Rosa

Bicycle & Pedestrian MASTER PLAN

UPDATE 2018

ACKNOWLEDGEMENTS

City of Santa Rosa

Nancy Adams, Transportation Planner

Rob Sprinkle, Deputy Director of Traffic Engineering

Steve Brady, Senior Environmental Specialist

Jaime Smedes, Marketing & Outreach Coordinator

Santa Rosa City Council

Chris Coursey, Mayor

Chris Rogers, Vice Mayor

Julie Combs

Ernesto Olivares

John Sawyer

Tom Schwedhelm

Jack Tibbetts

Bicycle & Pedestrian Advisory Board

Beth Dadko, Chair

Shaun Ralston, Vice Chair

Adam Brown

Kim O. Badenfort

Christine Dektor

Mike Lopez

Doug McKenzie

Barbara Moulton

Jim Pedgrift

Community Advisory Board

Waterways Advisory Committee

Consultant Team

ALTA PLANNING + DESIGN

Hugh Louch, Principal

Jeff Knowles, Project Manager

Paul Klassen, Senior Engineering Associate

Emily Shandy, Senior Planner

Lisa Schroer, GIS Analyst

Ben Frazier, Planner

W-TRANS

Steve Weinberger, Principal

Mary Jo Young, Senior Engineer

Kevin Rangel, Assistant Engineer

FISHER TOWN DESIGN

Lois Fisher, President

TABLE OF CONTENTS

01
INTRODUCTION 4
- Why Develop a Master Plan?
- Purpose of the Plan
- Benefits of Bicycling and Walking
- Relationship to Other Documents
- Plan Organization
- Summary

02
VISION & GOALS 12
- Overview
- Vision
- Goals
- Policies and Actions

03
SANTA ROSA TODAY 22
- Local Context
- Equity
- Biking and Walking Today
- Safety
- User Experience and Perceived Comfort

04
OUTREACH 68
- Online Survey
- Online Mapping Tool
- City Website and Social Media
- Public Open Houses
- Stakeholder Interviews
- Pop Up Events
- Partner Agency Meetings

05
PROJECTS, PROGRAMS, & POLICIES 82
- Projects
- Citywide Projects
- Programs
- Policy Changes

06
IMPLEMENTATION PLAN 130
- Project Evaluation
- Funding Strategies
- Environmental Impact

Appendix A.
RECOMMENDATION TABLES 152

Appendix B.
BICYCLE AND PEDESTRIAN FACILITY GUIDELINES 175

01

INTRODUCTION

WHY DEVELOP A MASTER PLAN?

Santa Rosa is a vibrant city committed to improving the quality of life for residents and visitors by providing walking and bicycling as convenient, comfortable, and healthy modes of transportation and recreation. The largest city in Sonoma County, Santa Rosa is a gateway to the Redwood Empire and to Sonoma Valley wine country, drawing visitors from across the country and around the world.

The Bicycle and Pedestrian Master Plan is a critical tool for guiding city staff and the development community in building a balanced transportation system that is pedestrian and bicycle friendly and encourages residents to use these modes of transportation. The ultimate goal is a shift from driving single occupancy vehicles to more walking and bicycling as a normal part of daily life.

Purpose of the Plan

This Bicycle and Pedestrian Master Plan Update 2018 establishes a long term vision for improving walking and bicycling in Santa Rosa by updating the previous plan adopted by the City Council in 2010.

The Plan Update 2018 provides a strategy to develop a comprehensive bicycling and walking network to provide access to transit, schools, and downtown alongside support facilities like bicycle parking and pedestrian amenities. These network improvements are paired with education, encouragement, enforcement, and evaluation programs. This document also identifies a plan to implement these projects and programs through prioritization and phasing to ensure implementation is manageable and fundable. This Plan Update 2018 represents a long-term, aspirational vision for walking and bicycling in Santa Rosa, and recognizes that limited funding and resources will require phased implementation of the proposed improvements over many years.

The Plan Update 2018 process provided opportunities for elected and appointed members of the City's Boards, Commissions, and the public to participate in the development process of the Plan Update 2018 by evaluating, commenting, and suggesting ideas for walking and bicycling. Updates to the Plan are necessary as a progressive city is rarely static and the needs of a viable city are dynamic. Ideally, the Plan Update 2018 should be reviewed every two years to update maps, project lists, and priorities as facilities are completed and to keep pace with the development landscape.

BENEFITS OF BICYCLING AND WALKING

Public Health

In *A Portrait of Sonoma County* (2014), the Sonoma County Department of Health Services found the Sheppard neighborhood near downtown Santa Rosa to have one of the lowest life expectancies in the county at 76.6 years – nearly a decade less than Central Bennett Valley in eastern Santa Rosa, where the average life expectancy is 85.7 years. This wide variation between Census tracts in the same city suggests neighborhood amenities and characteristics can have a striking impact on health. Central Bennett Valley is adjacent to hundreds of acres of state parkland and includes Strawberry Park, with nearly six acres of open space and sports facilities. Sheppard is between two state highways and has only one acre of developed park within the neighborhood—and while the park provides walking areas, it lacks sports facilities or other active recreation opportunities. Among the 99 Sonoma County Census tracts evaluated, 13 of the bottom 20 are located in Santa Rosa.

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 six percent 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 key strategy to fight obesity and inactivity and has been shown to have substantial impacts on health with a relatively small public investment. *A Portrait of Sonoma County* identifies interventions that support safe walking, bicycling, and recreation opportunities as effective strategies to address public health concerns in the County and Santa Rosa, including a focus on sidewalks, street lights, and access to parks.

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 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.

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. 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.[1] 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.

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.

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.

1 Florida, Richard. Rise of the Creative Class: And How It's Transforming Work, Leisure, Community, and Everyday Life. New York, NY: Basic Books, 2004.

RELATIONSHIP TO OTHER DOCUMENTS

Santa Rosa's General Plan 2035 guides the physical development of the City and sets out a vision for Santa Rosa where:

> *Complete streets provide safe access for pedestrians, bicyclists, motorists, and transit users of all ages and abilities. Neighborhood-scale retail and service uses, schools, and recreational facilities are connected by bicycle and pedestrian paths and transportation management programs and bicycle/pedestrian improvements have reduced the number of single-occupancy cars on regional/arterial streets.*

The Bicycle and Pedestrian Master Plan Update 2018 helps the City realize this ambitious vision along with implementing goals, policies, and recommendations adopted through complementary City planning efforts such as the City's Creek Master Plan, Climate Action Plan, Downtown Station Area Specific Plan, North Santa Rosa Specific Plan, Roseland/Sebastopol Avenue Specific Plan, and corridor plans for Mendocino Avenue, Santa Rosa Avenue, and Sebastopol Avenue.

The Bicycle and Pedestrian Master Plan Update 2018 also helps the City do its part to achieve larger regional and state goals embraced in Sonoma County's General Plan 2040, Countywide Bicycle and Pedestrian Master Plan, Plan Bay Area 2040, Caltrans District 4 Bicycle Plan, and Toward an Active California: State Bicycle and Pedestrian Plan.

This Plan Update 2018 will help Santa Rosa continue to meet the following goals.

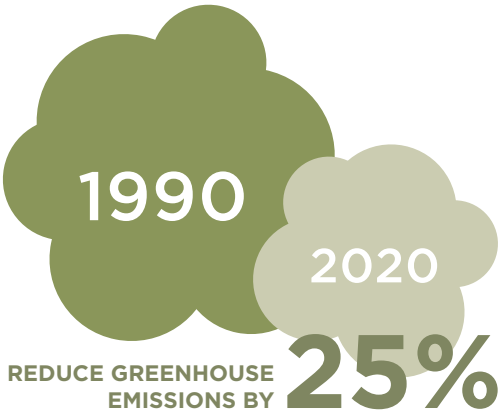
Santa Rosa

GENERAL PLAN 2035

- Provide attractive and safe streets for pedestrians and bicyclists
- Develop a citywide system of designated bikeways that serves both experienced and casual bicyclists, and which maximizes bicycle use for commuting, recreation, and local transport
- Develop a safe, convenient, and continuous network of pedestrian sidewalks and pathways that link neighborhoods with schools, parks, shopping areas, and employment centers
- Reduce traffic volumes and speeds in neighborhoods

CLIMATE ACTION PLAN

- Reduce greenhouse gas emissions by 25% below 1990 levels by 2020



Sonoma County

GENERAL PLAN 2040

- Reduce Sonoma County's greenhouse gas emissions by achieving a non-motorized trips mode share of five percent for all trips and ten percent for trips under five miles long by 2020

COUNTYWIDE BICYCLE AND PEDESTRIAN PLAN

- Develop and maintain a comprehensive countywide bicycle and pedestrian transportation system, which includes projects, programs, and policies that work together to provide safe and efficient transportation opportunities for bicyclists and pedestrians

COMPREHENSIVE TRANSPORTATION PLAN

- Shift transportation mode four percent from single occupant vehicle trips to bicycle and pedestrian trips due to changing attitudes, improved safety, improved non-auto infrastructure, pedestrian/bike/transit friendly land use changes

California

TOWARD AN ACTIVE CALIFORNIA: STATE BICYCLE AND PEDESTRIAN PLAN

- Triple bicycling trips and double walking and transit trips statewide by 2020 (relative to 2010).

PLAN UPDATE 2018 ORGANIZATION

CHAPTER 01: Introduction
outlines the Plan Update 2018's purpose and explains its place in the context of other planning efforts and initiatives.

CHAPTER 02: Vision & Goals
captures the vision and policy framework for Santa Rosa's Bicycle and Pedestrian Plan Update 2018. The chapter includes performance metrics because what fails to be measured fails to get done.

CHAPTER 03: Santa Rosa Today
provides an inventory of present-day walking and bicycling in Santa Rosa, including physical conditions of facilities as well as education, enforcement, and encouragement programs.

CHAPTER 04: Outreach
chronicles how stakeholders, businesses, and thousands of community members shaped the Plan Update 2018 through a comprehensive engagement process.

CHAPTER 05: Projects, Programs & Policies
describes and maps the specific projects, programs, and policy changes recommended to meet the active transportation needs of Santa Rosa's residents and visitors.

CHAPTER 06: Implementation Plan
presents a strategy to evaluate and prioritize projects and provides details on funding opportunities to advance the Plan Update 2018 through phased implementation.

APPENDIX A: Recommendation Tables

APPENDIX B: Bicycle and Pedestrian Facility Guidelines

SUMMARY

Santa Rosa is well poised to increase walking and bicycling for transportation. It has a mild climate most of the year, is relatively flat, and has a large network of existing sidewalks and growing network of on-street bikeways and off-street shared- use paths. The City has installed bicycle parking in much of the downtown and transit services connect destinations in the region and beyond.

These investments and natural assets provide a foundation upon which the City can continue to build a high-quality citywide network for bicycling and walking—one that is accessible and comfortable for everyday use by residents and visitors of all ages and abilities.

02

VISION & GOALS

OVERVIEW

The goals of the Plan Update 2018 reflect the priorities expressed by the community throughout the public outreach phase of this Plan Update 2018. Discussions with City departments, best practices across the nation, and input from community stakeholders have shaped the proposed strategies and policies intended to help the City achieve these goals.

All of the following goals, strategies, and policies support the larger citywide "Complete Streets" policy, which instructs staff to consider the needs of all modes of travel when developing any transportation facility. The goals, strategies, and policies are designed to guide the work of City staff and elected officials, partner agencies, and private developers to improve the livability, economic vitality, and non-motorized accessibility for residents and visitors throughout Santa Rosa. Reducing the amount of driving and automobile ownership is an overarching vision embodied in the Plan Update 2018.

The Plan Update 2018 is organized around a vision statement, three overarching goals tied to relevant performance measures, and a series of specific policies and actions.

BICYCLE AND WALK FRIENDLY COMMUNITY DESIGNATION

Santa Rosa is currently recognized as a Bicycle Friendly Community at the Bronze level by the League of American Bicyclists. This voluntary assessment and award program evaluates communities on ten criteria that they believe affect three key outcomes: ridership, crashes, and fatalities. These goals, policies, and actions are designed specifically to help elevate the city to a Silver or higher designation (Gold, Platinum, and Diamond) in the near future. Santa Rosa is not currently recognized as a Walk Friendly Community by the UNC Highway Safety Research Center. Taking the actions listed in this chapter can position the City for recognition through this national program as well.

GLOSSARY OF TERMS

VISION
A strong statement that serves as an aspirational guide

GOALS
Broad, long-range targets for making the vision a reality

PERFORMANCE MEASURES
How we mark progress in meeting the goals and policies

POLICIES
What we want to achieve in terms of outcomes

ACTIONS
Specific strategies for how to achieve the goals and policies

VISION

Santa Rosa is a community where walking and bicycling are comfortable, convenient, and common for people of all ages and abilities.

GOALS

GOAL 1

Increase Access and Comfort

Design bicycle and pedestrian facilities that are accessible and comfortable for people of all ages and abilities to use.

PERFORMANCE MEASURES:

- Increase the share of people walking and bicycling to work to five percent by 2025 and ten percent by 2040.
- Increase the share of students walking or bicycling to school to ten percent by 2025 and 20% by 2040.
- Reduce the number of severe and fatal collisions to zero by 2040.[1]
- Reduce the percent of arterial streets that are Level of Traffic Stress (LTS) 4 from 57% to 40% by 2040 (see Chapter 3 for information about LTS).
- Complete Short Term projects recommended in this Plan Update 2018 by 2030 and High Priority projects by 2040.

1 There are many factors that contribute to severe and fatal collisions that are not within the control of the City. This measure recognizes that the City will continue to monitor severe and fatal collisions, respond if necessary with appropriate solutions when these collisions occur, and act proactively to create an environment where the safety of the most vulnerable road users is prioritized.

GOAL 2

Maintain and Expand the Network

Identify, develop, and maintain a complete and convenient bicycle and pedestrian network.

PERFORMANCE MEASURES:

- Complete Studies recommended in this Plan Update 2018 by 2040.
- Double the number of short-term and secure long-term bicycle parking locations by 2040.
- Maintain adequate pavement quality, striping, and sign visibility and signal/beacon functionality on all bicycle and pedestrian facilities.
- Start tracking and begin publishing annual bicycle and pedestrian counts by 2021.

GOAL 3

Support a Culture of Walking and Biking

Increase awareness and support of bicycling and walking through programs and citywide initiatives.

PERFORMANCE MEASURES:

- Increase the share of people walking and bicycling to work to five percent by 2025 and ten percent by 2040.
- Increase the share of students walking or bicycling to school to ten percent by 2025 and 20% by 2040.
- Increase the number of Bicycle Friendly Businesses to include all of the top ten largest employers in Santa Rosa by 2025.

Sutter Health
Sutter Santa Rosa Regional Hospital
We Plus You

BICYCLE FRIENDLY BUSINESS
BRONZE
THE LEAGUE OF AMERICAN BICYCLISTS

THE LEAGUE OF BICYCLE FRIENDLY AMERICA
BICYCLE FRIENDLY BUSINESS

Sutter Santa Rosa Regional Hospital was recognized with Bronze-level Bicycle Friendly Business award by the League of American Bicyclists in 2018.

Sutter is the first business in Sonoma County to be awarded a Bicycle Friendly Business award and joins over 1,250 local businesses, government agencies, and Fortune 500 companies across the United States that are transforming the American workplace.

POLICIES AND ACTIONS

Planning

Policy 1: *Integrate bicycle and pedestrian network and facility needs into all city planning documents and capital improvement projects.*

- ***Action 1.1:*** Review the City's Capital Improvement Program (CIP) list on an annual basis to ensure that recommended projects from this Plan Update 2018 are incorporated at the earliest possible stage of both new capital projects and maintenance of existing facilities.
- ***Action 1.2:*** Follow a multi-disciplinary project scoping process that incorporates the needs of all modes and stakeholders, both internal and external. The design process should include the City divisions, departments, and staff responsible for emergency response, parking, law enforcement, maintenance, and other affected areas.
- ***Action 1.3:*** Utilize the Regional Complete Streets (Routine Accommodation) Checklist to assure consideration of pedestrian and bicycle facility needs in City transportation projects and roadway improvements.
- ***Action 1.4:*** Evaluate all streets during pavement resurfacing to determine if bicycle facilities can be provided (e.g. bike lanes, wider curb lanes or shoulders) when the striping is reapplied.
- ***Action 1.5:*** Ensure that all traffic impact studies, analyses of proposed street changes, and development projects address impacts on bicycling and walking facilities. Specifically, the following should be considered:
  - » Consistency with General Plan, Area Plan, and Bicycle and Pedestrian Master Plan Update 2018 policies and recommendations
  - » Impact on the existing bikeway and pedestrian network
  - » Degree to which bicycle and walking travel patterns are altered or restricted by the projects
  - » Safety of future bicycle and pedestrian operations (based on conformity to Plan Update 2018 Bicycle and Pedestrian Facility Guidelines and City, State, and Federal design standards)
- ***Action 1.6:*** Require new development, or reconstruction if applicable, to address the pedestrian and bicycle circulation element based on the above considerations.
- ***Action 1.7:*** Conduct regular pedestrian and bicycle counts pursuant to regional methodology as part of before and after project implementation.
- ***Action 1.8:*** Continue to implement the City's Bicycle and Pedestrian Facility Guidelines for all new development projects to support integration of transportation into land use planning decisions.

Policy 2: *Coordinate with other agencies and stakeholders to incorporate Santa Rosa Bicycle and Pedestrian Plan Update 2018 elements.*

- ***Action 2.1:*** Work with adjacent governmental entities, public service companies, coordinating agencies, transit agencies, and the Santa Rosa Junior College to ensure that Plan Update 2018 recommendations are incorporated into their planning and areas of responsibility, and vice versa.
- ***Action 2.2:*** Work with transit providers to improve bicycle and pedestrian access (first/last mile connections) to transit stations and the comfort of transit stops and onboard transit vehicles, especially during peak commute hours, and to provide secure bike parking, benches, and covered waiting areas at stations and stops.
- ***Action 2.3:*** Establish an ad-hoc Bicycle and Pedestrian Advisory Board Sub-Committee to monitor the launch of the one-year bikeshare pilot program funded by MTC. The Sub-Committee may evaluate the program and report to City Council the successes and opportunities to expand the program to other areas of the city. A bikeshare business plan may be needed as a next step.

Design

Policy 3: *Design a Low Stress Bikeway Network suitable for the "Interested but Concerned," to include people of all ages and ability levels riding bicycles.*

- ***Action 3.1:*** Design a network of continuous Low Stress Bikeways as identified in this Plan Update 2018. Projects that improve comfort at intersections and along corridors with high stress should be prioritized.
- ***Action 3.2:*** Utilize the bicycle and pedestrian facility guidelines in this Plan Update 2018, guidance from North American City Transportation Officials (NACTO), and most recent State and Federal design standards and guidelines to develop plans for on-street bicycle facilities along corridors and at intersections.
- ***Action 3.3:*** Follow a multi-disciplinary design process that incorporates and balances the needs of all modes and stakeholders, both internal and external; the design process should include the City divisions, departments, and staff responsible for emergency response, parking, law enforcement, maintenance, and other affected areas as well as other responsible external stakeholder agencies.
- ***Action 3.4:*** Continue to install bicycle-sensitive loop detectors at all signalized intersections with accurately-placed pavement markings placed such that the bicycle detection symbol is off-center of the travel lane and not on the right edge of the travel lane. Consider benefits and costs of infrared, video, and microwave detection.

Policy 4: *Design a connected, convenient, and comfortable pedestrian network to serve people of all ages and abilities.*

- ***Action 4.1:*** Include sidewalks on all new or retrofitted roadways.
- ***Action 4.2:*** Identify and construct sidewalks in areas where they are incomplete.
- ***Action 4.3:*** Continue to enforce the sidewalk maintenance program to ensure that adjacent property owners maintain the sidewalk properly.
- ***Action 4.4:*** Plan and develop well-connected streets, sidewalks, and pathways that provide the most direct paths of travel for pedestrians. Provide connections between or through cul-de-sacs and remove barriers to walking where feasible.
- ***Action 4.5:*** Continue to install lead pedestrian interval phases in traffic signal timing in the urban core and outside the urban core, as warranted, to encourage walking and facilitate crossing busy regional or high-volume transitional streets.
- ***Action 4.6:*** Review signal locations on an annual basis to identify and adjust for increased pedestrian clearance time where needed.
- ***Action 4.7:*** Routinely evaluate locations for enhancing crosswalks.

Policy 5: *Design accessible, comfortable, and continuous off-street paths that contribute to the framework of Santa Rosa's active transportation network.*

- ***Action 5.1:*** Utilize the bicycle and pedestrian facility guidelines in this Plan Update 2018 and most recent State and Federal design standards and guidelines to develop plans for ADA-compliant off-street trails (Class I shared-use paths).
- ***Action 5.2:*** Utilize Crime Prevention Through Environmental Design (CPTED) principles in the design of trails.[1]
- ***Action 5.3:*** Identify opportunities for trailhead enhancements to include gateway treatments, public art, wayfinding, and placemaking.

Policy 6: *Develop an easy to read, unified, and comprehensive wayfinding system for bicyclists, pedestrians, and trail users.*

- ***Action 6.1:*** Pursue grant funding to develop a consistent citywide wayfinding program and replace all prior wayfinding signs.

1 CPTED is a multidisciplinary approach to reducing criminal behavior that includes designing public spaces and pathways to promote visibility, reduce or eliminate hiding places, and promote desired activity and natural surveillance, among other tools.

Funding

Policy 7: *Leverage existing funding to maximize project delivery.*

- ***Action 7.1:*** Utilizing funds as a local match, aggressively pursue funding from available grant sources.
- ***Action 7.2:*** Actively develop projects from the Plan Update 2018 to position the City to best compete for grant funding.
- ***Action 7.3:*** Follow the Plan Update 2018's prioritization recommendations, which include equity and other funding-agency-determined factors in scoring.
- ***Action 7.4:*** Seek to submit grant applications for projects that most competitively match with funding agency criteria.

Policy 8: *Continue and enhance the City's annual commitment of local funds for bicycle and pedestrian project implementation.*

- ***Action 8.1:*** Continue preparing an annual Work Plan including the status of pedestrian and bicycle projects in this Plan Update 2018 that have been completed, are in progress, and are proposed for the budget year showing scope, schedule, and budget by fund source.
- ***Action 8.2:*** Through the CIP process, assess and prepare for upcoming staffing, consultant, and capital funding needs as projects arise.[2]

2 The average Bronze Bicycle Friendly Community invests nine percent of its transportation budget in bicycle projects annually.

Project Delivery

Policy 9: *Construct projects within the Plan Update 2018 utilizing all available internal and external resources.*

- ***Action 9.1:*** If additional internal support is required, establish a full-time pedestrian and bicycle coordinator position to assist in the planning and implementation of bicycle and pedestrian projects and programs.
- ***Action 9.2:*** Continue to support a representative Bicycle and Pedestrian Advisory Board to assist City staff in the planning, design, and implementation of projects that positively impact bicycle and pedestrian travel and safety.

Policy 10: *Ensure that bicyclists and pedestrians have accommodation in work zones.*

- ***Action 10.1:*** Incorporate routine accommodation for pedestrian and bicycle facilities when developing priority lists for overlay and construction projects, maintenance, and in the City's guidelines.

Operations & Maintenance

Policy 11: *Maintain designated facilities to be comfortable and free of hazards to bicycling and walking.*

- ***Action 11.1:*** Sweep streets regularly, with priority given to those with higher pedestrian and bicycle traffic.
- ***Action 11.2:*** Trim overhanging and encroaching vegetation to maintain a clear path of travel along pedestrian and bicycle facilities.
- ***Action 11.3:*** Develop and implement an appropriate minimum paving surface standard for bicycle boulevards and other low stress bikeways.
- ***Action 11.4:*** Update repaving project selection methodology to prioritize bicycle boulevards and other low stress bikeways to ensure that the minimum paving surface standard is maintained.
- ***Action 11.5:*** Incorporate maintenance needs into design of separated bikeways to ensure proper maintenance after construction.
- ***Action 11.6:*** Work with homelessness navigation centers, the Police Department, and the Department of Housing and Community Services to provide services to unhoused residents encamped on trails.

Policy 12: *Maintain bicycle parking.*

- ***Action 12.1:*** Develop a procedure for inspection and prompt replacement of damaged bicycle racks.
- ***Action 12.2:*** Remove abandoned bicycles from bicycle racks and donate to local non-profit community bicycle shops for use in youth education programs.
- ***Action 12.3:*** Encourage event organizers to provide and publicize valet bicycle parking. Amend Santa Rosa event permitting process to require secure valet bicycle parking at events over a certain size.

Programs

Policy 13: *Educate pedestrians, bicyclists, motorists, and the public about roadway safety and the benefits of bicycling and walking.*

- ***Action 13.1:*** Develop a comprehensive Vision Zero strategy that outlines engineering, enforcement, education and encouragement actions.
- ***Action 13.2:*** Support the continuation and expansion of bicycle safety education programs such as those taught by Sonoma County Bicycle Coalition.

Policy 14: *Encourage Santa Rosa Public Schools to participate in the Safe Routes to School program.*

- ***Action 14.1:*** Continue to support walk audits at Santa Rosa public schools and utilize improvement plans to pursue grant funding for implementation.
- ***Action 14.2:*** Continue City staff participation in countywide Safe Routes to School task forces.

Policy 15: *Support police enforcement activities targeted at both bicyclists and motorists that educate and reinforce proper and safe behaviors.*

- ***Action 15.1:*** Establish a bicycle ticket diversion program per the Bicycle Traffic School bill (AB 902) that allows bicyclists who are ticketed for certain infractions to attend a class on safe bicycle riding to reduce or eliminate their fines.
- ***Action 15.2:*** Focus data-driven enforcement efforts on behaviors with greatest crash risk and/or injury severity such as vehicle speeding or bicyclist wrong-way riding.

Policy 16: *Increase bicycling and walking through targeted marketing and promotion.*

- ***Action 16.1:*** Provide current and easily accessible information about the Santa Rosa bicycle network, bicycle programs, and bicycle parking. This includes distribution of online bicycle maps, maintaining up-to-date City web pages, and providing opportunities for continued public feedback.
- ***Action 16.2:*** Encourage major employers to continue, develop, or expand bicycle promotion programs for their employees and recognize those companies designated a Bicycle Friendly Business by the League of American Bicyclists
- ***Action 16.3:*** Encourage the use of bicycles for City employee commute and work travel purposes so that the City is seen as a model employer.
- ***Action 16.4:*** Continue to sponsor the annual Bicycle and Walk to Work Week in May to receive input on the pedestrian and bicycle program as well as to educate the public as to the benefits of walking and bicycling and the Transportation Demand Management program.
- ***Action 16.5:*** Continue to offer and expand, if possible, the City's Free Ride Program.

Evaluation

Policy 17: *Measure bicycling and walking activity through an annual count program.*

- ***Action 17.1:*** Establish an annual count program at key locations around the city.
- ***Action 17.2:*** Make the data publicly available on an on-going or at least annual basis.

Policy 18: *Report annually on the implementation of this Plan Update 2018.*

- Action 18.1: Prepare and present a report to the Bicycle and Pedestrian Advisory Board describing the progress in:
  - » Achieving the three Goals of the Plan Update 2018 in terms of their specific performance measures
  - » Implementing the Policies and Actions of this Plan Update 2018

03

SANTA ROSA TODAY

This chapter describes the active transportation landscape in Santa Rosa, including a discussion of related themes that inform the recommended infrastructure projects, programs, and policies in the community.

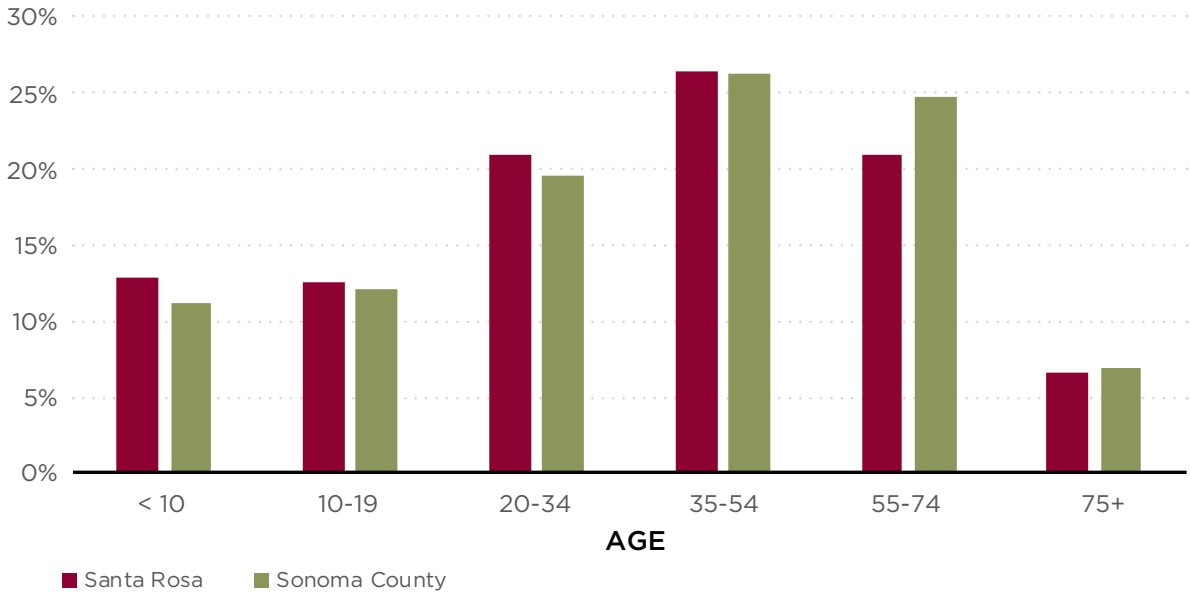
Local Context

DEMOGRAPHICS

Santa Rosa is home to 173,165 residents, according to 2016 American Community Survey five-year estimates. This represents more than one third of the Sonoma County population of 497,776. When compared to the county population, Santa Rosa is slightly younger, with more residents under 10 years old and between 20-34 years old, as shown in Figure 3-1.

Santa Rosa families participate in a Kidical Mass ride

Figure 3-1: Population by Age in Santa Rosa and Sonoma County



LAND USE & MAJOR DESTINATIONS

This Plan Update 2018 will support Santa Rosa's Priority Development Areas (PDAs), the areas where the City plans to focus development in denser, mixed-use areas along transit routes shown in Figure 3-2. In conjunction with this development and transit service, high-quality bicycling and walking infrastructure within PDAs is intended to offer improved alternatives to driving. The existing and planned land uses in Santa Rosa will inform the recommendations in this Plan Update 2018 in an effort to maximize the number of people who will have access to walking and bicycling networks.

Major destinations in Santa Rosa include schools, parks, healthcare facilities, shopping centers, city hall, county administration, and transit stations, mapped in Figure 3-3. These destinations are dispersed throughout the four quadrants of the city, and will require a comprehensive network of active transportation facilities to allow people to walk or bicycle instead of driving. Employment density is highest in the downtown area and in northern Santa Rosa along Highway 101 where Kaiser Permanente Medical Center and several federal and county offices are located.

TRANSIT ACCESS

Santa Rosa is served by several transit providers and routes that offer connections to local and regional destinations. Santa Rosa CityBus and Sonoma County Transit both offer local bus service, and two Sonoma-Marin Area Rail Transit (SMART) stations have service to the Sonoma County Airport as well as Rohnert Park, Petaluma, Cotati, Novato, and San Rafael. Future stations are planned for Larkspur, Windsor, Healdsburg, and Cloverdale. Golden Gate Transit also offers bus service between Santa Rosa and San Francisco. See Figure 3-4 for a map of frequently used transit routes in the city.

Many bicyclists use transit for a portion of their trip, making bicycling access to transit stops and stations an important part of the active transportation network. Between 2013 and 2018, approximately 30,000 bicycles were brought on CityBus trips each year. From August 2017 to August 2018, SMART carried nearly 723,000 passengers and nearly 65,500 bicycles. This means approximately one in nine passengers brought a bicycle aboard.

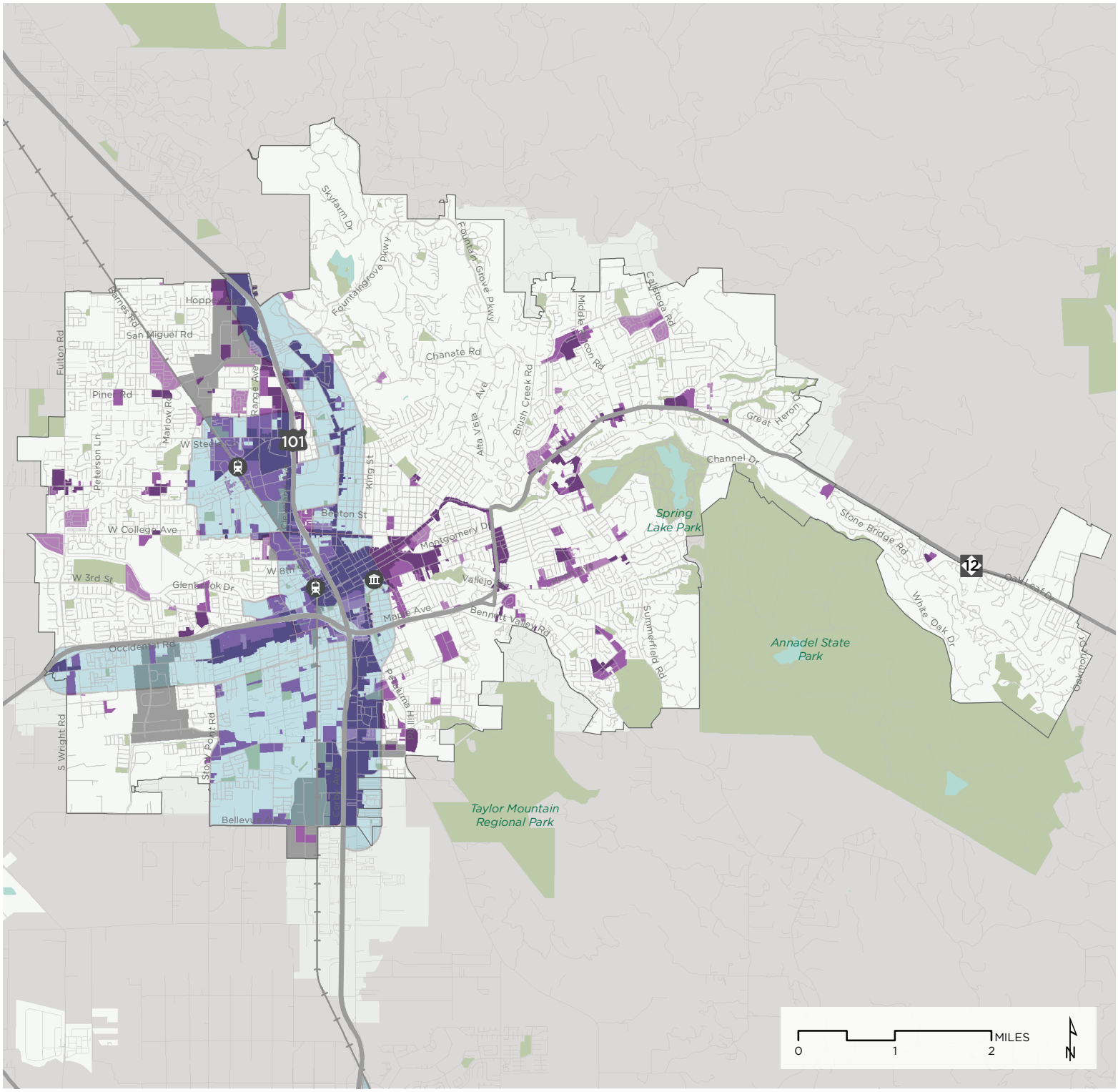


Figure 3-2

PRIORITY DEVELOPMENT AREAS

Priority Development Area

LAND USE INTENSITY

- Low Density
- Medium Density
- High Density
- Commercial + High Mix Use
- Industrial

DESTINATIONS + BOUNDARIES

- City Hall
- SMART Station
- Park
- Current City Limts
- Urban Growth Boundary

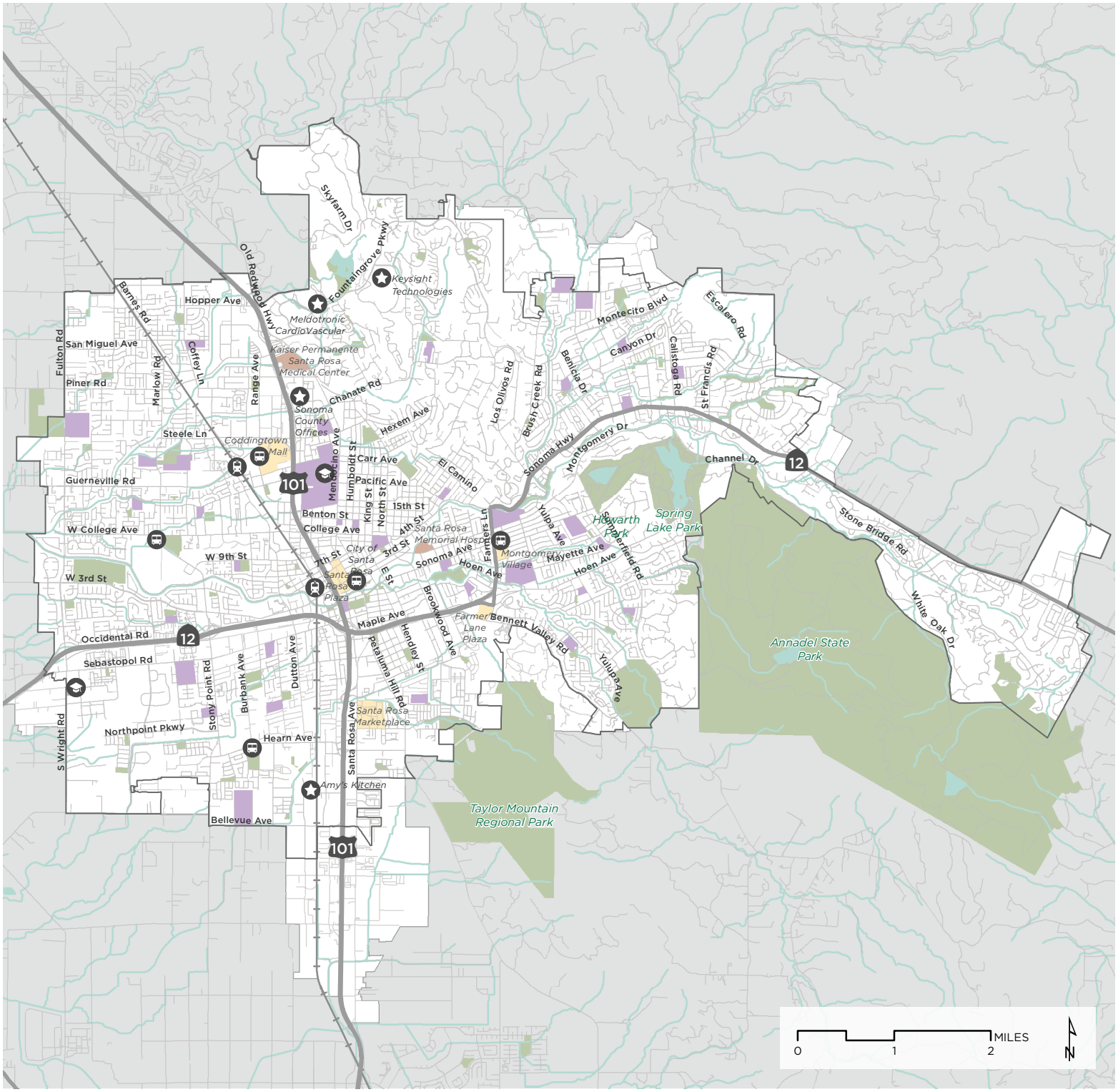


Figure 3-3

MAJOR DESTINATIONS

DESTINATIONS + BOUNDARIES

- Santa Rosa Junior College
- Major Employer
- Transit Station
- SMART Station
- City Limts
- Hospital
- Shopping Center
- School
- Park
- Urban Growth Boundary

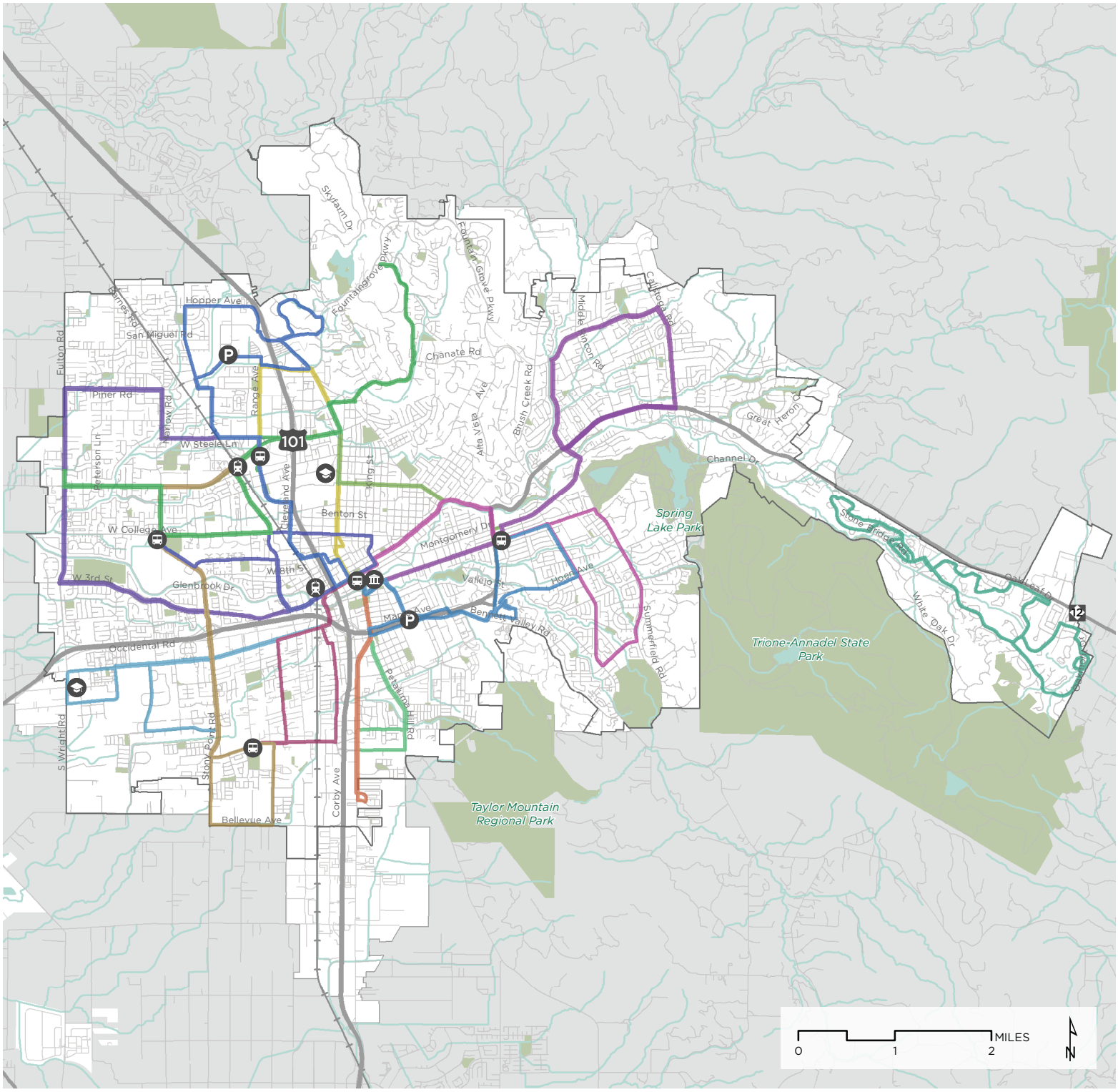


Figure 3-4

TRANSIT CONNECTIONS

CONNECTIONS + SUPPORT FACILITIES

- SMART Station
- Park and Ride
- Transfer Station

CITYBUS ROUTES

- 1
- 2, 2B
- 3
- 4, 4B
- 5
- 6
- 7
- 8
- 9, 9E
- 10, 10W
- 12
- 15
- 16
- 18
- 19

DESTINATIONS + BOUNDARIES

- City Hall
- Santa Rosa Junior College
- Park
- Current City Limts
- Urban Growth Boundary

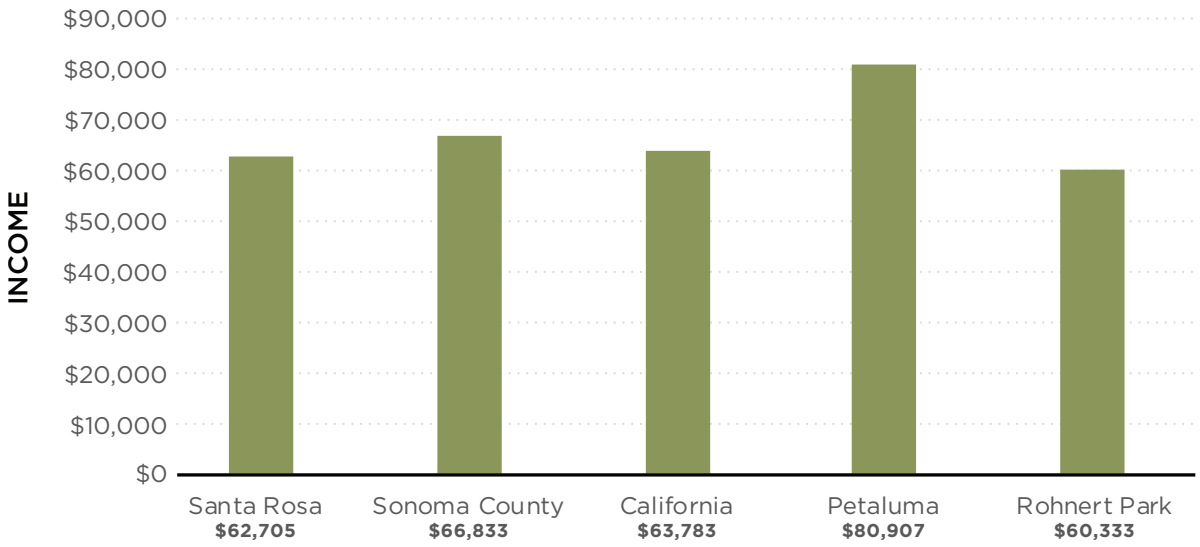
EQUITY

Equity issues are an important part of all planning processes, including development of this Plan Update 2018. Historically, communities with large populations of people of non-white races or ethnicities and low income households have received less investment from their local governments, including an uneven spatial distribution of facilities and safety improvements for people walking and bicycling. A review of citywide factors related to walking, bicycling, and equity identified neighborhoods that are disproportionately burdened by pollution or other negative impacts. These and other considerations informed the projects and prioritization recommended in this Plan Update 2018.

Income and Vehicle Access

While Sonoma County has a higher median household income at $66,833 than the state of California at $63,783, Santa Rosa is slightly less affluent than both the county and state with a median household income of $62,705. Median income varies widely between cities in Sonoma County, as shown in Figure 3-5. The other two large cities—Rohnert Park and Petaluma—have median household incomes of $60,333 and $80,907 respectively. All median income figures are from the American Community Survey 2016 5-year estimates.

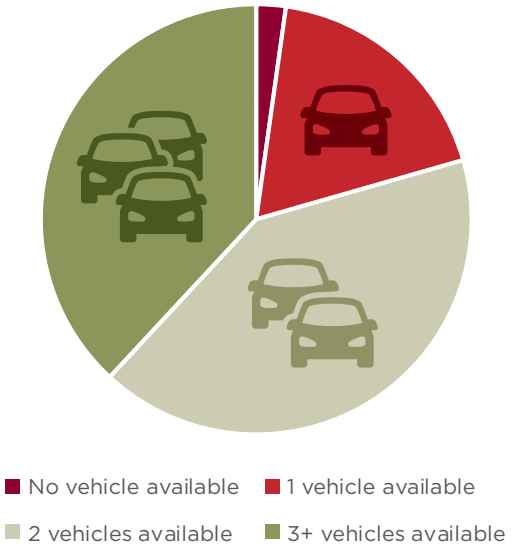
Figure 3-5: Median Household Income



Just two percent of households in Santa Rosa lack access to a vehicle, as shown in Figure 3-6. Nearly 80% of households have access to two or more vehicles. These rates are nearly identical to countywide vehicle access.

With such widespread vehicle access, few households rely on walking or bicycling out of necessity. To create significant shifts in trips away from driving, walking and bicycling must be convenient and comfortable options to attract more people.

Figure 3-6: Vehicles Available



Communities of Concern

As part of the San Francisco Bay Area's long-range integrated transportation and land use/housing strategy, *Plan Bay Area*, the Association of Bay Area Governments (ABAG), and the Metropolitan Transportation Commission (MTC) analyzed the distribution of benefits and burdens that would result from implementation of the region's preferred planning scenario. To conduct this analysis, ABAG and MTC, along with extensive input from an Equity Working Group and other stakeholders, identified "Communities of Concern" throughout the Bay Area region that meet at least four thresholds listed in Table 3-1.

In the City of Santa Rosa, the three Communities of Concern include the Roseland neighborhood southwest of the Highway 101 and SR 12 interchange, an area north of College Avenue and west of Highway 101, and the downtown area east of Highway 101 between College Avenue and Sonoma Avenue. See Figure 3-7 for a map of Communities of Concern. The walking and bicycling improvements recommended in this Plan Update 2018 will consider the benefits and burdens of those projects on these communities.

Table 3-1: Community of Concern Factors and Thresholds

FACTOR	% OF REGIONAL POP.	COMMUNITY OF CONCERN THRESHOLD
Minority Population	54%	70%
Low Income (<200% of poverty) Population	23%	30%
Limited English Proficiency Population	9%	20%
Zero-Vehicle Households	9%	10%
Seniors 75 and Older	6%	10%
Population with a Disability	18%	25%
Single-Parent Families	14%	20%
Cost-Burdened Renters	10%	15%

Source: Appendix A: Detailed Methodology, Plan Bay Area (2013). planbayarea.org/pdf/Draft_Plan_Bay_Area/Appendices_to_Draft_Equity_Analysis_Report.pdf

CalEnviroScreen

The California Office of Environmental Health Hazard Assessment developed the CalEnviroScreen tool to help identify communities that are disproportionately burdened by multiple sources of pollution. It combines pollution data (such as ozone concentrations and drinking water contaminants) with population indicators (such as birth weight and educational attainment).

This is also a tool used in California's Active Transportation Program grant application scoring. Communities that score in the most burdened 25% of the state are considered to be disadvantaged and receive a small advantage in the competitive funding process. Areas in Santa Rosa that meet this threshold are mapped in Figure 3-8.

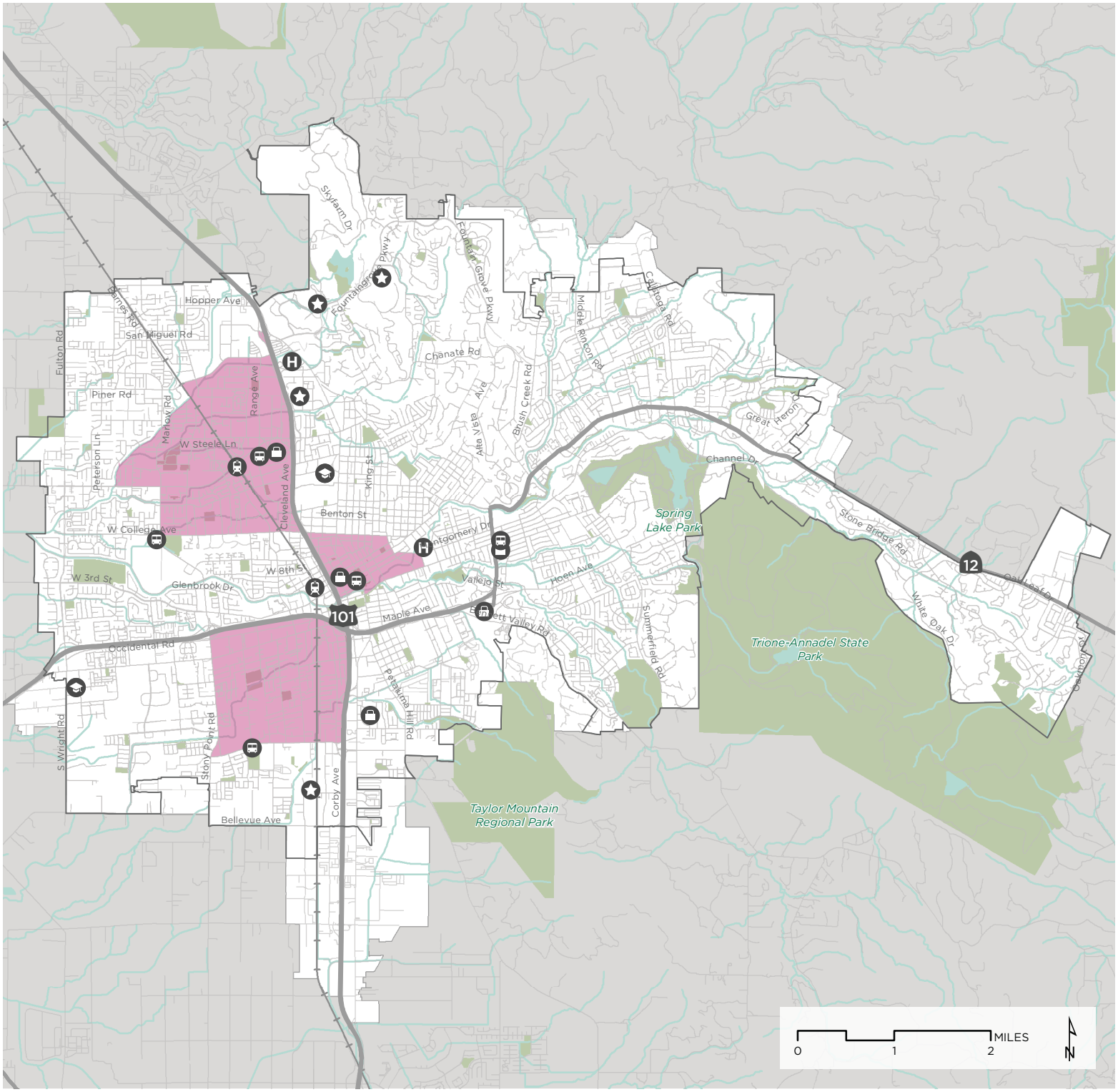


Figure 3-7

COMMUNITIES OF CONCERN

Community of Concern

DESTINATIONS + BOUNDARIES

- Transit Station
- Major Employer
- Hospital
- Shopping Center
- SMART Station
- Santa Rosa Junior College
- City Limts
- Park
- Urban Growth Boundary

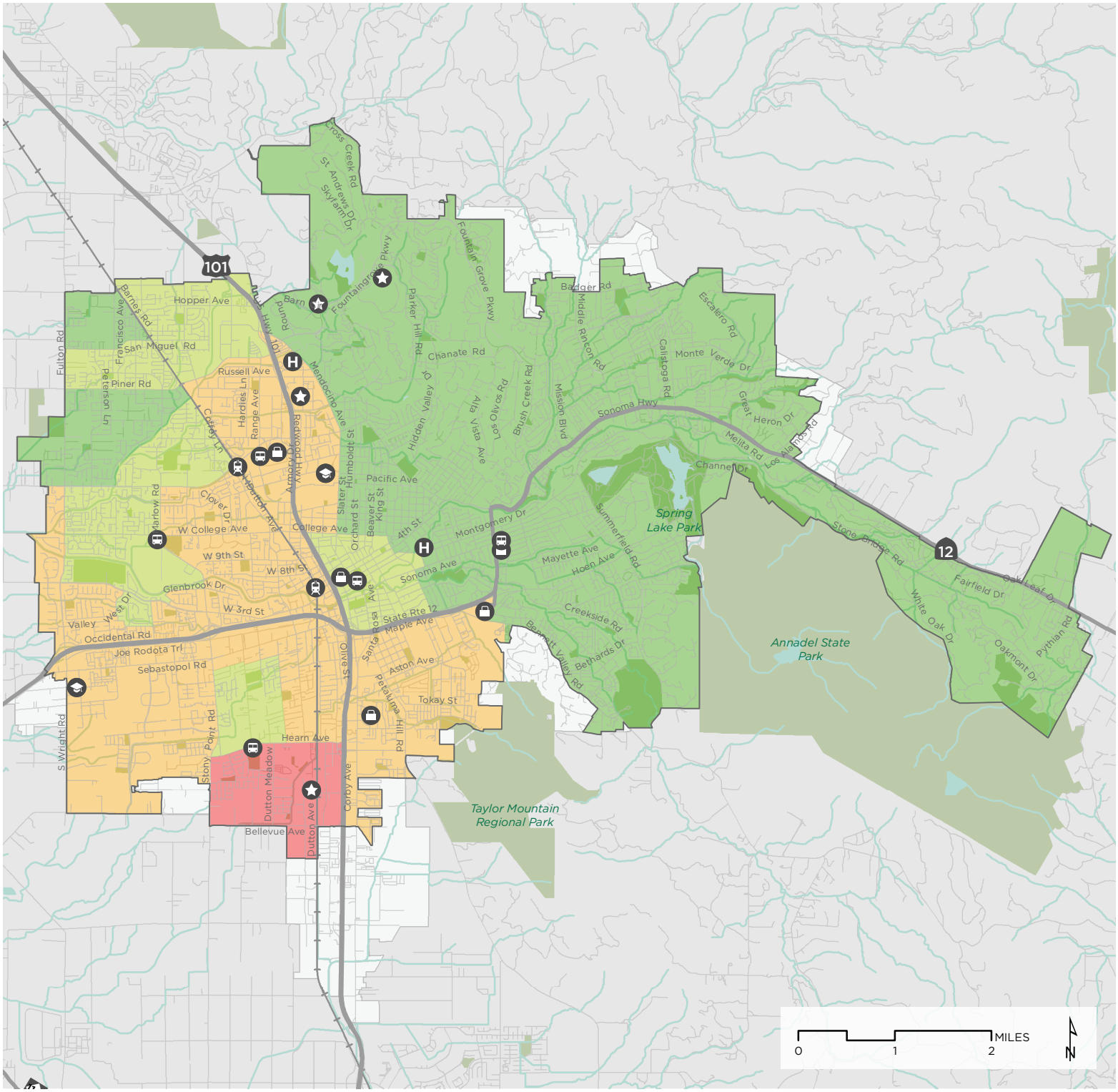


Figure 3-8

CALENVIROSCREEN

SCORE (PERCENTILE)

- 1 - 25% (Lowest Scores)
- 26 - 50%
- 51 - 75%
- 76 - 100% (Highest Scores)

DESTINATIONS + BOUNDARIES

- Transit Station
- Major Employer
- Hospital
- Shopping Center
- SMART Station
- Santa Rosa Junior College
- Park
- City Limts
- Urban Growth Boundary

**Scoring is based on environmental, health, and socioeconomic conditions. Areas with higher scores are faced with more adverse conditions and areas with lower scores are faced with less adverse conditions.*

BICYCLING AND WALKING TODAY

Existing Bicycle Network

The California Department of Transportation (Caltrans) designates four classes of bicycle facilities: Class I shared use paths, Class II bicycle lanes, Class III bicycle routes, and Class IV separated bikeways. The City's current bicycle network has approximately 115 miles of bikeways, and has grown by 40% since the last Bicycle and Pedestrian Master Plan Update 2018 in 2010 (see Table 3-2). Descriptions of each bikeway class are included in the following section, and bikeways are mapped in Figure 3-9 through Figure 3-14 to show where they currently exist in Santa Rosa.

Table 3-2: Bikeway Mileage in 2010 and 2018

BIKEWAY TYPE	2010 MILES	2018 MILES
Class I Shared Use Paths	13	30.9
Class II Bicycle Lanes	46	67.1
Class II Buffered Bicycle Lanes	0	0.2
Class III Bicycle Routes	18	12.8*
Class III Bicycle Boulevards	1	1.6
Class IV Separated Bikeways	0	0
Total	**78**	**112.6**

**Several miles of Class III bicycle routes were upgraded to Class II bicycle lanes*

CLASS I SHARED USE PATHS

Class I shared use paths are paved trails completely separated from the street. They allow two-way travel by people bicycling and walking, and are often considered the most comfortable facilities for children and inexperienced riders as there are few potential conflicts between people bicycling and people driving.

> *There are currently 30.9 miles of Class I shared use paths in Santa Rosa.*

CLASS II BICYCLE LANES

Class II bicycle lanes are striped preferential lanes on the roadway for one-way bicycle travel. Some bicycle lanes include a striped buffer on one or both sides to increase separation from the traffic lane or from parked cars, where people may open doors into the bicycle lane. Buffered Class II bicycle lanes were recently installed on 3rd Street from Morgan Street to B Street, where 3rd Street passes underneath Santa Rosa Plaza.

> *There are currently 67.1 miles of Class II bicycle lanes and 0.2 miles of buffered bicycle lanes in Santa Rosa.*

CLASS III BICYCLE ROUTES

Class III bicycle routes are signed routes where people bicycling share a travel lane with people driving. Because they are shared facilities, bicycle routes are only appropriate on quiet, low-speed streets with relatively low traffic volumes. Some Class III bicycle routes include shared lane markings or "sharrows" that recommend proper bicycle positioning in the center of the travel lane and alert drivers that bicyclists may be present. Others include more robust traffic calming features to promote bicyclist comfort and are known as "bicycle boulevards." The Santa Rosa Fire Department should be included in discussions about new or altered features on bicycle boulevards, to ensure access for emergency responders is maintained.

> *There are currently 12.8 miles of Class III bicycle routes in Santa Rosa and 1.6 miles of bicycle boulevards on Jennings Avenue and Humboldt Street.*

CLASS IV SEPARATED BIKEWAYS

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

> *No Class IV separated bikeways exist in Santa Rosa.*

Class I Shared Use Path

Class II Bicycle Lanes

Class III Bicycle Lanes

Class IV Separated Bikeways

Existing Support Facilities

Support facilities are also needed to attract and maintain bicyclists by considering their needs throughout their journey. People are less likely to ride their bicycles to destinations without secure bicycle parking. Other support facilities include showers or lockers at destinations, repair stations with basic tools, and wayfinding or guide signs to help bicyclists navigate along the way.

A complete bicycle network must include secure bicycle parking at each end of every trip. Bicycle parking can generally be divided into two categories: short-term bicycle racks and long-term higher-security parking.

The City has installed short-term bicycle parking throughout downtown on sidewalks, plazas, and in parking garages. These racks have been funded primarily through the Transportation Fund for Clean Air, provided by the Bay Area Air Quality Management District. Currently, 62 bicycle racks are installed through downtown Santa Rosa, as shown in Figure 3-15.

Long-term bicycle parking is available in the form of on-demand bike lockers. BikeLink, a private vendor, has installed 80 lockers at 12 locations across the city listed in Table 3-3, including seven locations on the Santa Rosa Junior College campus. To use the lockers, bicyclists purchase a BikeLink card online or at one of three vendors in the city. Once activated, the card can be loaded with funds to purchase time at 3-5 cents per hour. BikeLink has also been testing the use of Clipper Cards for lockers, which would integrate rentals with the existing transit fare card.

Table 3-3: Bicycle Locker Locations

LOCKER LOCATION	SPACES
Santa Rosa Junior College	36
Bailey Field	*4*
Tauzer Gym	*4*
Pioneer Hall	*4*
Quinn Swim Center	*4*
Doyle Library	*8*
Plover Hall	*8*
Analy Village	*4*
SMART – Santa Rosa Downtown	12
SMART – Santa Rosa North	4
Sonoma County Permit Resource Management	12
Sonoma County La Plaza	8
Sonoma County Hall of Justice	8

From September 2017 to October 2018, the 12 bicycle lockers at the Santa Rosa Downtown SMART station combined averaged more than 100 rentals per month (each locker is rented an average of 9.14 times per month). At the Santa Rosa North station, the four lockers combined averaged just over 20 rentals per month (each locker rented an average of 5.08 times per month).

The average rental length at Santa Rosa Downtown is just over 11 hours, while lockers at the Santa Rosa North station are rented for an average of 15 hours. At both locations, nearly all rentals occur on weekdays—93% at Santa Rosa Downtown and 98% at Santa Rosa North.

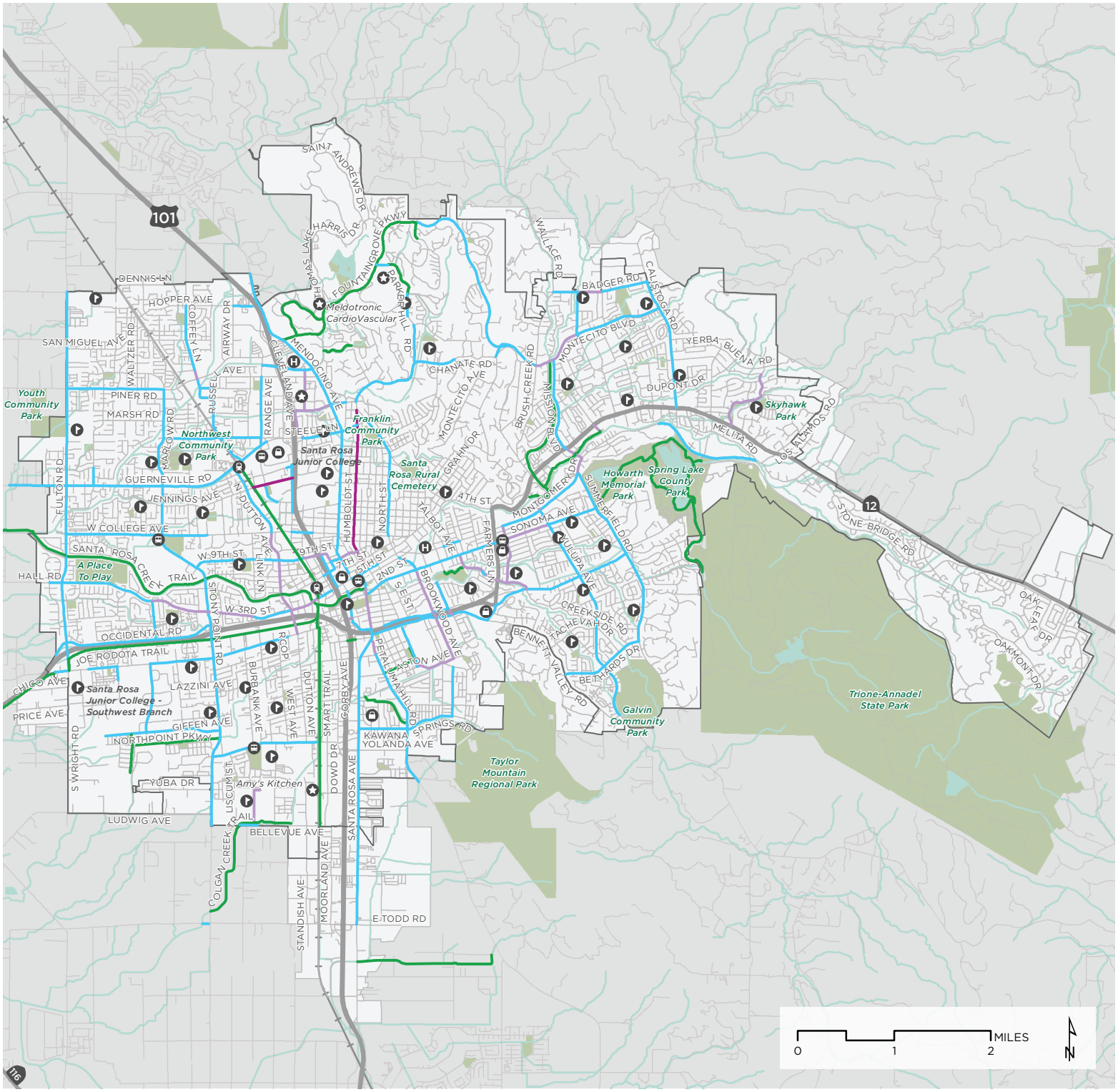


Figure 3-9

EXISTING BIKEWAYS (CITYWIDE)

- Class I Shared-Use Path
- Class II Bike Lane
- Class III Bike Route
- Class IIIB Bicycle Boulevard

DESTINATIONS + BOUNDARIES

- School
- Major Employer
- Transit Station
- SMART Station
- Hospital
- Shopping Center
- Park
- City Limits
- Urban Growth Boundary

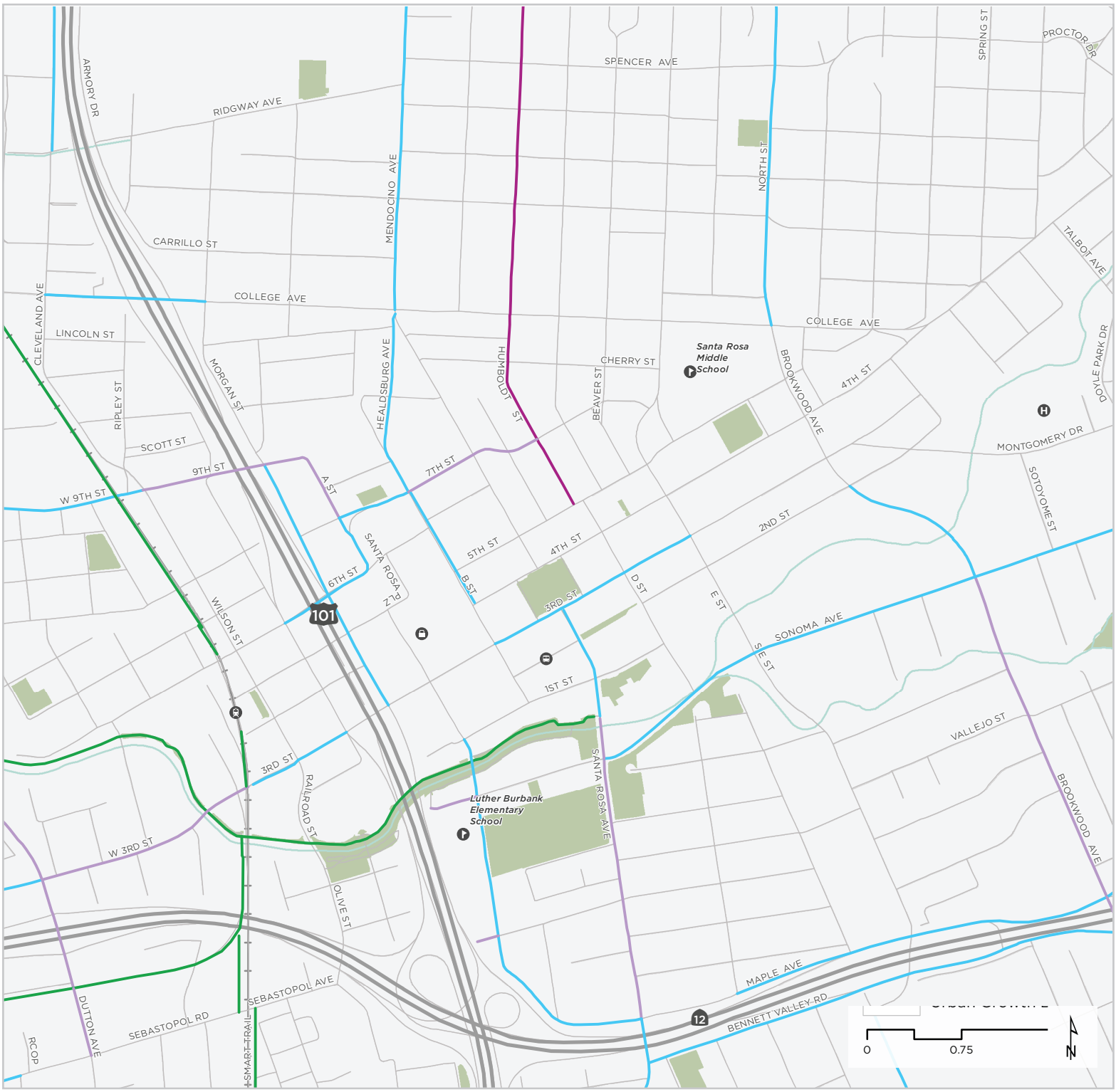


Figure 3-10

EXISTING BIKEWAYS (DOWNTOWN)

- Class I Shared-Use Path
- Class II Bike Lane
- Class III Bike Route
- Class IIIB Bicycle Boulevard

DESTINATIONS + BOUNDARIES

- School
- Major Employer
- Transit Station
- SMART Station
- Hospital
- Shopping Center
- Park
- City Limts
- Urban Growth Boundary

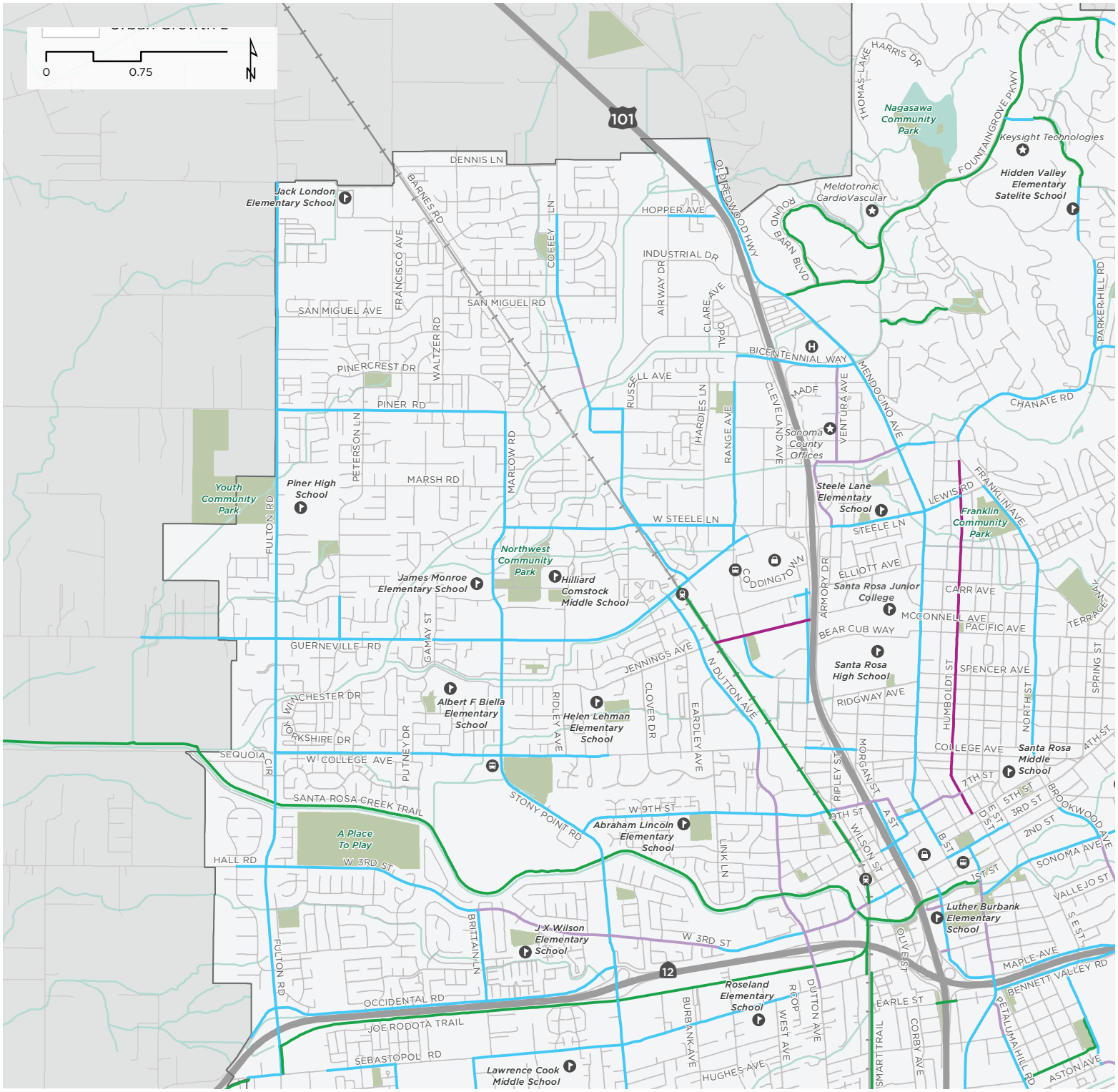


Figure 3-11

EXISTING BIKEWAYS (NORTHWEST)

- Class I Shared-Use Path
- Class II Bike Lane
- Class III Bike Route
- Class IIIB Bicycle Boulevard

DESTINATIONS + BOUNDARIES

- School
- Major Employer
- Transit Station
- SMART Station
- Hospital
- Shopping Center
- Park
- City Limts
- Urban Growth Boundary

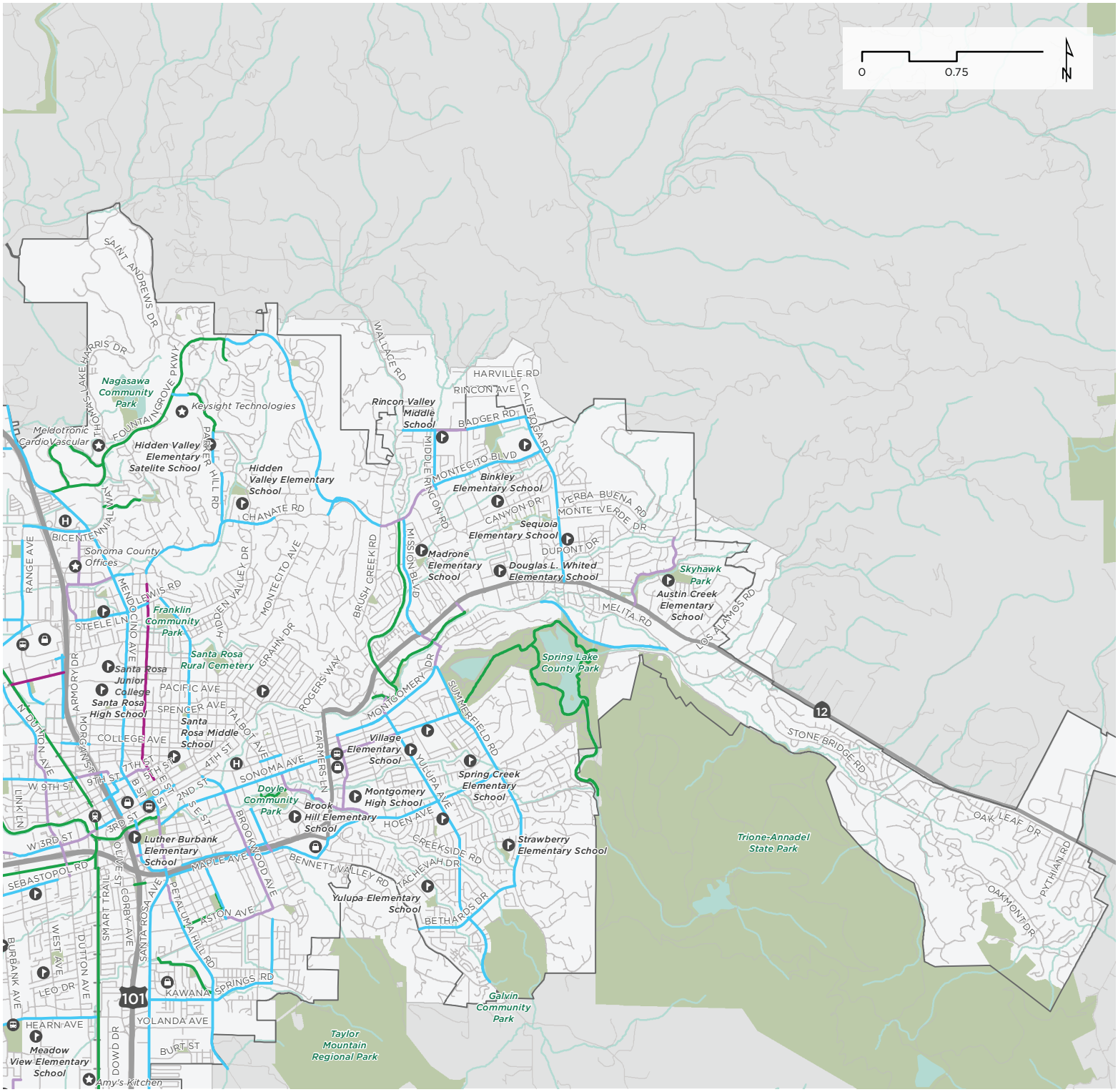


Figure 3-12

EXISTING BIKEWAYS (NORTHEAST)

- Class I Shared-Use Path
- Class II Bike Lane
- Class III Bike Route
- Class IIIB Bicycle Boulevard

DESTINATIONS + BOUNDARIES

- School
- Major Employer
- Transit Station
- SMART Station
- Hospital
- Shopping Center
- Park
- City Limts
- Urban Growth Boundary

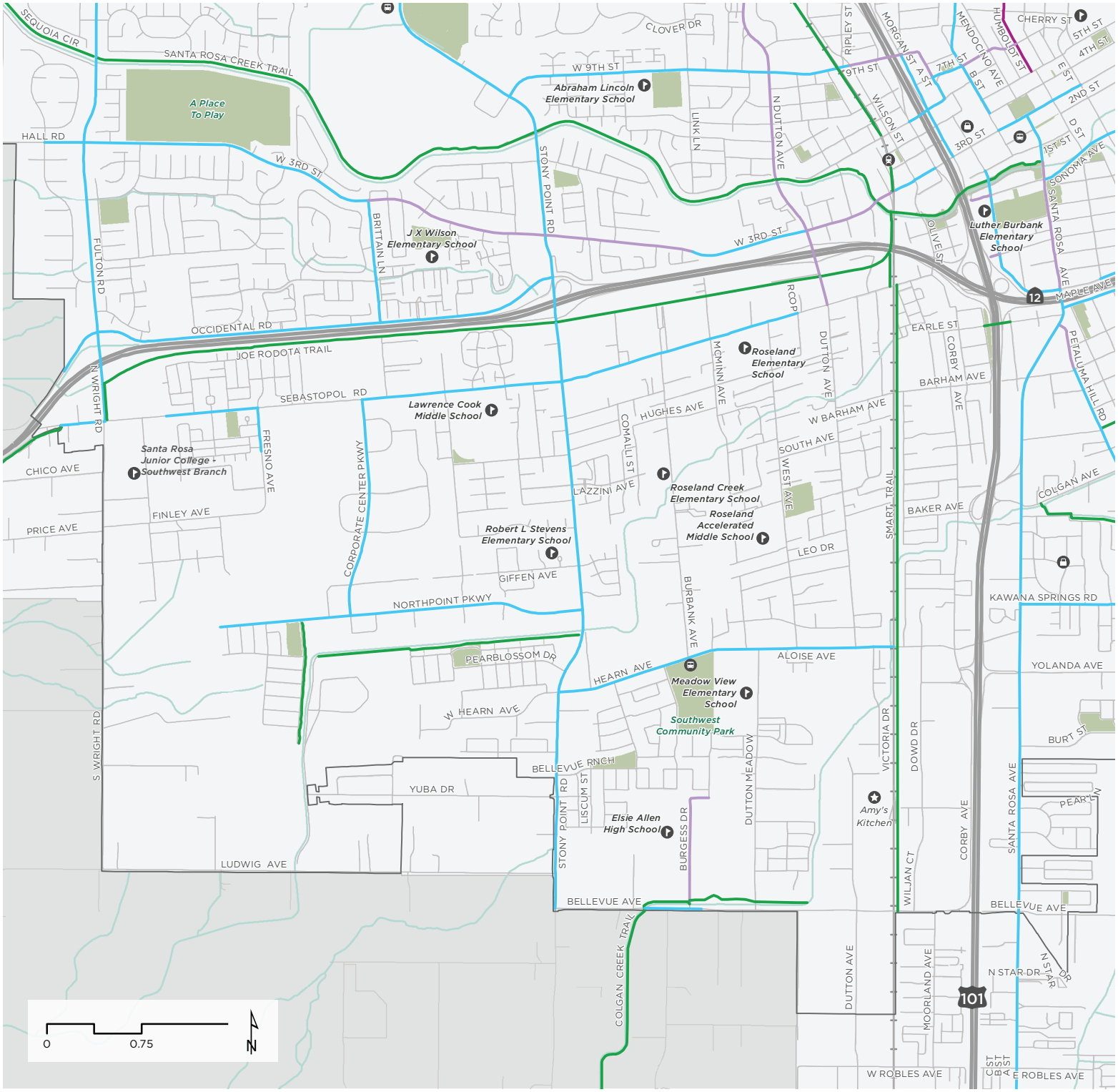


Figure 3-13

EXISTING BIKEWAYS (SOUTHWEST)

- Class I Shared-Use Path
- Class II Bike Lane
- Class III Bike Route
- Class IIIB Bicycle Boulevard

DESTINATIONS + BOUNDARIES

- School
- Major Employer
- Transit Station
- SMART Station
- Shopping Center
- Park
- City Limts
- Urban Growth Boundary

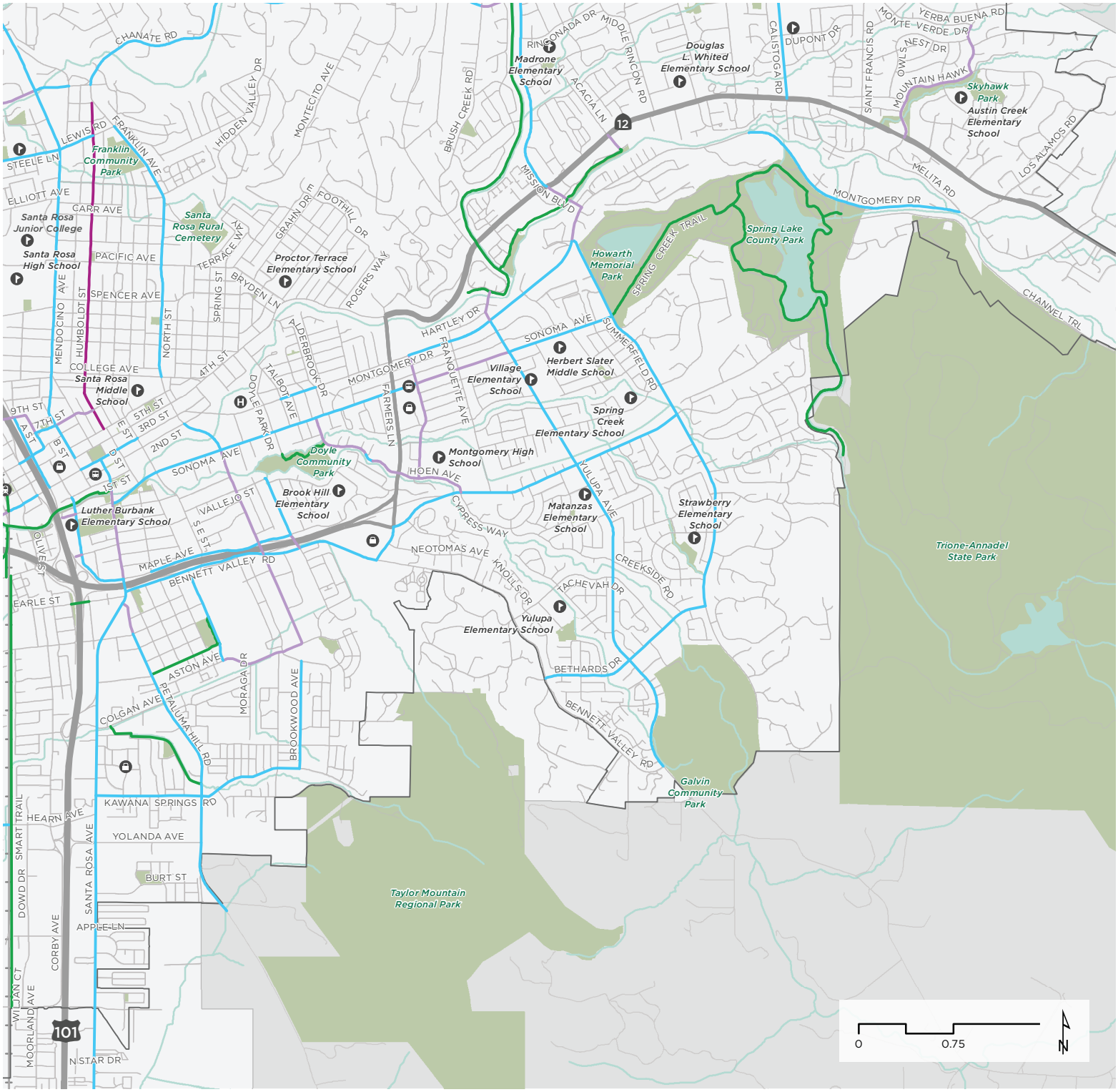


Figure 3-14

EXISTING BIKEWAYS (SOUTHEAST)

- Class I Shared-Use Path
- Class II Bike Lane
- Class III Bike Route
- Class IIIB Bicycle Boulevard

DESTINATIONS + BOUNDARIES

- School
- Transit Station
- SMART Station
- Hospital
- Shopping Center
- Park
- City Limts
- Urban Growth Boundary

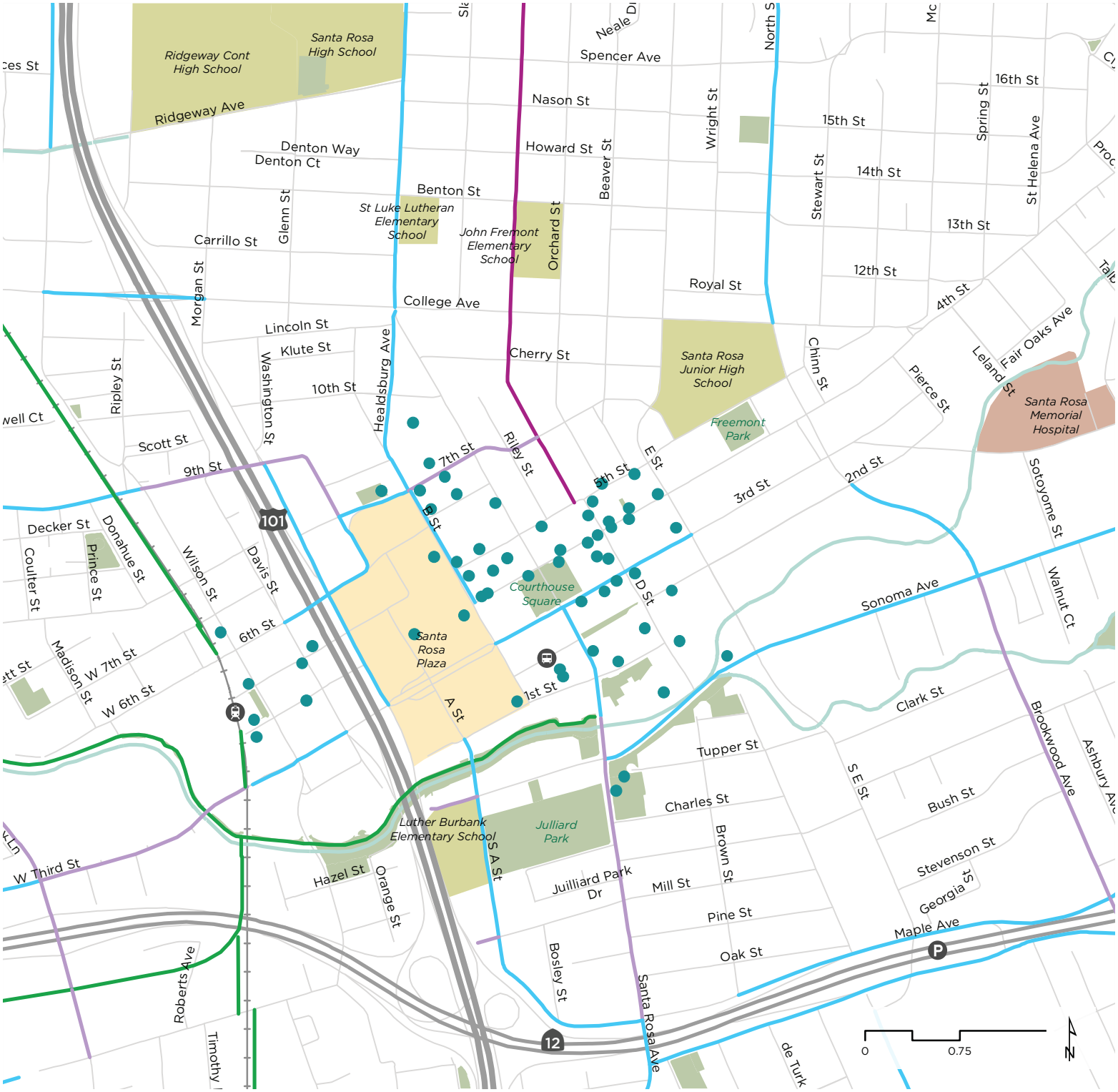


Figure 3-15

BICYCLE PARKING

- Bicycle Rack
- Class I Shared-Use Path
- Class II Bike Lane
- Class III Bike Route

DESTINATIONS + BOUNDARIES

- Santa Rosa Junior College
- SMART Station
- Park and Ride
- Transfer Station
- Shopping Center
- School
- Hospital
- Park

Existing Pedestrian Network

There are many features that contribute to a convenient and comfortable walking environment. Significant investments and commitments to future improvements have been made that continue to enhance the pedestrian experience in Santa Rosa.

FUNDING COMMITMENTS

In the 2017-2018 Capital Improvement Program (CIP), Traffic Safety and Transportation projects focus on street rehabilitation, traffic safety, bicycle and pedestrian safety, and street lighting. Projects related to improving circulation and safety for all users were funded at almost $3 million, representing approximately 24% of the total budget request for transportation projects. These projects include traffic signal improvements, sidewalk installations, pedestrian signal installations, traffic calming, and bikeway improvements.

$1,500,000 has been committed to date for LED streetlight replacements, which last longer and require less maintenance than alternatives. This will allow the city to improve and expand lighting, creating a more comfortable walking environment.

The City has also committed $1.2 million from the General Fund in an ongoing effort to implement facility improvements for people with disabilities, in compliance with the Americans with Disabilities Act (ADA). These improvements often include sidewalk gap closures, pavement repairs, or curb ramps.

SIDEWALKS

Sidewalks form the backbone of the pedestrian transportation network. Most streets in the City have sidewalks or pathways on at least one side. Within the City limits, sidewalk maintenance is the responsibility of the property owner. Some parts of the City are not required to provide sidewalks. These include rural hillside developments, such as portions of the Fountaingrove area, or areas previously built out while under County jurisdiction and subsequently annexed into the City, such as the Castlerock subdivision and Roseland community.

HIGH VISIBILITY 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 to pedestrians. Markings can be standard parallel lines or the "continental" high visibility pattern shown in the image above, which enhances visibility of the crossing and is becoming best practice. Crosswalks in school zones are yellow.

The City conducted a review of uncontrolled crossings in 2014, which evaluated 185 crossing locations. The study included a robust data collection effort, and made detailed recommendations for each location to improve accessibility and comfort, including additional pavement markings for visibility, beacons or traffic controls, and visibility improvements such as parking removal or vegetation maintenance. The City was recently awarded a Highway Safety Improvement Program (HSIP) grant to implement the recommended improvements at approximately 100 of the uncontrolled crossings. Unfunded locations will be carried forward in this Bicycle & Pedestrian Master Plan Update 2018.

PEDESTRIAN HYBRID BEACONS

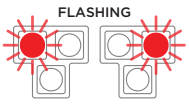
Pedestrian hybrid beacons are used to enforce motorist yielding to pedestrians at uncontrolled crosswalk locations. The beacon, when activated by a person wishing to cross, flashes yellow before displaying a solid red signal to motorists, requiring them to stop. Pedestrians are then shown a WALK signal, and may cross the road. When the WALK phase is complete, the beacon flashes yellow before returning to a dark inactive state. Operation of the beacon is illustrated in the graphic below.

Santa Rosa recently installed a hybrid beacon at this crossing on Montgomery Drive at Spring Lake Village.

RECTANGULAR RAPID FLASHING BEACONS

Rectangular Rapid Flashing Beacons or RRFBs increase visibility of uncontrolled or midblock crosswalks with bright LED lights activated by a pedestrian push button.

Santa Rosa has multiple RRFBs throughout the City, including at 3rd Street and Courthouse Square.

DRIVERS		PEDESTRIANS	
	Proceed with Caution		Push the Button to Cross
FLASHING	Slow Down (Pedestrian has activated the push button)		Wait
	Prepare to Stop		Continue to Wait
	STOP! (Pedestrian in Crosswalk)		Start Crossing
FLASHING 	STOP! Proceed with Caution if Clear		Continue Crossing (Countdown Signal)
	Proceed if Clear		Push the Button to Cross

Barriers to Active Transportation

Two freeways cross the City, dividing it into four quadrants. Highway 101 runs north-south through Santa Rosa, and State Route (SR) 12 runs east-west. The SMART rail line also runs north-south through the City, west of Highway 101. These transportation features create challenges for people walking and bicycling in some places, as crossings are limited.

Bicycle and Pedestrian Trips

The most consistent bicycling and walking data comes from American Community Survey 5-year estimates, which record the mode of transportation people use to commute to work. Over the most recent five years of available data, shown in Table 3-4, bicycling in Santa Rosa has remained steady just above one percent while walking has decreased slightly from 3.3% to 2.6%.

In addition to reviewing data on mode of transportation to work, the City of Santa Rosa also conducts bicycle and pedestrian counts at locations around the city. In 2018, counts conducted on the SMART Trail at 9th Street and at Sebastopol Road reported an average of 576 pedestrians and 53 bicyclists using the trail each day. Active transportation use was highest on weekdays, and peaked from approximately 7 – 10 a.m. and from 3 – 6 p.m., suggesting residents may be using the path to commute to work.

By comparison, counts conducted in 2016 on the nearby Joe Rodota Trail showed a daily average of 265 people bicycling along that trail. These counts showed consistent use during both weekdays and weekends, with weekend days showing peak hours similar to the SMART trail. This suggests the Joe Rodota Trail is used for both commuting to work and for weekend recreational use.

Table 3-4: Santa Rosa Bicycling and Walking to Work Mode Share

YEAR	BICYCLE MODE SHARE	WALKING MODE SHARE
2012	1.2%	3.3%
2013	1.0%	3.0%
2014	1.0%	2.7%
2015	1.2%	2.8%
2016	1.3%	2.6%

Between 2009 and 2014, hourly counts of people walking and bicycling in Santa Rosa were also gathered by multiple agencies, including the Sonoma County Transportation Authority (SCTA), and the Metropolitan Transportation Commission (MTC). From these hourly counts, average daily walking and bicycling trips were extrapolated and compared to identify cross streets that currently have the most people walking and bicycling in the City.

Locations with high bicycling activity are listed in Table 3-5 and locations with high walking activity are listed in Table 3-6. Four locations are popular for both bicycling and walking:

- Mendocino Avenue and Pacific Avenue
- Sonoma Avenue and Brookwood Avenue
- Mendocino Avenue and Steele Lane
- Santa Rosa Avenue and 2nd Street

Table 3-5: Top Ten Bicycle Count Locations

STREET	CROSS STREET	DAILY TRIPS
Sanda Rosa Creek	Stony Point Rd.	807
Joe Rodota Trail	Prince Memorial Greenway	711
Joe Rodota Trail	Dutton Ave.	629
Humboldt St.	College Ave.	561
Mendocino Ave.	Pacific Ave.	546
Sonoma Ave.	Brookwood Ave.	546
Joe Rodota Trail	South Wright Rd.	386
Santa Rosa Ave.	2nd St.	379
Mendocino Ave.	Steele Lane	350
Stony Point Rd.	Sebastopol Rd.	307

Table 3-6: Top Ten Pedestrian Count Locations

STREET	CROSS STREET	DAILY TRIPS
Santa Rosa Ave.	2nd St.	2,511
Mendocino Ave.	Pacific Ave.	2,432
B St.	4th St.	1,964
Davis St.	4th St.	1,071
Middle Rincon Rd.	Badger Rd.	1,032
Sonoma Ave.	Brookwood Ave.	825
Morgan St.	4th St.	767
Mendocino Ave.	Steele Lane	679
Yulupa Ave.	Bethards Dr.	639
Davis St.	6th St.	567

Programs

Programs help support walking and bicycling by sharing information, promoting comfort, and creating a vibrant active transportation culture. Communities that have the highest rates of walking and bicycling consistently use a "5Es" approach, with four types of programs complementing **Engineering** improvements:

Education
Providing safety education for people walking, riding bicycles, and driving, as well as education about the environmental and health benefits of active transportation and the facilities available in the community

Encouragement
Promoting bicycling and walking as fun and efficient modes of transportation and recreation

Enforcement
Enforcing laws and good behavior for people walking, bicycling, and driving

Evaluation
Monitoring the success of the effort through counts, surveys, and review of relevant data

The City and its partners have been carrying out the following programs in recent years to support bicycling and walking.

SAFE ROUTES TO SCHOOL

The City participates in the Sonoma County Safe Routes to School (SRTS) program, led by the Sonoma County Bicycle Coalition with support from Sonoma County Department of Health Services and SCTA. Many schools participate in program activities, including in-school bicycling and walking safety education, student and family bicycle rodeos, and Walk and Bike to School Days. The SRTS program also includes evaluation components to measure changes in walking and bicycling rates along with program activity effectiveness. Over the last four years, the City and its partners have conducted walking audits or other program activities at 20 elementary and middle schools in Santa Rosa. During the 2017-2018 school year, all five public high schools were reviewed for bicycle and pedestrian access. The City has implemented several pedestrian and bicycle enhancements at the various schools based on the results of these assessments.

BIKE TO WORK DAY

Bike to Work Day, celebrated in May each year, is a day when people are encouraged to try bicycling to work. Coordinated by the Sonoma County Bicycle Coalition, civic organizations and local business partners host "energizer stations" along popular commute routes to offer snacks and other giveaways to people who participate. In 2017, nearly 1,000 people visited 12 energizer stations in Santa Rosa as part of Bike to Work Day.

FREE RIDE TRIP REDUCTION INCENTIVE PROGRAM

The City sponsors a "Free Ride – Trip Reduction Incentive Program" for employers in the city to encourage commute alternatives such as bicycling, walking, transit, and carpooling. Incentives include discounted transit passes and a chance to win a $50 gift card. Approximately 1,532 people are signed up for the program. To date, more than 263,536 one-way bicycle commute trips and more than 74,150 one-way walking commute trips have been recorded.

There is also a guaranteed ride home component, where a registered participant may get a free taxi ride home in an emergency. This reduces the need to commute by car because a person is worried they might need to pick up a sick child from school or for some other emergency.

These incentives are part of the City's Transportation Demand Management (TDM) program and administered by the Santa Rosa Transit Division through a Transportation Fund for Clean Air grant.

EMERGENCY RIDE HOME

The SCTA recently launched a program offering employees anywhere in the county a free ride home to encourage active transportation commuting in addition to carpooling and transit. If a family emergency arises, the carpool driver must leave unexpectedly, or your bike is stolen, for example, you can take a taxi or app-based rideshare home and be reimbursed up to $125.

TARGETED ENFORCEMENT

The Santa Rosa Police Department conducts targeted enforcement to address behaviors that contribute to bicycle or pedestrian crashes on an ongoing basis, as funding and resources are available. The Department recently secured a grant from the Office of Traffic Safety to fund education and enforcement activities, including:

- Traffic safety education presentations on bicycle and pedestrian safety
- Additional patrols at intersections with increased incidents of bicycle or pedestrian collisions
- Speed limit, red light, and stop sign enforcement

Similar targeted enforcement efforts in the past have focused on reducing illegal turns by drivers, failures to yield to pedestrians in crosswalks, and bicyclist helmet laws.

Collisions

Data on bicycle- and pedestrian-related collisions can provide insight into locations or roadway features that tend to have higher collision rates, as well as behaviors and other factors that contribute to collisions. These insights will inform the recommendations in this Plan Update 2018 to address challenges facing people bicycling and walking.

Collision data involving people walking and bicycling was acquired from the Statewide Integrated Traffic Records System (SWITRS), where the California Highway Patrol and local law enforcement agencies upload collision reports. Ten years of data were evaluated, from September 1, 2007 through August 31, 2017.

A total of 9,706 collisions were reported in Santa Rosa during the study period, 6.5% of which involved people bicycling and 5.9% of which involved people walking.

BICYCLE-RELATED COLLISIONS

During the study period, 628 collisions in Santa Rosa involved a person riding a bicycle. Only four of these were fatal, but nearly 600 resulted in an injury. See Table 3-7 and Figure 3-17.

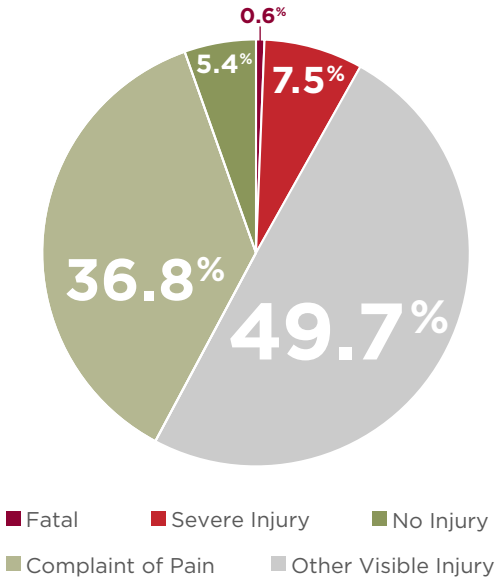
Overall during the study period, fewer than one percent of bicycle collisions were fatal. Over seven percent resulted in severe injury, and approximately five percent did not result in any injury. Figure 3-16 shows collision severity for the study period.

Table 3-7: Annual Bicycle Collisions in Santa Rosa

YEAR	BICYCLE COLLISIONS	INJURIES	FATALITIES
2007*	18	17	
2008	65	55	2
2009	76	71	
2010	70	67	
2011	64	62	1
2012	75	71	1
2013	59	58	
2014	47	44	
2015	63	62	
2016	56	54	
2017*	35	30	
Total	**628**	**591**	**4**

**2007 data reflects September 1 through December 31. 2017 data reflects January 1 through August 31.*

Figure 3-16: Bicycle Collision Severity



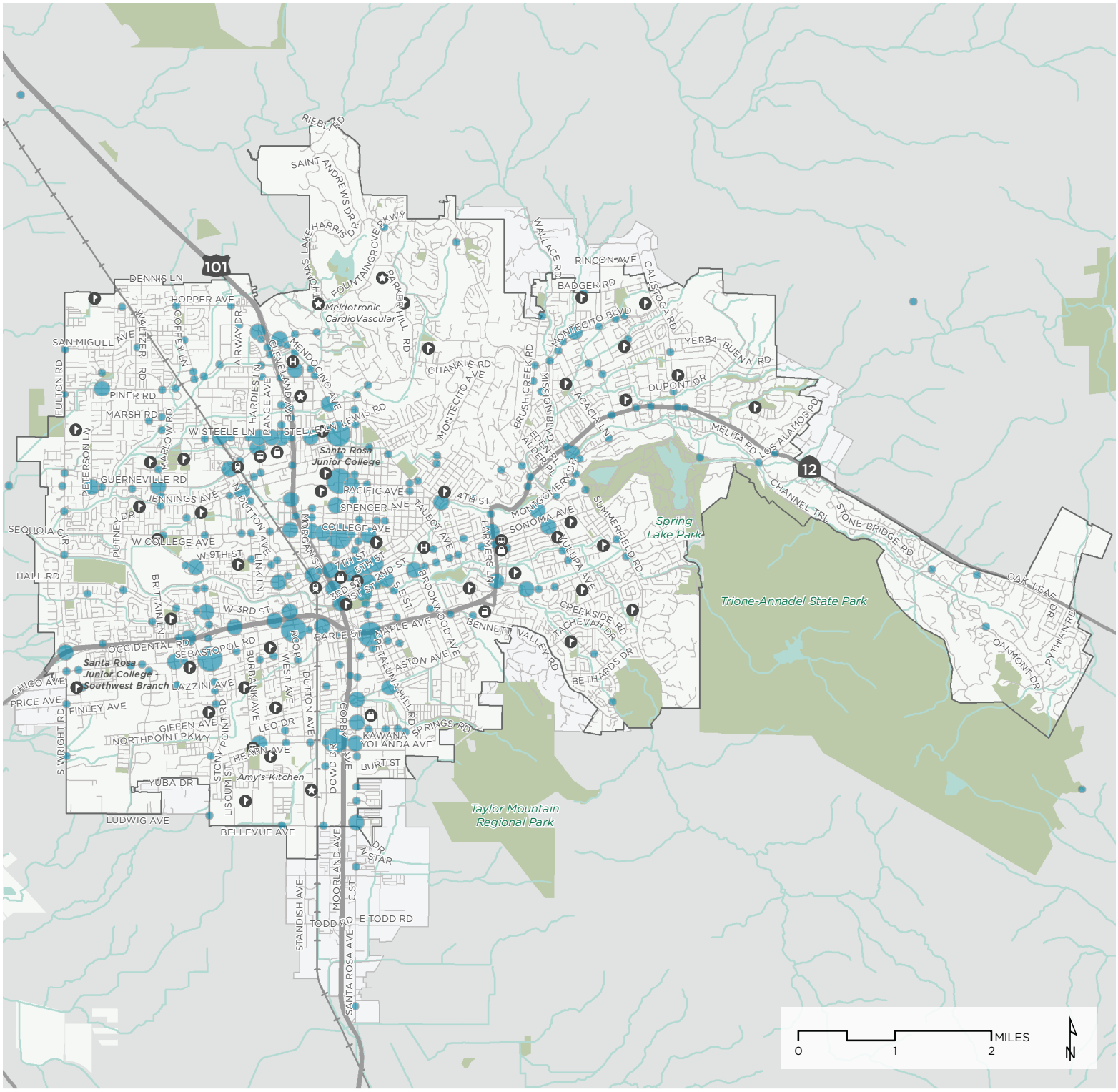


Figure 3-17

BICYCLE INVOLVED COLLISIONS

BICYCLE COLLISIONS

from September 2007 to August 2017

- 1 - 2
- 3 - 8
- 9 - 25
- 26 - 47

DESTINATIONS + BOUNDARIES

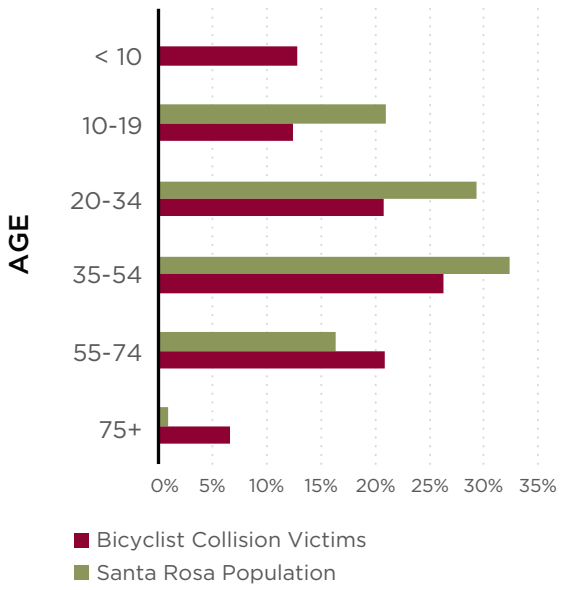
- SMART Station
- Transit Station
- Major Employer
- School
- Hospital
- Shopping Center
- Park
- Current City Limts
- Urban Growth Boundary

As shown in Figure 3-18, no bicyclists under 10 years old were involved in collisions during the study period. Bicyclists between 10 and 54 years old are overrepresented among collision victims compared to the general population, with 10-19 showing the largest discrepancy.

Nearly 80% of collisions occurred during daylight hours, and an additional 15% occurred at night where street lights were present and functioning.

Examining only those bicycle collisions that occurred within 500 feet of a school, 74 of 146 collisions occurred during school hours between 7 am and 4 pm, and 19 of those school-hour collisions involved bicyclists under 18 years old.

Figure 3-18: Collisions by Bicyclist Age Range



The majority of the bicycle-involved collisions during the study period were attributed to three violations that lend insight into behaviors that contribute to collisions:

- Violating the right of way of a driver (25%)
- Wrong side of the road (24%)
- Improper turning (18%)

When evaluating the locations where bicycle-involved collisions are more likely to occur, six locations approach an average of one collision every two years, as shown in Table 3-8.

Table 3-8: Top Bicycle Collision Intersections

LOCATION	BICYCLE-INVOLVED COLLISIONS
Corby Ave & Hearn Ave	12
College Ave & Mendocino Ave	8
Mendocino Ave & Pacific Ave	6
Sonoma Ave & South E St	6
1st St & Santa Rosa Ave	5
3rd St & Santa Rosa Ave	5

Pedestrian-Related Collisions

During the study period, 573 collisions in Santa Rosa involved a person walking. Thirty-three of these were fatal collisions, and over 500 resulted in an injury. See Table 3-9 and Figure 3-21.

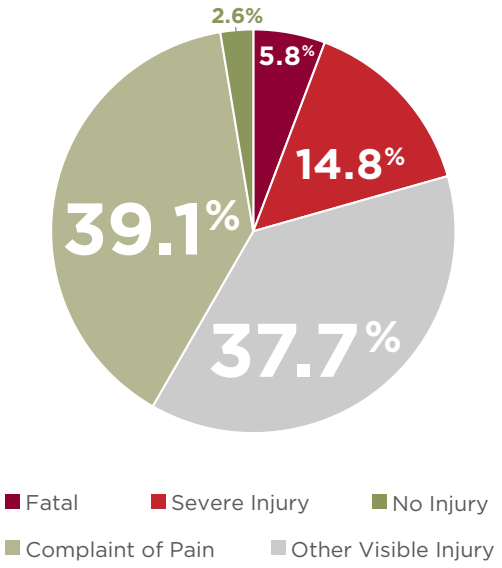
Overall during the study period, just under six percent of pedestrian collisions were fatal. Nearly 15% resulted in severe injury, and only about three percent did not result in any injury. Figure 3-19 shows collision severity for the study period.

Table 3-9: Annual Pedestrian Collisions

YEAR	PEDESTRIAN COLLISIONS	INJURIES	FATALITIES
2007*	23	22	
2008	45	43	1
2009	54	49	4
2010	49	46	1
2011	66	56	8
2012	74	69	4
2013	51	47	3
2014	48	45	3
2015	49	44	4
2016	69	66	4
2017*	45	41	1
Total	**573**	**528**	**33**

**2007 data reflects September 1 through December 31. 2017 data reflects January 1 through August 31.*

Figure 3-19: Pedestrian Collision Severity



As shown in Figure 3-20, pedestrians between 10 and 54 years old are overrepresented among collision victims compared to the general population.

Just under 60% of collisions occurred during daylight hours, and an additional 38% occurred at night where street lights were present and functioning.

Examining only those pedestrian collisions that occurred within 500 feet of a school, 49 of 138 collisions occurred during school hours between 7 am and 4 pm, and 16 of those school-hour collisions involved pedestrians under 18 years old.

Over 80% of the pedestrian-involved collisions during the study period were attributed to two violations that lend insight into behaviors that contribute to collisions:

- Violating the right-of-way of a pedestrian (44%)
- Pedestrian violation (37%)

When evaluating the locations where pedestrian-involved collisions are more likely to occur, two locations average more than one collision every two years, as shown in Table 3-10.

Figure 3-20: Collisions by Pedestrian Age Range

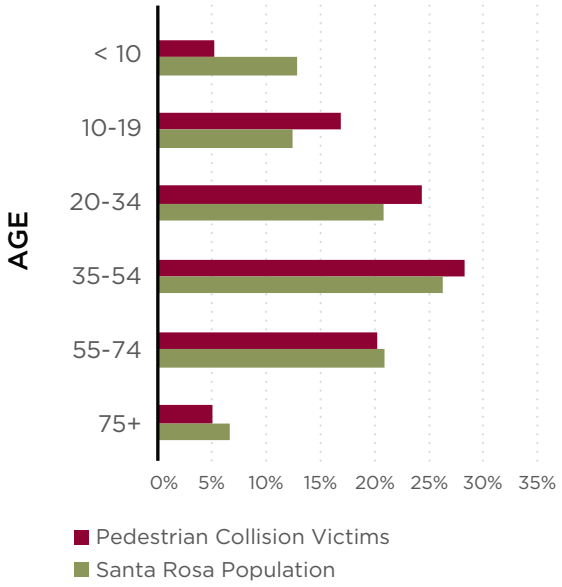


Table 3-10: Top Pedestrian Collision Intersections

LOCATION	PEDESTRIAN-INVOLVED COLLISIONS
3rd St & D St	10
McConnell Ave & Mendocino Ave	7

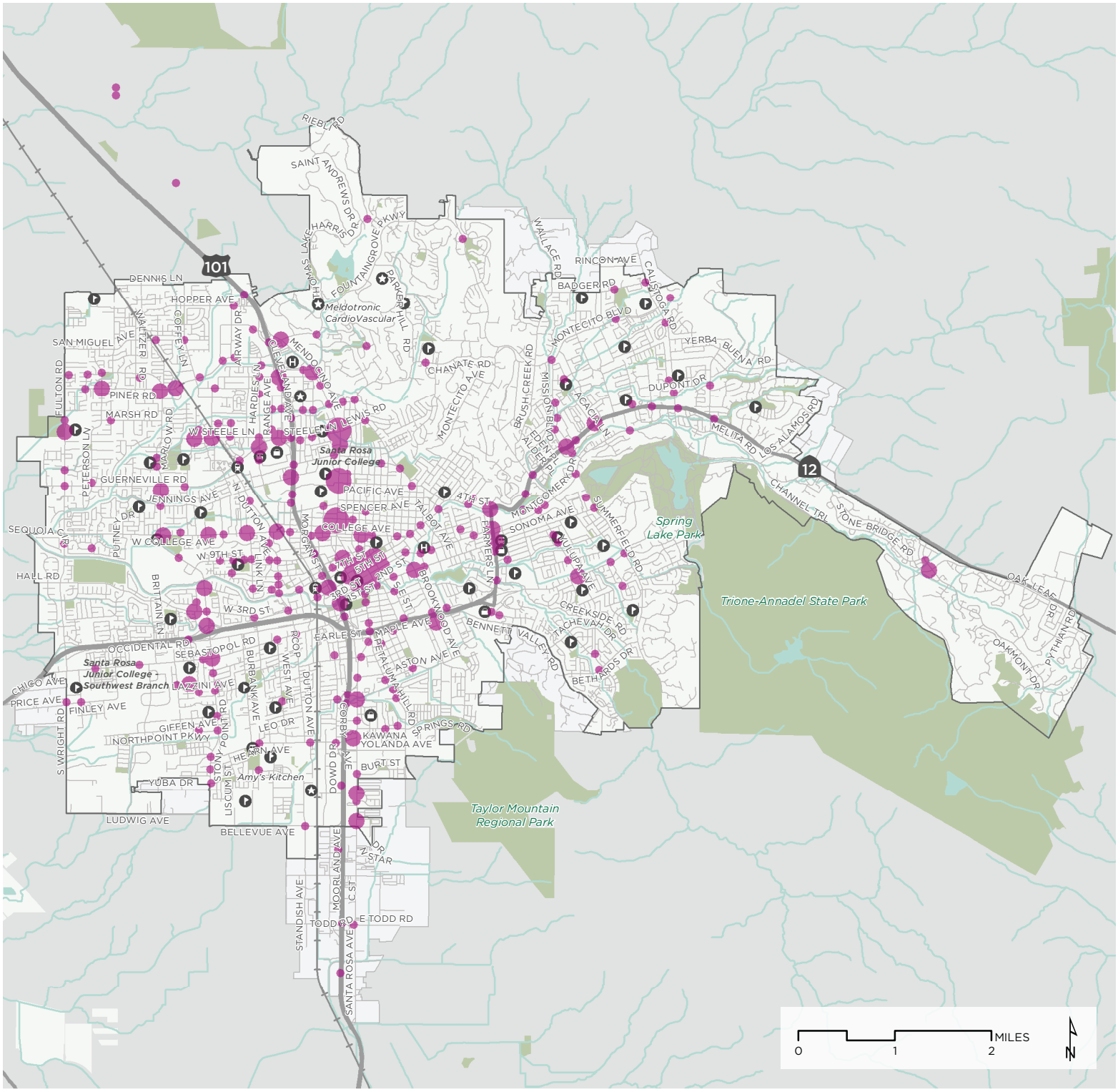


Figure 3-21

PEDESTRIAN INVOLVED COLLISIONS

PEDESTRIAN COLLISIONS

from September 2007 to August 2017

- 1 - 2
- 3 - 7
- 8 - 17
- 18 - 47

DESTINATIONS + BOUNDARIES

- SMART Station
- Transit Station
- Major Employer
- School
- Hospital
- Shopping Center
- Park
- Current City Limts
- Urban Growth Boundary

High-Injury Network

To identify street segments in the City where serious collisions are occurring at a greater frequency, a high-injury network was developed based on the number and proximity of collisions that resulted either in death or severe injury to a person bicycling or walking. The City's street network was evaluated for segments where three or more fatal or severe injury collisions occurred that met a threshold for concentration.

For bicycle-involved collisions, this threshold was set at 0.5 fatal or severe-injury collisions per 1,000 feet. For pedestrian-involved collisions, the threshold is one fatal or severe-injury collision per 1,000 feet. These high-injury network segments are listed in Table 3-11 and Table 3-12, and mapped in Figure 3-22.

Table 3-11: High Injury Bicycle Corridors

STREET	START/END	FATAL & SEVERE INJURY COLLISIONS	COLLISIONS /1000 FT.
Mendocino Ave	Elliott Ave to 10th St	5	1.0
Santa Rosa Ave	Petaluma Hill Rd to Colgan Ave	3	0.9
Guerneville Rd/ Steele Ln	Dutton Ave to Rowe Dr	5	0.8
Sebastopol Rd	Mattson Rd to Dutton Ave	6	0.6
Stony Point Rd	College Ave to Campbell Dr	5	0.5
Montgomery Dr	Farmers Ln to Mission Blvd	3	0.5

Table 3-11: High Injury Pedestrian Corridors

STREET	START/END	FATAL & SEVERE INJURY COLLISIONS	COLLISIONS /1000 FT.
Santa Rosa Ave	Charles St to Mill St	3	4.7
3rd St	Gate Way to Stony Point Rd	3	2.6
Santa Rosa Ave	Court Rd to Bellevue Ave	4	2.2
Piner Rd	Bay Village Cir to Coffey Ln	3	2.1
Mendocino Ave	McConnell Ave to 4th St	9	1.6
Farmers Ln	Long Dr to Sonoma Ave	3	1.4
Guerneville Rd/ Steele Ln	Coffey Ln to Mendocino Ave	8	1.3
Stony Point Rd	Glenbrook Dr to Sebastopol Rd	5	1.3
4th St	Mendocino Ave to College Ave	4	1.2
3rd St	Hwy 101 to E St	3	1.2
Range Ave	Bicentennial Way to Guerneville Rd	5	1.1
College Ave	Link Ln to Mendocino Ave	5	1.0

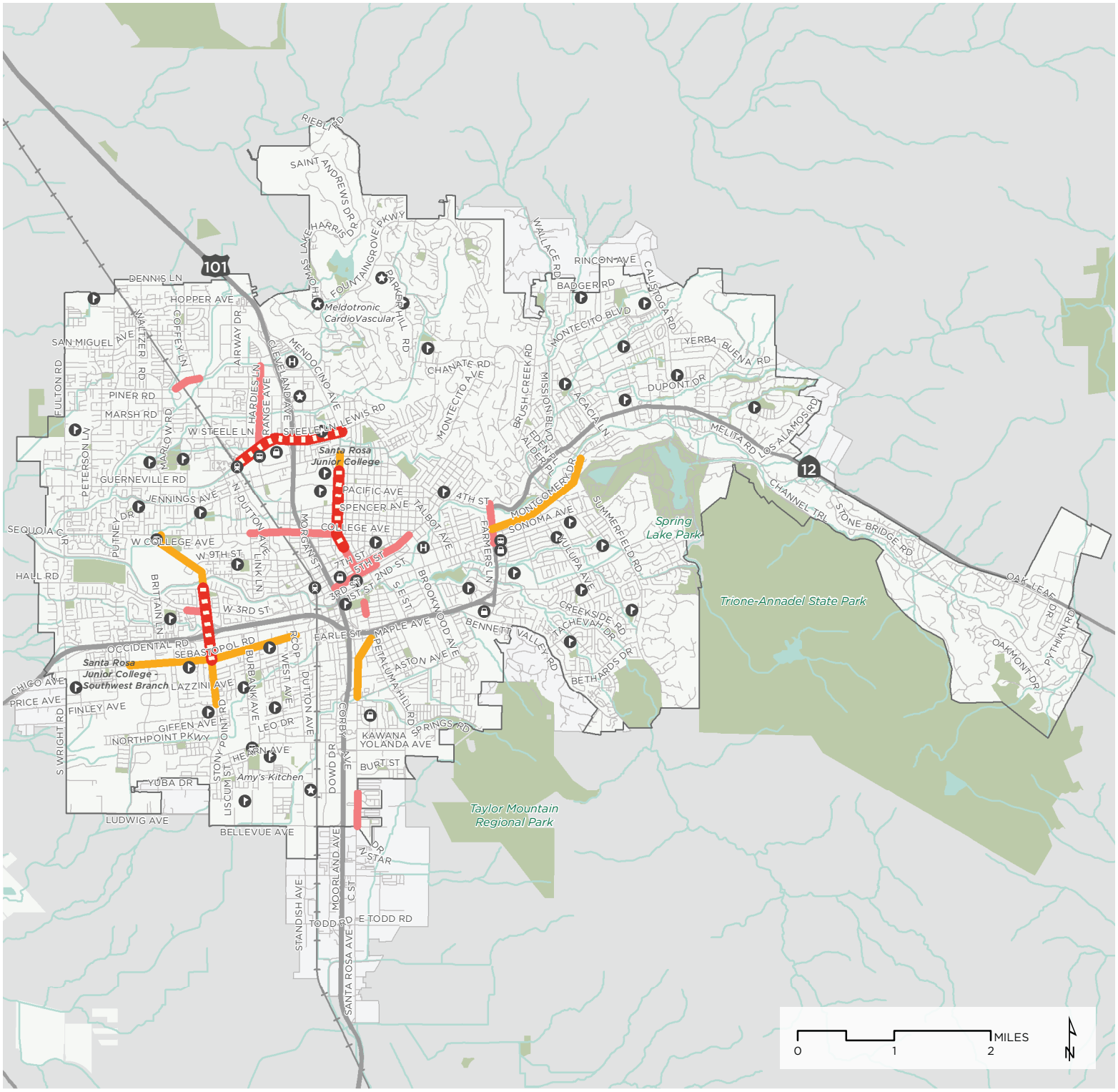


Figure 3-21

HIGH INJURY NETWORK

COLLISION CORRIDORS

As determined by the rate of roadway collisions resulting in severe injury between September 2007 and August 2017.

- Bicycle and Pedestrian
- Bicycle
- Pedestrian

DESTINATIONS + BOUNDARIES

- SMART Station
- Transit Station
- Major Employer
- School
- Hospital
- Shopping Center
- Park
- Current City Limts
- Urban Growth Boundary

USER EXPERIENCE & PERCEIVED COMFORT

Traffic stress is the perceived sense of danger associated with riding in or adjacent to vehicle traffic. Studies have shown that traffic stress is one of the greatest deterrents to bicycling. The less stressful—and therefore more comfortable—a bicycle facility is, the wider its appeal to a broader segment of the population. A bicycle network will attract a large portion of the population if it is designed to reduce stress associated with potential motor vehicle conflicts and if it connects people bicycling with where they want to go.

Bikeways are considered low stress if they involve very little traffic interaction by nature of the roadway's vehicle speeds and volumes (e.g., a shared, low-traffic neighborhood street) or if greater degrees of physical separation are placed between the bikeway and traffic lane on roadways with higher traffic volumes and speeds (e.g., a separated bikeway on a major street).

Types of Bicyclists

Research indicates that the majority of people in the United States (56-73%) would 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.[1] This research into how people perceive bicycling as a transportation choice has indicated that most people fall into one of four categories, illustrated below.

1-3%

STRONG & FEARLESS

Very comfortable and willing to ride on streets without designated facilities

5-10%

ENTHUSIASTIC & CONFIDENT

Very comfortable, but prefer streets with designated bike lanes

50-60%

INTERESTED, BUT CONCERNED

Comfortable on trails and streets with buffered or separated bike lanes and interested in biking more

30%

NOT CURRENTLY INTERESTED

Physically unable or very uncomfortable even on streets with separated bike lanes

Bicycle Level of Traffic Stress

To better meet the needs of the "Interested, But Concerned" cyclist, 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. 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 level.

The combination of these criteria creates four levels of traffic stress for the existing roadway network. The lower the number, the lower the stress and the higher the level of comfort for people on bicycles. LTS 1 & 2 roads are typically the roadways that appeal to the "Interested, but Concerned" cyclists.

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.

LEVEL 1: ALL AGES AND ABILITIES

Level 1 includes off-street shared use paths and some very low-stress roadways suitable for all ages and abilities.

Level 1 makes up six percent of the entire network in Santa Rosa.

The Joe Rodota Trail is an example of a Level 1 facility.

LEVEL 2: AVERAGE ADULT

Level 2 includes roadways that are comfortable enough that the mainstream adult population would ride a bicycle on them.

Level 2 makes up 68% of the entire network in Santa Rosa.

Humboldt Street from College Ave to Lewis Road is an example of a Level 2 street.

LEVEL 3: CONFIDENT ADULT

Level 3 includes arterial roadways with bicycle facilities that are probably only comfortable for an experienced, confident bicyclist.

Level 3 makes up 11% of the entire roadway network in Santa Rosa and 43% of arterial streets.

Yulupa Avenue from Creekside Road to Montgomery Drive is an example of a Level 3 street.

Note that having standard Class II bicycle lanes does not outweigh other factors such as traffic volume and speeds for this road to be considered low-stress.

LEVEL 4: FEARLESS ADULT

Level 4 includes arterial roadways with no bicycle facilities ridden only by strong or fearless bicyclists.

Level 4 makes up 15% of the entire roadway network and 57% of arterial streets.

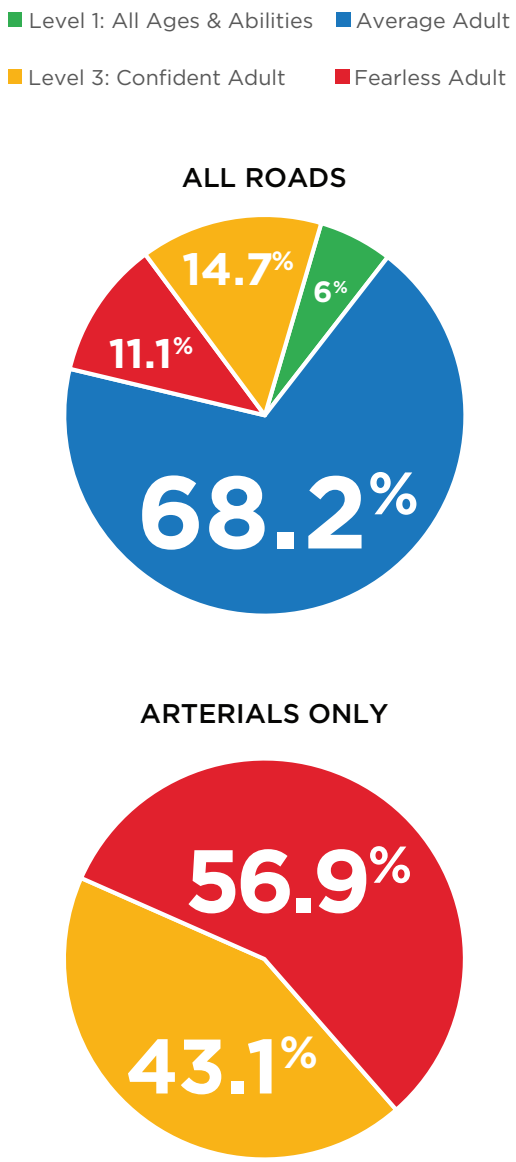
Santa Rosa Avenue from Maple Ave to W Third Street is an example of a Level 4 street

RESULTS

The level of traffic stress scores shown in Figure 3-24 illustrate the low stress connections and gaps throughout Santa Rosa. The Bicycle LTS results map approximates the user experience for the majority of Santa Rosa residents, however people may have differing opinions of traffic stress depending on their own experiences. While a majority of Santa Rosa's entire network scored a Level 1 and 2 (74% total), these facilities are minor local roads or off-street paths typically surrounded by higher stress arterials where most average adults would not feel comfortable riding. When only arterial roadways are examined, which serve as the direct connections to most destinations, nearly 57% are Level 4. See Figure 3-23.

Multi-use trails offer a low stress route that helps cut across these barriers, however the majority of residents may not feel comfortable bicycling outside their immediate neighborhood using local streets. This means that getting from residential areas to major destinations may not be possible given most people's tolerance for mixing with traffic—even on streets that have bicycle lanes.

Figure 3-23: Bicyclist Level of Traffic Stress on All Roads vs Arterials



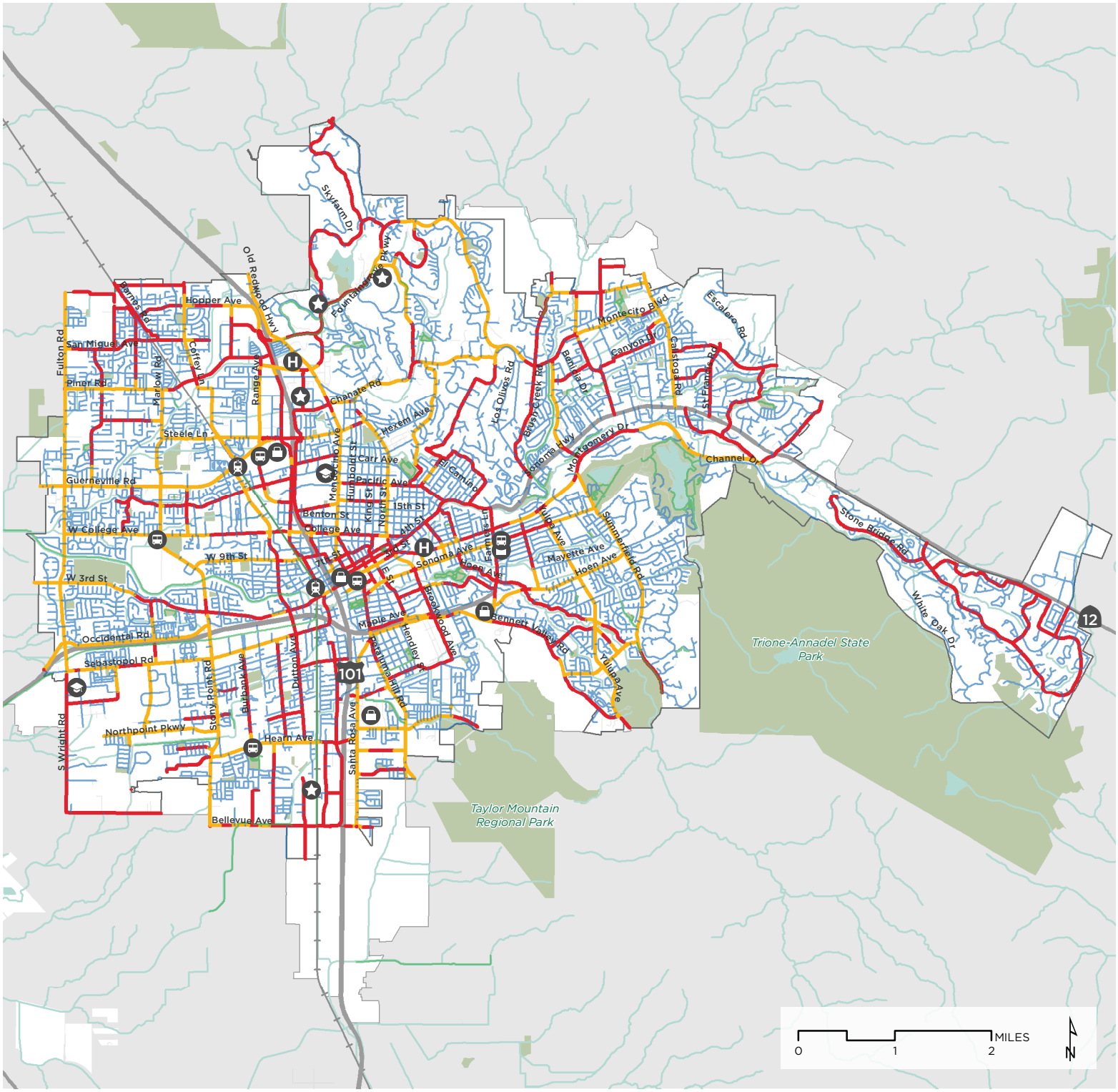


Figure 3-24

BICYCLE LEVEL OF TRAFFIC STRESS (CITYWIDE)

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

DESTINATIONS + BOUNDARIES

- Major Employer
- Transit Station
- Hospital
- Shopping Center
- SMART Station
- SMART Station
- Santa Rosa Junior College
- Park
- City Limts
- Urban Growth Boundary

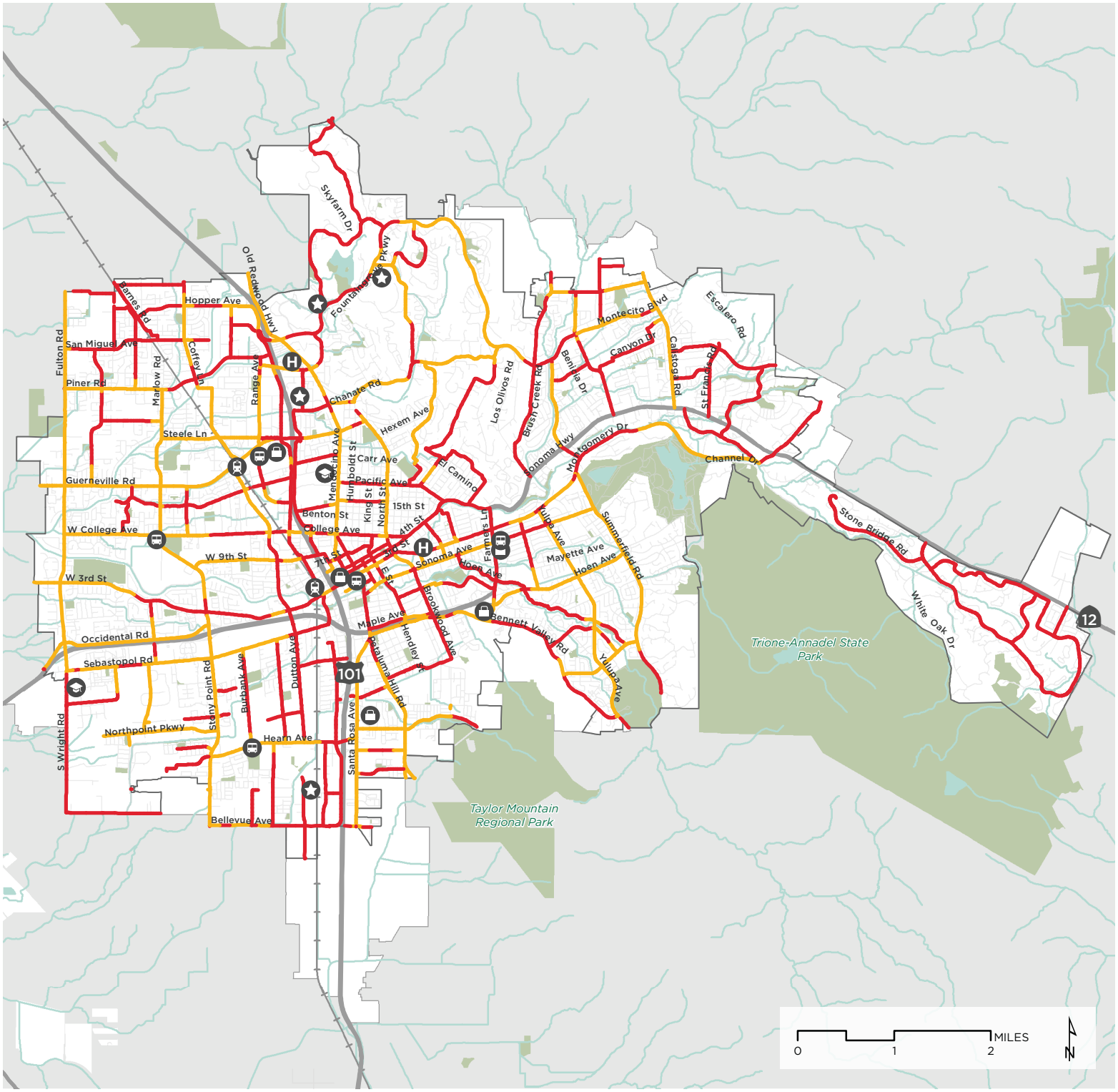


Figure 3-24

BICYCLE LEVEL OF TRAFFIC STRESS (ARTERIALS ONLY)

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

DESTINATIONS + BOUNDARIES

- Major Employer
- Transit Station
- Hospital
- Shopping Center
- SMART Station
- Santa Rosa Junior College
- Park
- City Limts
- Urban Growth Boundary

This page intentionally left blank

04

OUTREACH

Engaging the Santa Rosa community has been a priority throughout the Plan Update 2018 process. A variety of outreach opportunities were used to seek input from diverse Santa Rosa residents and community members. The plan development process also included extensive coordination with partner agencies and other City departments to ensure this Plan Update 2018 meets community needs, advances initiatives of local and regional partners, and includes projects and programs that can feasibly be implemented.

Ongoing outreach ensured a continuous feedback loop that informed the final project list and Plan Update 2018. Specific events and opportunities included:

This chapter presents an overview of the format and approach for each outreach opportunity, along with a summary of feedback received.

COMMUNITY MEETINGS

- Public Open Houses
- Pop Up Events
- Stakeholder Interviews

CITY BOARD, COMMISSION AND COUNCIL MEETINGS

- Bicycle and Pedestrian Advisory Board
- Waterways Advisory Committee
- Community Advisory Board
- Planning Commission
- City Council

ONLINE

- Community Survey
- Interactive Mapping Tool
- City Website and Social Media
- City Newsletter

ONLINE SURVEY

A community survey was developed to gather input on walking and bicycling challenges, preferences, and opportunities throughout Santa Rosa. The survey was made available online in both Spanish and English from February through June 2018, and advertised at all outreach events, through City newsletter and email notifications, and distributed by community groups. Participation in the survey was also encouraged by awarding a gift card to a randomly selected respondent. More than 1,300 people responded to the survey.

A summary of responses is provided below.

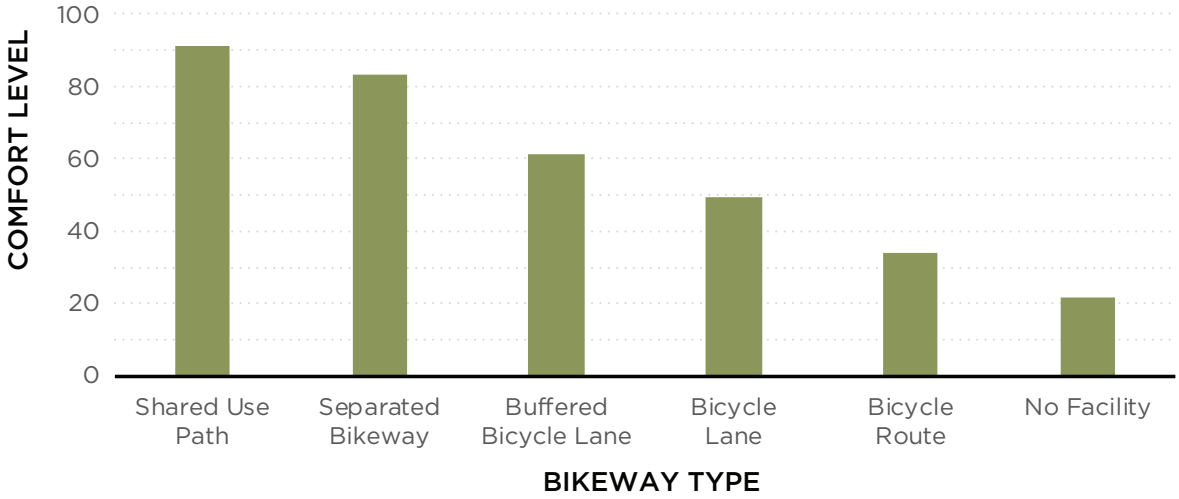
When asked about their comfort on a variety of bikeways, respondents expressed a clear preference for facilities that separate bicyclists from motorists. Shared use paths and separated bikeways were ranked most comfortable, while bicycle routes and streets with no bicycle facility were ranked least comfortable. See Figure 4-1.

Survey respondents stated a clear desire for walking and bicycling improvements in the community. Nearly 90 percent strongly or somewhat agreed they would like to travel by bicycle more than they currently do, and nearly 95 percent strongly or somewhat agreed they would like to walk more.

Health or recreation was the most common purpose for both bicycling and walking trips, with more than 40 percent of respondents bicycling and over 80 percent walking for health once a week or more.

Survey respondents overwhelmingly indicated that increased separation between facilities for different modes of transportation would encourage them to walk or bicycle more often. This separation, mentioned in 238 comments, includes buffering bicycle or pedestrian facilities from motor vehicle traffic, grade separation for challenging crossings, and providing dedicated space for both bicyclists and for pedestrians on some highly used paths.

Figure 4-1: Comfort on Bikeway Types



One common feature survey respondents said would improve their walking experience was enhanced crosswalks (mentioned in 102 responses). Of these, more than half expressed a desire for in-pavement flashing lights at crosswalks. Other crossing improvements mentioned included RRFBs or pedestrian hybrid beacons, curb extensions, refuge islands, high visibility markings, and beacons or stop controls on busy streets.

An improved sidewalk network was mentioned in responses 118 times, including both filling missing sidewalk segments and providing wide sidewalks with ample room for passing and walking abreast.

Finally, maintenance was mentioned in 111 comments. Specific needs reported included sweeping and debris removal, trimming vegetation, and resurfacing or repairing paved facilities to provide a smooth, level surface.

Topics mentioned in 40 or more survey comments are listed in Table 4-1 with the number of responses they appeared in.

Table 4-1: Top Survey Comment Themes

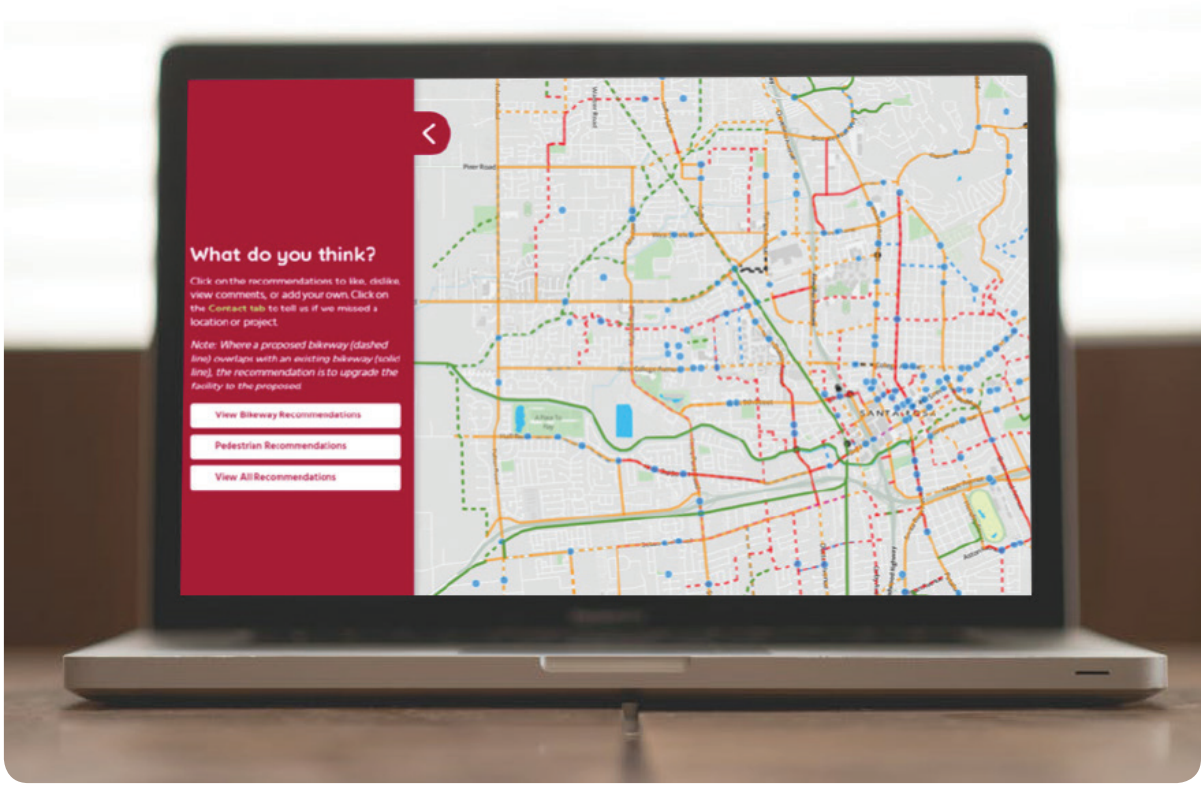
COMMENT THEME	NUMBER OF RESPONSES
Increased separation between road users, including grade separated crossings of highways and busy streets, buffers between streets and sidewalks or bicycle paths, and dedicated bicycling and walking areas on shared use paths	238
Improved sidewalks	118
Improved maintenance of walking and bicycling facilities including sweeping, vegetation trimming, and pavement repairs	111
Enhanced crosswalks	102
Better connectivity along existing networks	81
Address concerns about personal security related to homeless encampments	75
Enforcement, including targeting stopping at signals and stop signs; distracted driving, walking, and bicycling; and speeding	72
Bicycle network improvements, including green markings in potential conflict areas, bicycle detection at signals, and eliminating parking in bicycle lanes	58
Traffic calming	57
Secure bicycle parking	57
Increased lighting on sidewalks and at crossings	56
Providing bicycle lanes or other bikeways, especially on busier roads	48
Education for people driving, bicycling, and walking on the rights and responsibilities of all transportation users and on how to safely share space	44
Pedestrian amenities including seating, restrooms, trash receptacles, and water fountains	42
Traffic signal improvements including pedestrian countdown signals, leading pedestrian intervals, and longer “walk” phases	40

ONLINE INTERACTIVE MAPPING TOOL

An interactive mapping tool was posted on the City's website and used throughout development of this Plan Update 2018 to gather input and feedback from the community directly on a map of the city.

In early project phases from February through June 2018, community members were encouraged to draw routes or place pins on the map and add comments to identify desired walking or bicycling improvements, challenging locations, and other information about the walking and bicycling environment. Nearly 800 comments were received during this phase. This input informed the recommended bicycling and walking network improvements.

In the second phase of development from July through September 2018, the draft recommended walking and bicycling networks were displayed on the map and community members were invited to "like" or "dislike" projects to show their preferences, in addition to adding comments on specific projects and seeing the feedback left by others. More than 900 votes on projects were recorded along with approximately 420 comments on the draft recommendations. This input helped prioritize projects and refine the networks.



CITY WEBSITE AND SOCIAL MEDIA

For all community outreach opportunities, including the online survey and interactive mapping tool, the City leveraged their existing website, social media accounts, and newsletter mailing list to share information about the Plan Update 2018 process and encourage Santa Rosa residents to engage with the project team.

Website

The City created a section on their website for this Bicycle and Pedestrian Master Plan Update 2018. All online communications and project flyers pointed to this website, where community members were able to learn about the planning process, see upcoming outreach events, and download draft maps and other deliverables at key milestones.

Social Media

The City has nearly 16,000 followers on Facebook and over 34,500 subscribers on Nextdoor. Throughout the Plan Update 2018 process, posts on these platforms notified residents of upcoming events, draft documents available for review, online engagement tools, and other project milestones.

Newsletter

In addition to their social media presence, the City sent email newsletters to more than 11,000 subscribers. The City's Transportation and Public Works Out in the Field newsletter has more than 9,200 subscribers, and the email list for this Plan Update 2018 has more than 1,800. These newsletters were used to announce open houses and other events, encourage participation, and share updates about the project.

Promotional Material

An information card was also created in both English and Spanish with the project website and Community Open Houses listed. The cards were available at all outreach events and placed at various businesses, community centers, and libraries throughout the City. The Sonoma County Bicycle Coalition inserted 650 cards into participant goodie bags on Bike to Work Day (May 18, 2018) and members of the Community Advisory Board hand-delivered 350 cards to residents near the Rincon Valley Library to encourage attendance at the second Open House held there.

THE CITY SHARED PROJECT INFORMATION WITH THEIR:

16,000
Facebook followers

34,500+
Nextdoor subscribers

11,000+
Newsletter subscribers

PUBLIC OPEN HOUSES

Three open houses were held at key milestones during the planning process to gather input from the community and refine the Plan Update 2018.

Open House 1

The first open house was held April 18, 2018, at Montgomery High School. Stations at the open house shared findings from Chapter 2 including the existing walking and bicycling networks and programs, a review of collision locations, and the results of the Level of Traffic Stress analysis. A brief presentation described the planning process and an update on progress made since the 2010 Plan was adopted.

Input from approximately 20 residents who attended the open house informed the recommended projects and programs in this Plan Update 2018. Key themes included:

- Improve crossings along major roads and across Highway 101
- Close gaps in the sidewalk network
- Build more shared use paths with improved connections to destinations and on-street networks

Open House 2

Midway through the project, a second open house was held on July 25, 2018 at Rincon Valley Library. The open house was attended by nearly 90 residents, who reviewed draft network maps for bicycling and walking improvements in Santa Rosa. Attendees provided feedback on the draft networks, which helped refine and prioritize the project list.

Open House 3

A complete draft of this Plan Update 2018 was presented at a third open house on November 8, 2018. More than 50 attendees had the opportunity to revisit maps and other results from early project phases while also reviewing the evaluation strategy and resulting project implementation categories. Attendees provided feedback on the public draft materials which helped refine this Plan Update 2018.

STAKEHOLDER INTERVIEWS

To gain deeper insights into the needs and priorities of key community stakeholders, interviews were conducted with representatives of eleven groups in the city or region. Interviews were conducted over the phone or in person. Key topics from each interview are summarized below.

SANTA ROSA CYCLING CLUB AND SONOMA COUNTY BICYCLE COALITION (APRIL 5, 2018)

- Need for secure bicycle parking, including lockers or other long-term parking solutions
- Need for valet bicycle parking at all large events
- Desire for enhanced bicycle facilities in Santa Rosa including green markings at conflict areas or bike boxes

SAFE ROUTES TO SCHOOL PARTNERS (APRIL 12, 2018)

- Highest priority challenges include multi-lane roads and uncontrolled crossings
- Need for better visibility between road users
- Need for funding for education and encouragement

NEIGHBORHOOD REVITALIZATION PROGRAM (APRIL 19, 2018)

- Limited storage space for bicycles at home leads some residents to rely more on walking and transit
- Education about wrong-way bicycling was a past focus area
- Desire for increased education and encouragement for kids to walk and bicycle

VILLAGES AT WILD OAK (APRIL 19, 2018)

- Concerns about bicyclists sharing space with seniors walking on paths
- Need for education on sharing the road and consensus-building between residents and people walking or bicycling

SONOMA COUNTY TRANSIT AND SONOMA COUNTY REGIONAL PARKS (APRIL 25, 2018)

- Opportunity to align county and city trail and on-street bikeway connections
- Desire for trail segments from 2010 Plan to be carried forward along with six new trail segments for consideration

OAKMONT VILLAGE ASSOCIATION COMMUNITY DEVELOPMENT COMMITTEE (APRIL 30, 2018)

- Concerns about high-speed bicycling through Oakmont Village
- Desire for connection to Trione-Annadel State Park
- Toured potential access points in the neighborhood

SANTA ROSA JUNIOR COLLEGE AND JUNIOR COLLEGE NEIGHBORHOOD ASSOCIATION (APRIL 30, 2018)

- Desire for clear, measurable targets for bike infrastructure and mode share
- Need for secure bike parking
- Improved connections to SMART and other transit
- Access through the neighborhood and to campus

REDWOOD CHAPTER FOR THE BLIND (MAY 2, 2018)

- Educate bicyclists about audible signals when approaching or passing pedestrians with vision impairments
- Need for longer "walk" phases at some signals

COUNCIL ON AGING (MAY 8, 2018)

- Concerns about personal security for older adults walking on trails
- Need for lighting, seating, shade, and other amenities
- Desire to promote community walking events to promote health and foster social connections

SANTA ROSA POLICE DEPARTMENT (MAY 8, 2018)

- Downtown Safety Unit and Sonoma County Parks working together to address concerns about homeless along trails
- Periodically does targeted enforcement based on identified safety needs, including programs funded by the Office of Traffic Safety
- Need for education for all transportation users about sharing the road safely and rules of the road for each mode

ROSELAND COMMUNITY BUILDING INITIATIVE MEETING (JUNE 21, 2018)

- Concerns about speed of traffic on arterial streets
- Desire for pedestrian network gaps to be addressed

SUTTER HEALTH (JULY 25, 2018)

- Improve connections with transit
- Need for enforcement to address concerns about aggressive driving
- Working to promote bicycling and walking among staff with programs like a safe ride home, providing secure covered bicycle parking, and partnering with the Sonoma County Bicycle Coalition

POP-UP EVENTS

The project team also participated in six pop-up events in Santa Rosa, which provided opportunities for additional input into the Plan Update 2018 and helped raise awareness of the update process.

At each event, the project team gathered input about challenges and opportunities to improve walking and bicycling in Santa Rosa. This feedback informed documentation of existing networks along with development of draft network recommendations. The six events are listed below with feedback themes.

WELCOME ROSELAND (JANUARY 20, 2018)

- Pedestrian priorities include shade, increased lighting, and beacons at uncontrolled crossings
- Bicycling priorities include shared use paths, buffered bicycle lanes, and separated bikeways

HIGHWAY 101 OVERCROSSING PUBLIC MEETING (MARCH 29, 2018)

- Need for bicycle connections and secure bicycle parking at Santa Rosa Junior College
- Desire for SMART path to connect further north toward the airport
- Split opinions on possible alternatives presented for the Highway 101 Overcrossing

A pop up event at the Welcome Roseland event

A pop up event at a meeting for the Highway 101 Overcrossing project

A pop up event at the Cinco de Mayo Festival

A pop up event at the Coddington Mall Summer Resource Fair

EARTH DAY ON STAGE (APRIL 21, 2018)

- Desire for more creek trails and connections to regional trails
- Need for improved crossings, especially at the railroad and highways
- Preference for bicycle lanes (with buffers where feasible) on existing streets

SONOMA COUNTY HUMAN RACE (APRIL 28, 2018)

- Need for education about wrong-way bicycling
- Concerns about biking on roads that are narrow, higher speed, and do not have dedicated bicycle facilities
- Desire for improved SMART trail connections
- Desire for improved connections to nearby communities

CINCO DE MAYO FESTIVAL (MAY 5, 2018)

- Increase lighting on trails
- Need for secure bicycle parking
- Improve connections to and within the Roseland community

SUMMER RESOURCE FAIR AT CODDINGTOWN MALL (JUNE 16, 2018)

- Need for wider bicycle lanes
- Desire for separated facilities for active transportation

CITY BOARD, COMMISSION, AND COUNCIL MEETINGS

Bicycle and Pedestrian Advisory Board

Draft deliverables were presented to the City's Bicycle and Pedestrian Advisory Board (BPAB) at seven of their meetings during development of this Plan Update 2018. Meeting dates and presentation topics are outlined below.

- **February 15, 2018:** Draft Bicycle Friendly Community Assessment
- **March 15, 2018:** Draft Existing Conditions and Level of Traffic Stress
- **April 19, 2018:** Draft Bicycle and Pedestrian Facility Guidelines
- **July 19, 2018:** Draft Network Recommendations
- **August 16, 2018:** Draft Program and Policy Recommendations
- **November 15, 2018:** Administrative Draft Plan Update 2018
- **January 17, 2019:** Final Draft Plan Update 2018

In addition to these seven meetings, a survey was sent to BPAB members in September 2018 to gather feedback on draft prioritization criteria.

BPAB feedback guided development of this Plan Update 2018 by providing both strategic direction and specific input throughout the planning process.

Members of the Santa Rosa BPAB review draft recommendations and share feedback

Waterways Advisory Committee

Because Santa Rosa has a robust network of trails along the many creeks in the City, the Waterways Advisory Committee (WAC) was a key partner in developing recommendations to improve and expand the trail network. Staff presented to the WAC three times during the Plan Update 2018 process, in June, August, and November 2018.

- **June 18, 2018:** Introduced the Project
- **August 23, 2018:** Draft Network Recommendations
  - » Identified additional recommendations from the Citywide Creeks Master Plan to be incorporated
  - » Closing sidewalk gaps and improving pedestrian access to parks are priorities
- **November 29, 2018:** Administrative Draft Plan Update 2018
  - » Reviewed recommendations for consistency with the Citywide Creeks Master Plan
  - » Provided detailed feasibility input on proposed shared use paths and creek trails

Community Advisory Board

The project team presented to the Community Advisory Board on March 28, 2018 to share information about the Plan Update 2018 and encourage them to participate in upcoming public outreach activities.

Planning Commission

The Final Draft Plan Update was presented to the Planning Commission on February 14, 2019.

City Council

This section will be completed following the City Council meeting on March 12, 2019.

05

PROJECTS, PROGRAMS, & POLICIES

The active transportation network described in this Plan Update 2018 seeks to provide the Santa Rosa community with convenient, comfortable, and healthy transportation choices.

Built on the needs and opportunities identified through the evaluation of existing conditions, progress made since the development of the 2010 Plan, extensive community input, and data-driven analyses, this chapter presents the projects, programs, and policy changes for the City of Santa Rosa. Improvements identified during previous planning efforts or studies were also reviewed for this Plan Update 2018, including the Uncontrolled Crossing Study and numerous Safe Routes to School Audit reports.

Recommendations are considered planning-level, meaning they should be used as a guide when implementing projects. In some cases, traffic impact analysis and more detailed design analysis will be required to evaluate specific site conditions and develop designs that reflect conditions and constraints.

This chapter includes the following sections:

- **Projects** describes the proposed bicycling and walking infrastructure improvements, including sections for crossing improvements and for studies at locations where further analysis or community outreach is necessary to determine the most appropriate improvement type for the location
- **Citywide Projects** describes improvements that should be pursued throughout Santa Rosa as opportunities arise, but specific locations for these improvements have not been identified in this Plan Update 2018
- **Programs** includes recommended education, encouragement, enforcement, and evaluation activities to be pursued or expanded by the City and its partners
- **Policy Changes** includes changes to municipal codes, operating procedures, or other policies that will support a more walkable and bikeable Santa Rosa

For a table of infrastructure recommendations and studies, see Appendix A.

PROJECTS

Bicycle Network Projects

Bicycle network projects are categorized based on the four classifications recognized by Caltrans, along with two sub-classifications, described in detail in Chapter 3 and the Bicycle and Pedestrian Facility Guidelines in Appendix B. These include:

- **Class I Shared Use Paths:** Dedicated paths for walking and bicycling completely separate from the roadway
- **Class II Bicycle Lanes:** Striped lanes for bicyclists
  - » ***Class II Buffered Bicycle Lanes:*** Bicycle lanes that include a striped "buffer" area either between the bicycle lane and travel lane or between the bicycle lane and parked cars
- **Class III Bicycle Routes:** Signed routes for bicyclists on low-speed, low-volume streets where lanes are shared with motorists
  - » ***Class III Bicycle Boulevards:*** Bicycle routes that are further enhanced with traffic calming features or other treatments to prioritize bicyclist comfort
- **Class IV Separated Bikeways:** On-street bicycle facilities with a physical barrier between the bicycle space and motor vehicle lanes, including bollards, curbs, or parking

Nearly 130 miles of new bikeways are proposed in this Plan Update 2018, which would more than double the current 113 miles of bikeways in the City. A summary of existing and proposed bicycle network improvements is provided in Table 5-1 and mapped in Figure 5-1 through Figure 5-6.

Table 5-1: Existing and Proposed Bikeway Mileage

	EXISTING MILES	PROPOSED		
BIKEWAY TYPE	**2018**	**MILES**	**# OF PROJECTS**	**TOTAL EXISTING + PROPOSED MILES**
Class I Shared Use Paths	30.9	38.9	69	**69.8**
Class II Bicycle Lanes	67.1	48.5	115	**115.6**
Class II Buffered Bicycle Lanes	0.2	1.9	4	**2.1**
Class III Bicycle Routes	12.8*	35.3	116	**48.1**
Class III Bicycle Boulevards	1.6	2.5	8	**4.1**
Class IV Separated Bikeways		2.2	3	**2.2**
Total	**112.6**	**129.3**	**315**	**241.9**

**Some Class III Bicycle Routes were upgraded to Class II Bicycle Lanes*

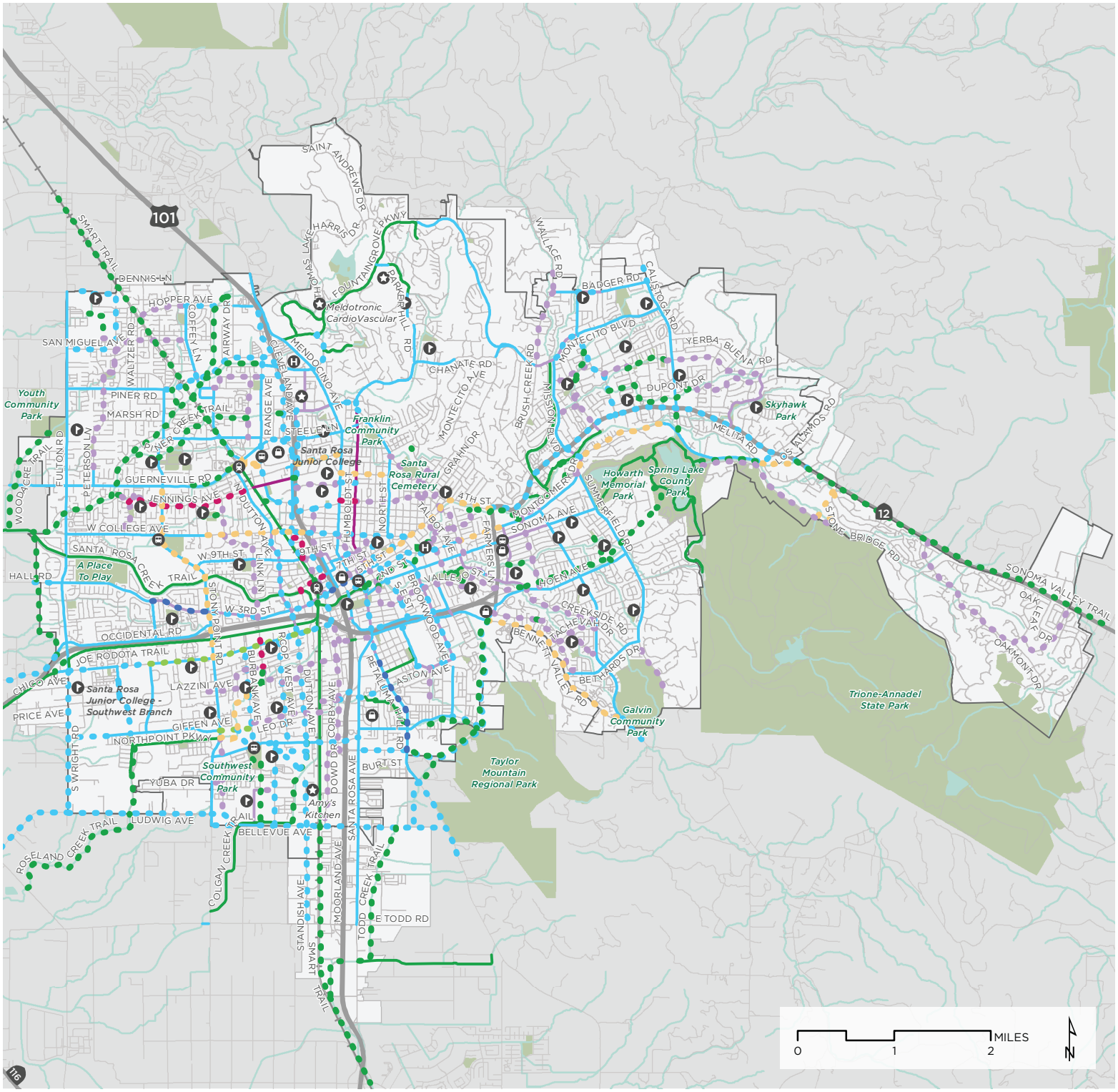


Figure 5-1

BIKEWAY PROJECTS (CITYWIDE)

DESTINATIONS + BOUNDARIES

- School
- Major Employer
- Transit Station
- SMART Station
- Hospital
- Shopping Center
- Park
- City Limts
- Urban Growth Boundary

PROPOSED

- Class I Shared-Use Path
- Class II Bicycle Lane
- Class IIB Buffered Bicycle Lan
- Class III Bicycle Route
- Class IIIB Bicycle Boulevard
- Class IV Separated Bikeway
- Study

EXISTING

- Class I Shared-Use Path
- Class II Bike Lane
- Class III Bike Route
- Class IIIB Bicycle Boulevard

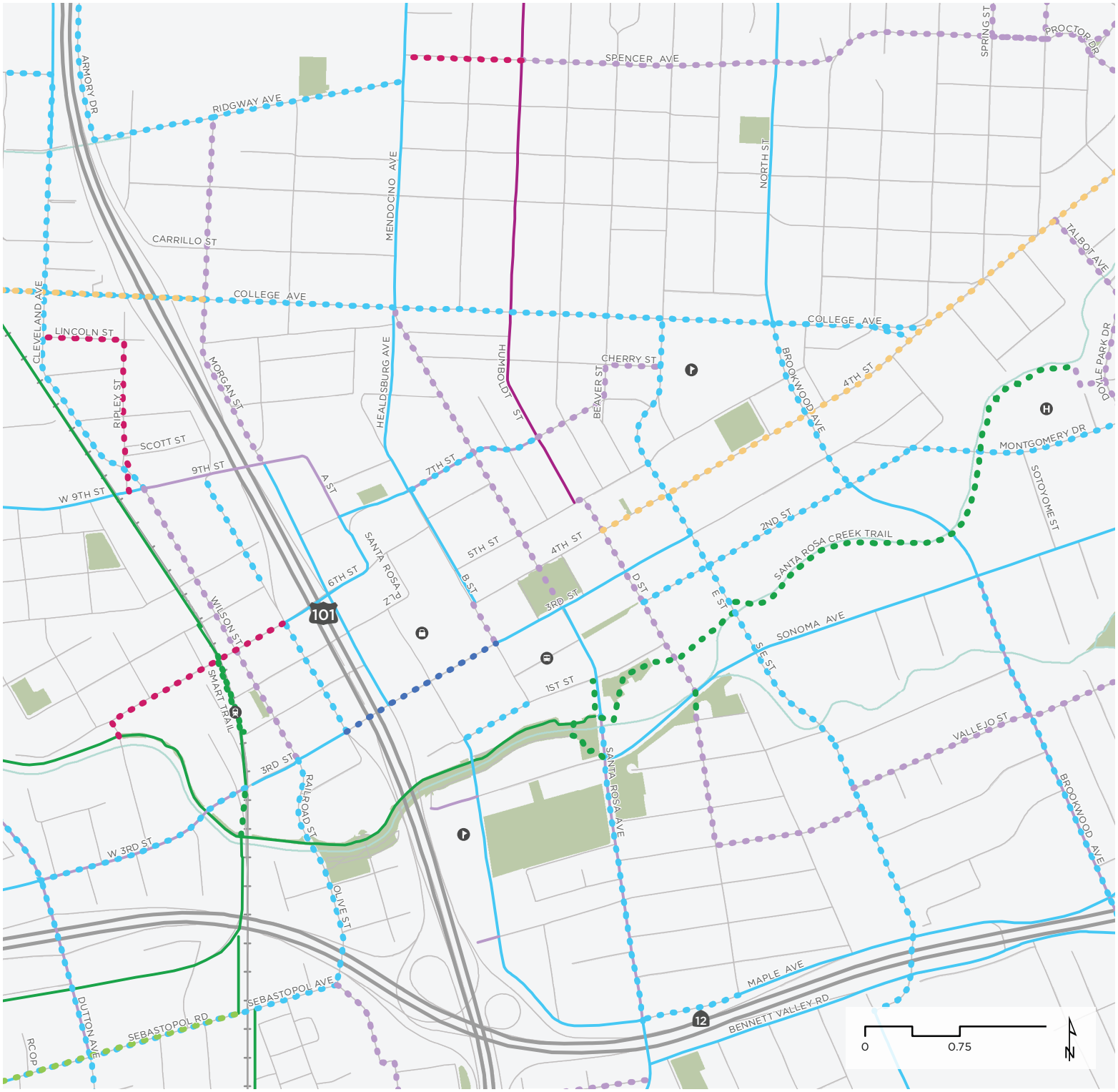


Figure 5-2

BIKEWAY PROJECTS (DOWNTOWN)

DESTINATIONS + BOUNDARIES

- School
- Transit Station
- SMART Station
- Hospital
- Shopping Center
- Park
- City Limts
- Urban Growth Boundary

PROPOSED

- Class I Shared-Use Path
- Class II Bicycle Lane
- Class IIB Buffered Bicycle Lan
- Class III Bicycle Route
- Class IIIB Bicycle Boulevard
- Class IV Separated Bikeway
- Study

EXISTING

- Class I Shared-Use Path
- Class II Bike Lane
- Class III Bike Route
- Class IIIB Bicycle Boulevard

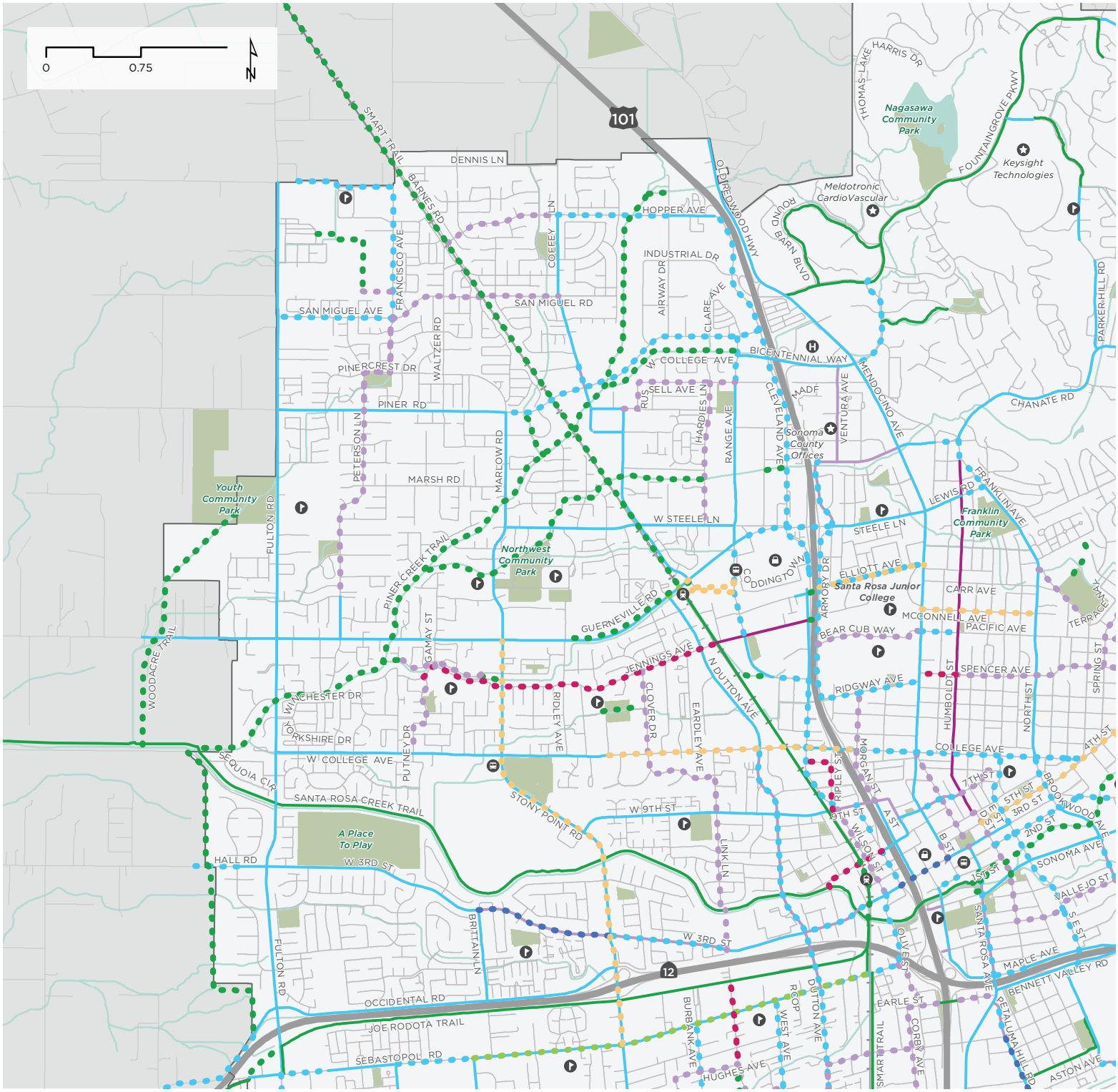


Figure 5-3

BIKEWAY PROJECTS (NORTHWEST)

DESTINATIONS + BOUNDARIES

- School
- Major Employer
- Transit Station
- SMART Station
- Hospital
- Shopping Center
- Park
- City Limts
- Urban Growth Boundary

PROPOSED

- Class I Shared-Use Path
- Class II Bicycle Lane
- Class IIB Buffered Bicycle Lan
- Class III Bicycle Route
- Class IIIB Bicycle Boulevard
- Class IV Separated Bikeway
- Study

EXISTING

- Class I Shared-Use Path
- Class II Bike Lane
- Class III Bike Route
- Class IIIB Bicycle Boulevard

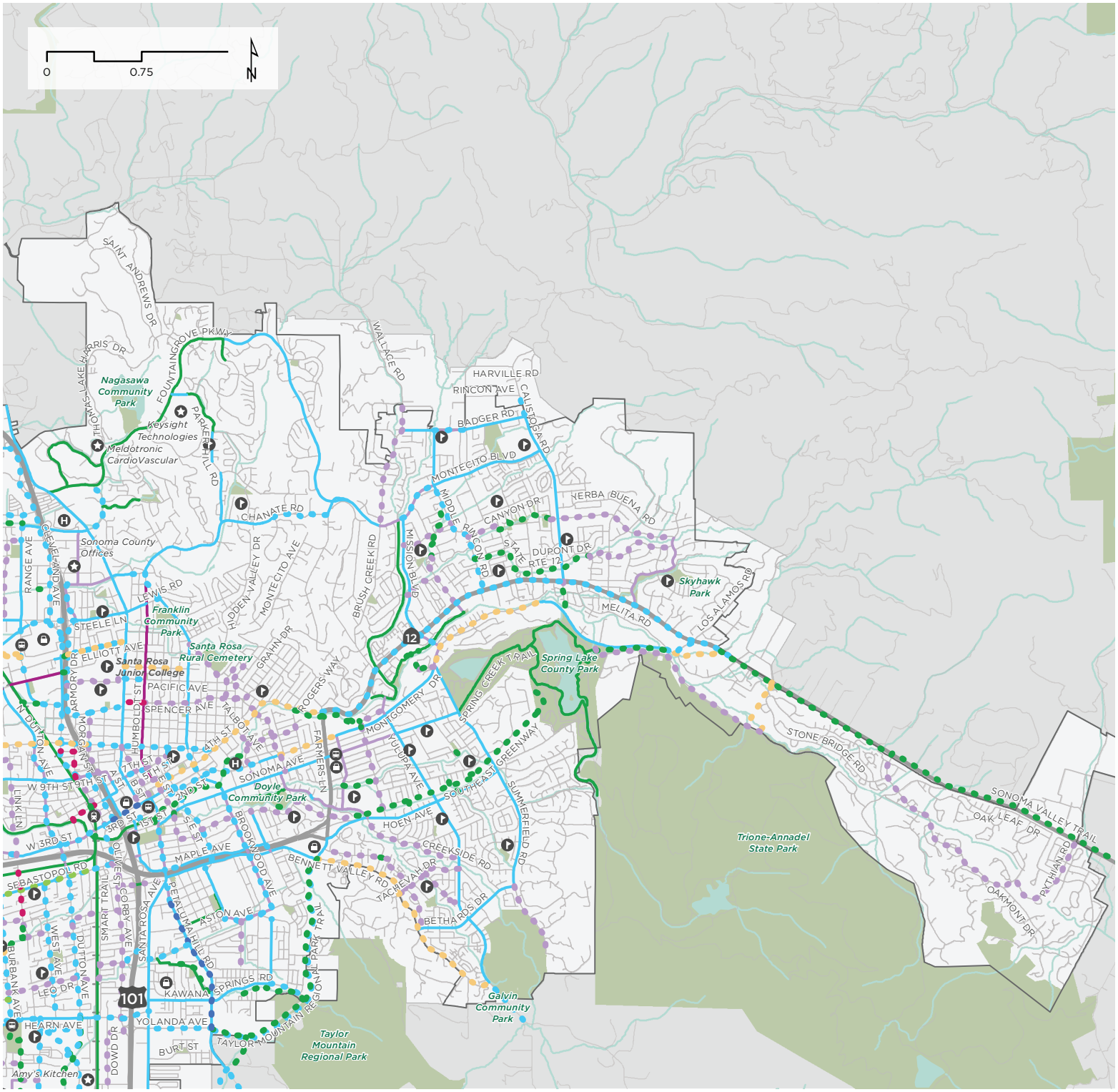


Figure 5-4

BIKEWAY PROJECTS (NORTHEAST)

DESTINATIONS + BOUNDARIES

- School
- Major Employer
- Transit Station
- SMART Station
- Hospital
- Shopping Center
- Park
- City Limts
- Urban Growth Boundary

PROPOSED

- Class I Shared-Use Path
- Class II Bicycle Lane
- Class IIB Buffered Bicycle Lan
- Class III Bicycle Route
- Class IIIB Bicycle Boulevard
- Class IV Separated Bikeway
- Study

EXISTING

- Class I Shared-Use Path
- Class II Bike Lane
- Class III Bike Route
- Class IIIB Bicycle Boulevard

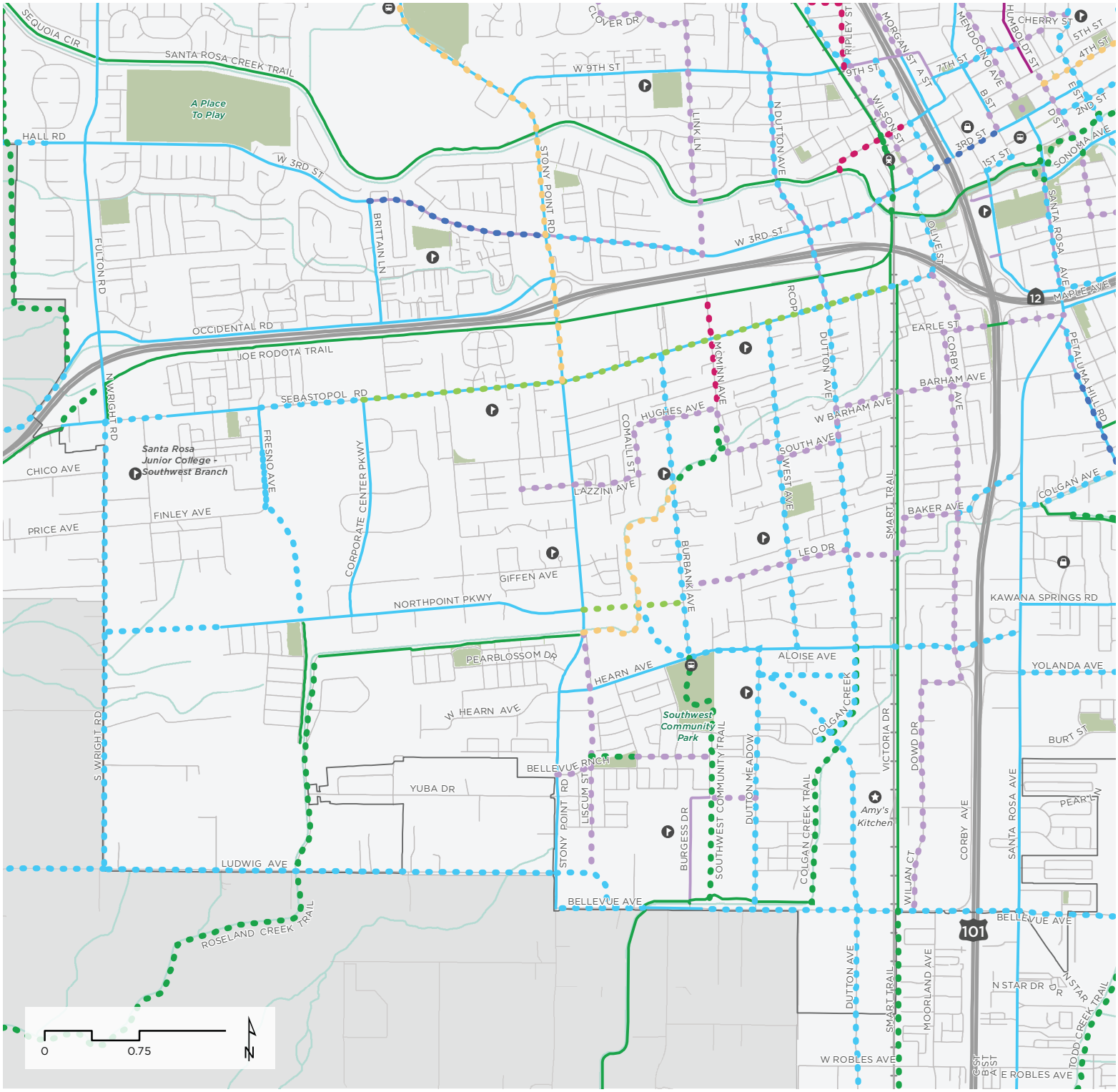


Figure 5-5

BIKEWAY PROJECTS (SOUTHWEST)

DESTINATIONS + BOUNDARIES

- School
- Major Employer
- Transit Station
- SMART Station
- Shopping Center
- Park
- City Limts
- Urban Growth Boundary

PROPOSED

- Class I Shared-Use Path
- Class II Bicycle Lane
- Class IIB Buffered Bicycle Lan
- Class III Bicycle Route
- Class IIIB Bicycle Boulevard
- Class IV Separated Bikeway
- Study

EXISTING

- Class I Shared-Use Path
- Class II Bike Lane
- Class III Bike Route

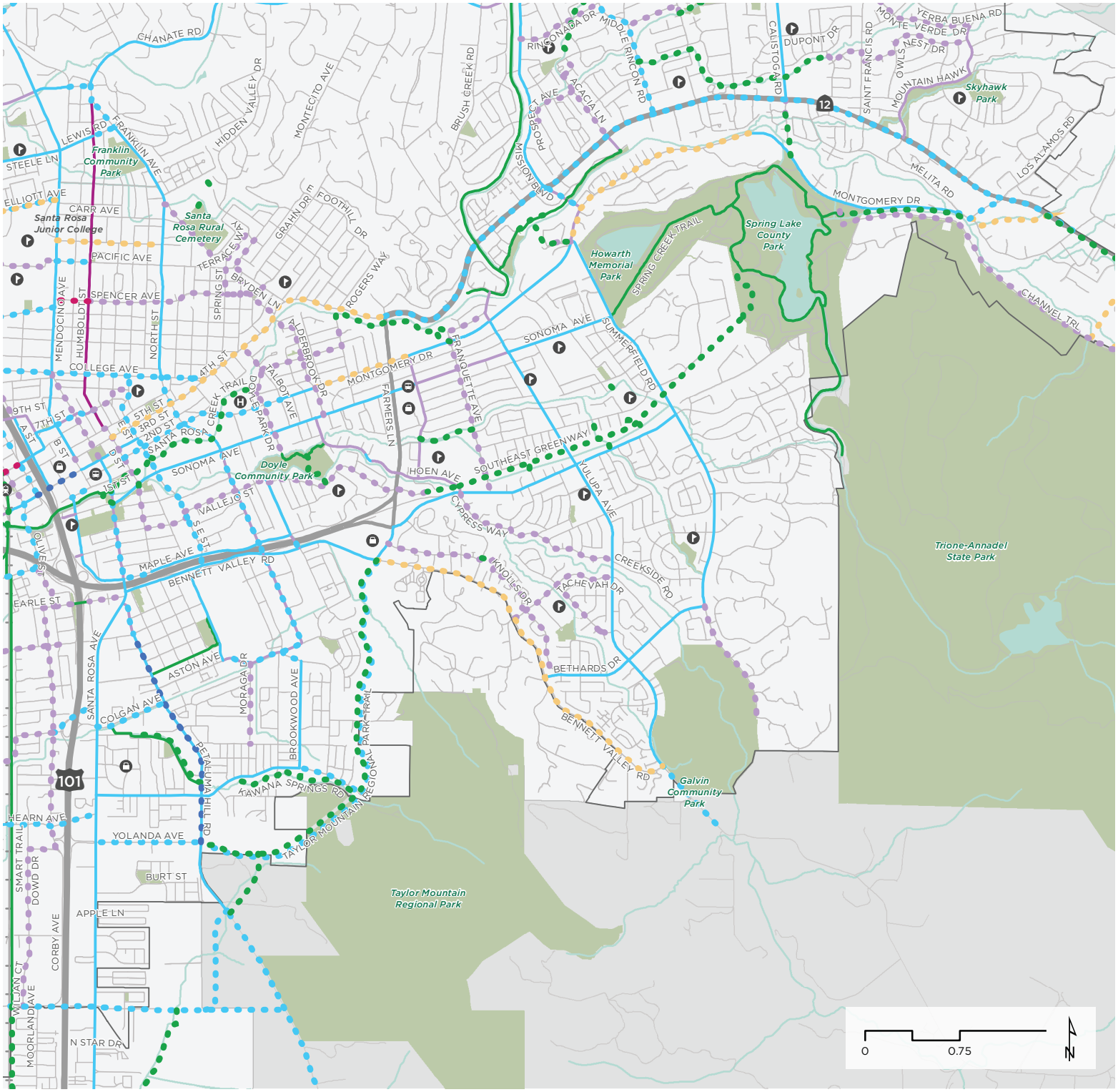


Figure 5-6

BIKEWAY PROJECTS (SOUTHEAST)

DESTINATIONS + BOUNDARIES

- School
- Transit Station
- SMART Station
- Hospital
- Shopping Center
- Park
- City Limts
- Urban Growth Boundary

PROPOSED

- Class I Shared-Use Path
- Class II Bicycle Lane
- Class IIB Buffered Bicycle Lan
- Class III Bicycle Route
- Class IIIB Bicycle Boulevard
- Class IV Separated Bikeway
- Study

EXISTING

- Class I Shared-Use Path
- Class II Bike Lane
- Class III Bike Route
- Class IIIB Bicycle Boulevard

Pedestrian Network Projects

The pedestrian network includes Class I Shared Use Paths, discussed in the previous section, along with sidewalks. Sidewalks and pathways are an essential element of a pedestrian network. They not only provide a comfortable walking space separate from the roadway, but are also a foundational element of Americans with Disabilities Act (ADA) compliance.

Sidewalks and pathways should provide a smooth surface free of obstructions at least five feet wide. In some areas, where high pedestrian activity is expected, wider sidewalks may be desirable. Sidewalks and pathways can either be adjacent to the curb or separated by a planted landscaping strip, as shown below.

There are many streets in Santa Rosa with sidewalks or pathways, but the network is inconsistent. Not every street without a sidewalk or pathway is recommended for improvement in this Plan Update 2018 due to limited available public right of way. Instead, sidewalk and pathway recommendations are focused on those corridors where they are likely to serve large numbers or pedestrians or address a priority community concern.

This Plan Update 2018 includes 21.2 miles of proposed sidewalks, mapped in Figure 5-7 through Figure 5-12 along with existing and proposed Class I shared use paths.

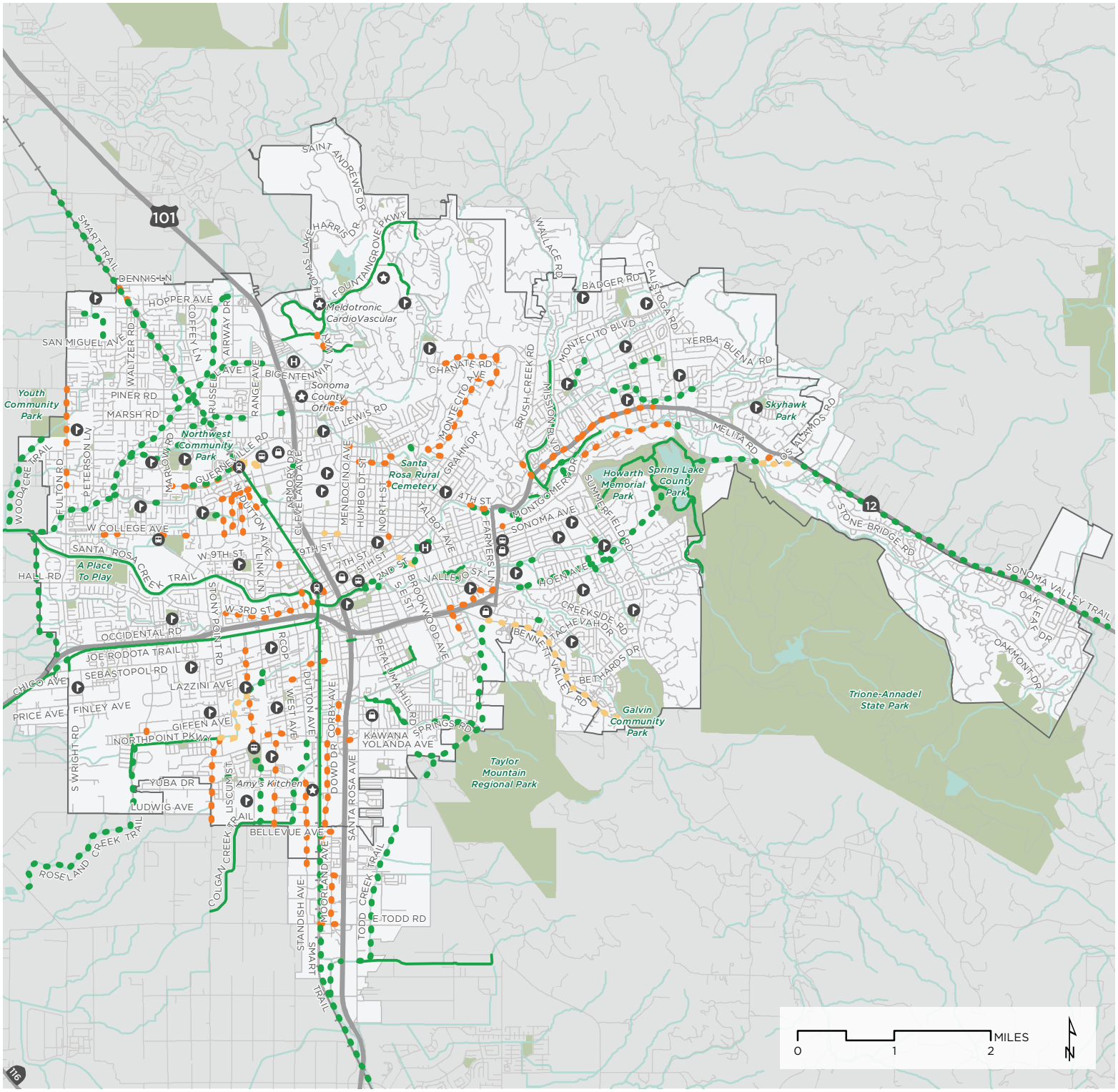


Figure 5-7

PEDESTRIAN PROJECTS (CITYWIDE)

PROPOSED

- Class I Shared-Use Path
- Sidewalk
- Study

EXISTING

- Class I Shared-Use Path

DESTINATIONS + BOUNDARIES

- School
- Major Employer
- Transit Station
- SMART Station
- Hospital
- Shopping Center
- Park
- City Limts
- Urban Growth Boundary

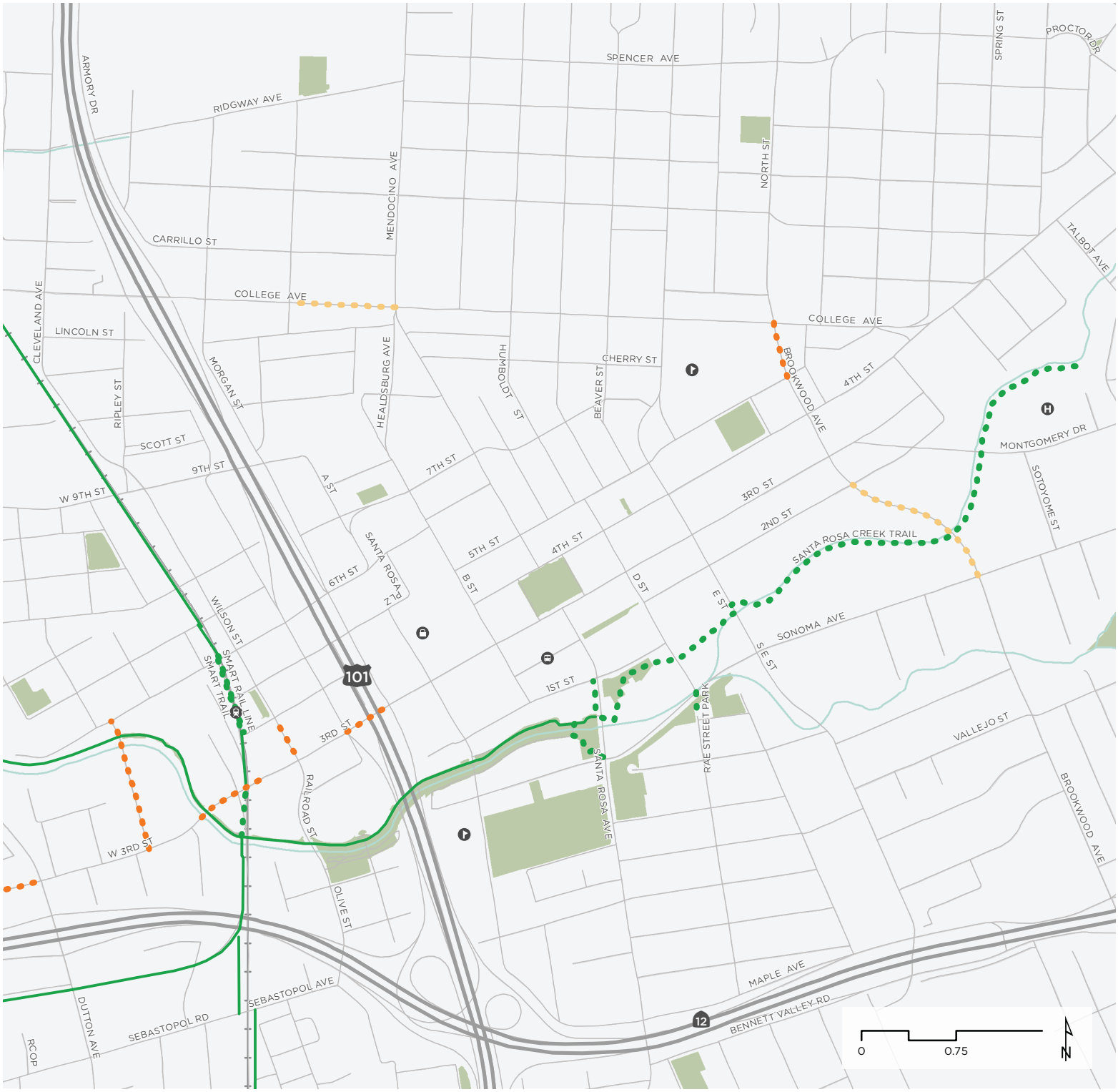


Figure 5-6

PEDESTRIAN PROJECTS (DOWNTOWN)

PROPOSED

- Class I Shared-Use Path
- Sidewalk
- Study

EXISTING

- Class I Shared-Use Path

DESTINATIONS + BOUNDARIES

- School
- Transit Station
- SMART Station
- Hospital
- Shopping Center
- Park
- City Limts
- Urban Growth Boundary

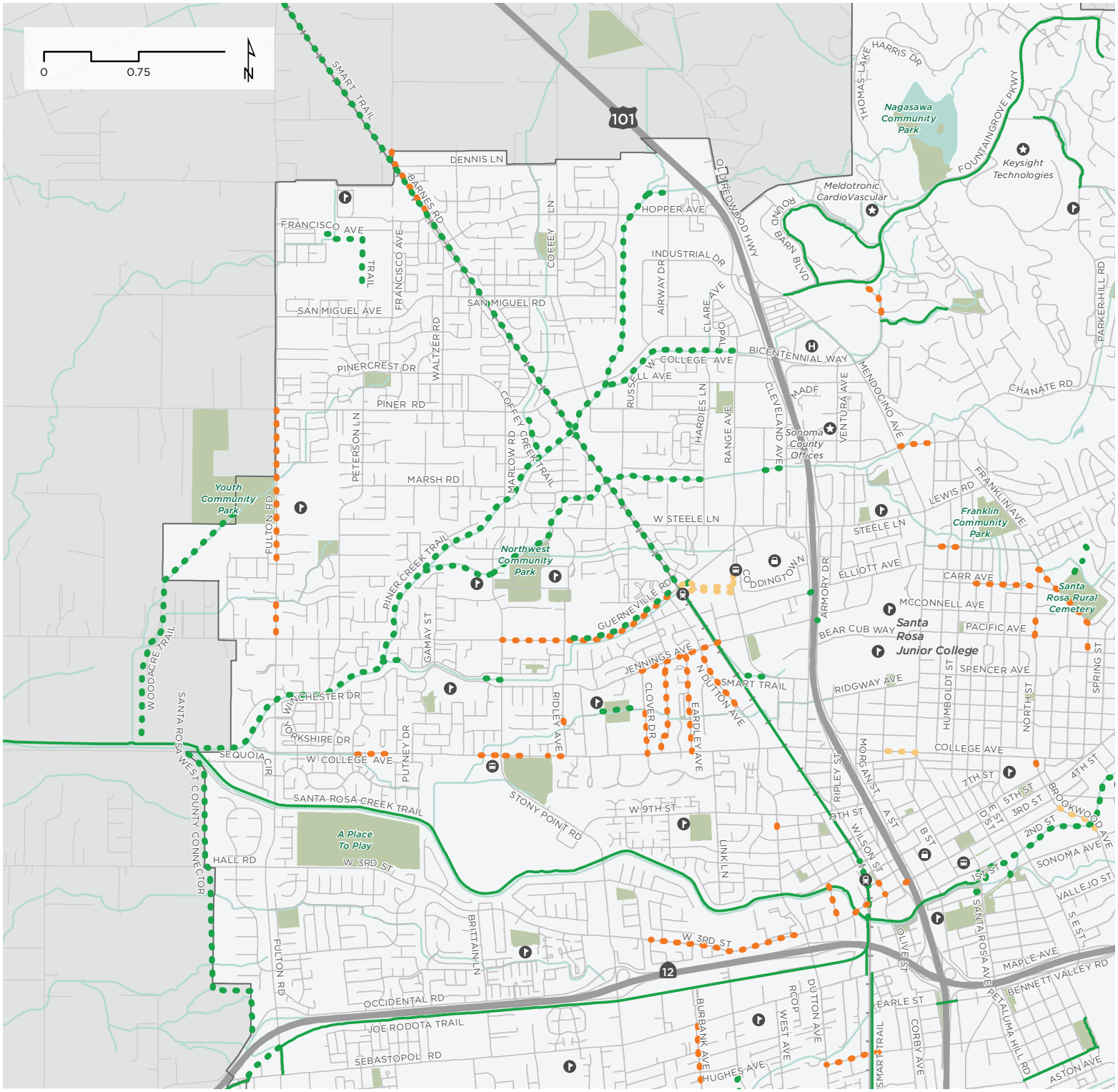


Figure 5-7

PEDESTRIAN PROJECTS (NORTHWEST)

PROPOSED

- Class I Shared-Use Path
- Sidewalk
- Study

EXISTING

- Class I Shared-Use Path

DESTINATIONS + BOUNDARIES

- School
- Major Employer
- Transit Station
- SMART Station
- Hospital
- Shopping Center
- Park
- City Limts
- Urban Growth Boundary

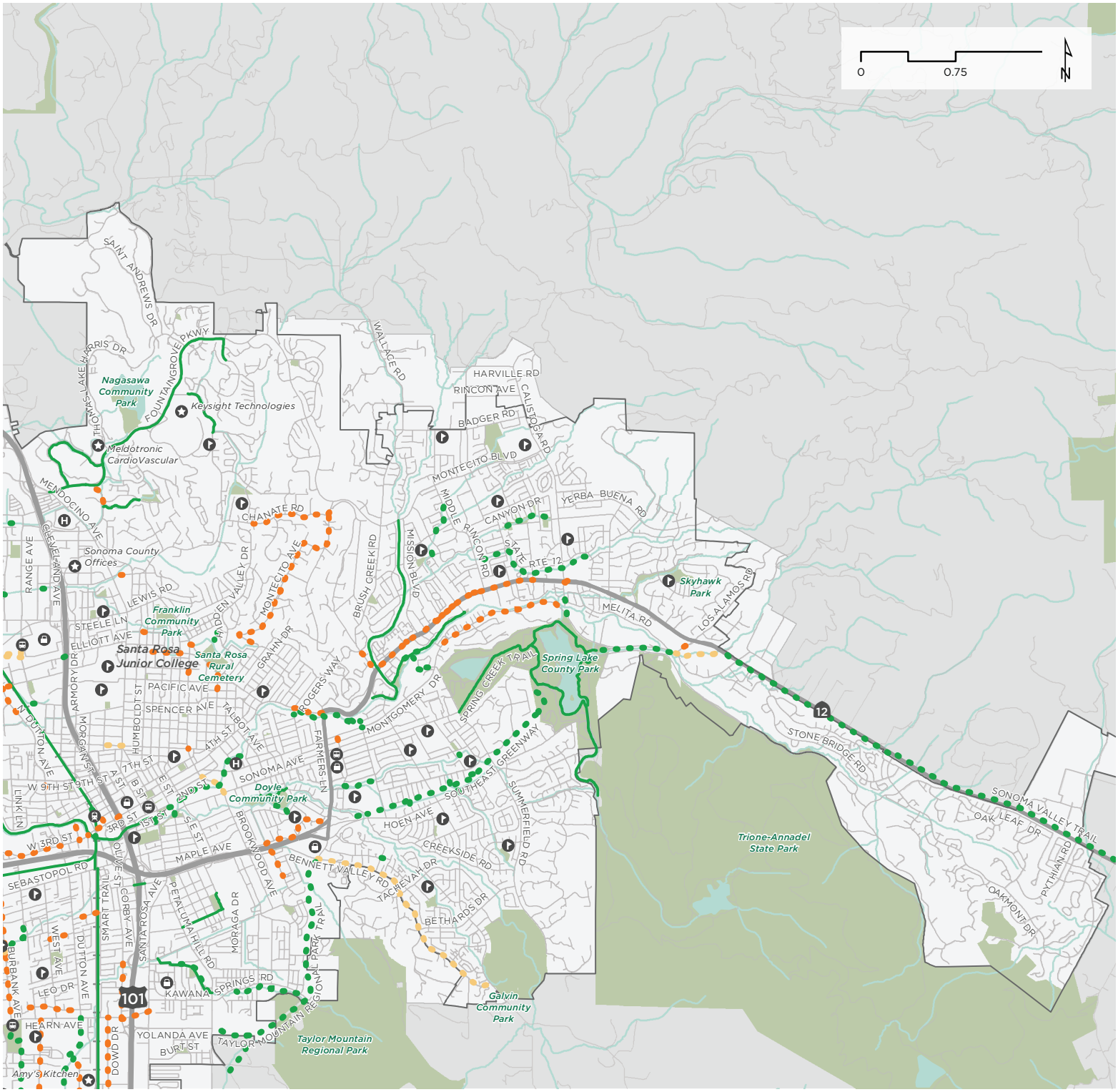


Figure 5-8

PEDESTRIAN PROJECTS (NORTHEAST)

PROPOSED

- Class I Shared-Use Path
- Sidewalk
- Study

EXISTING

- Class I Shared-Use Path

DESTINATIONS + BOUNDARIES

- School
- Major Employer
- Transit Station
- SMART Station
- Hospital
- Shopping Center
- Park
- City Limts
- Urban Growth Boundary

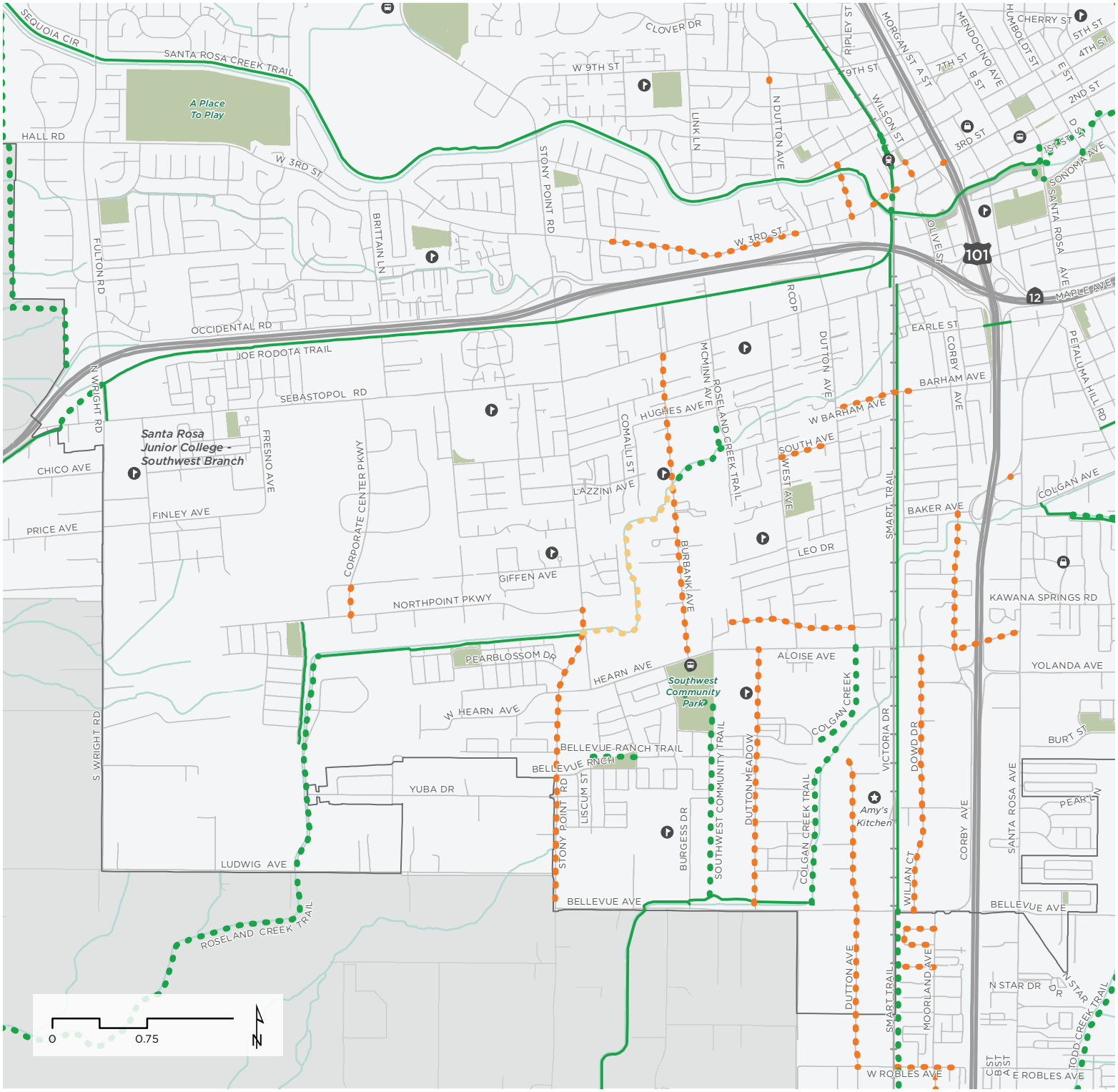


Figure 5-9

PEDESTRIAN PROJECTS (SOUTHWEST)

PROPOSED

- Class I Shared-Use Path
- Sidewalk
- Study

EXISTING

- Class I Shared-Use Path

DESTINATIONS + BOUNDARIES

- School
- Major Employer
- Transit Station
- SMART Station
- Shopping Center
- Park
- City Limts
- Urban Growth Boundary

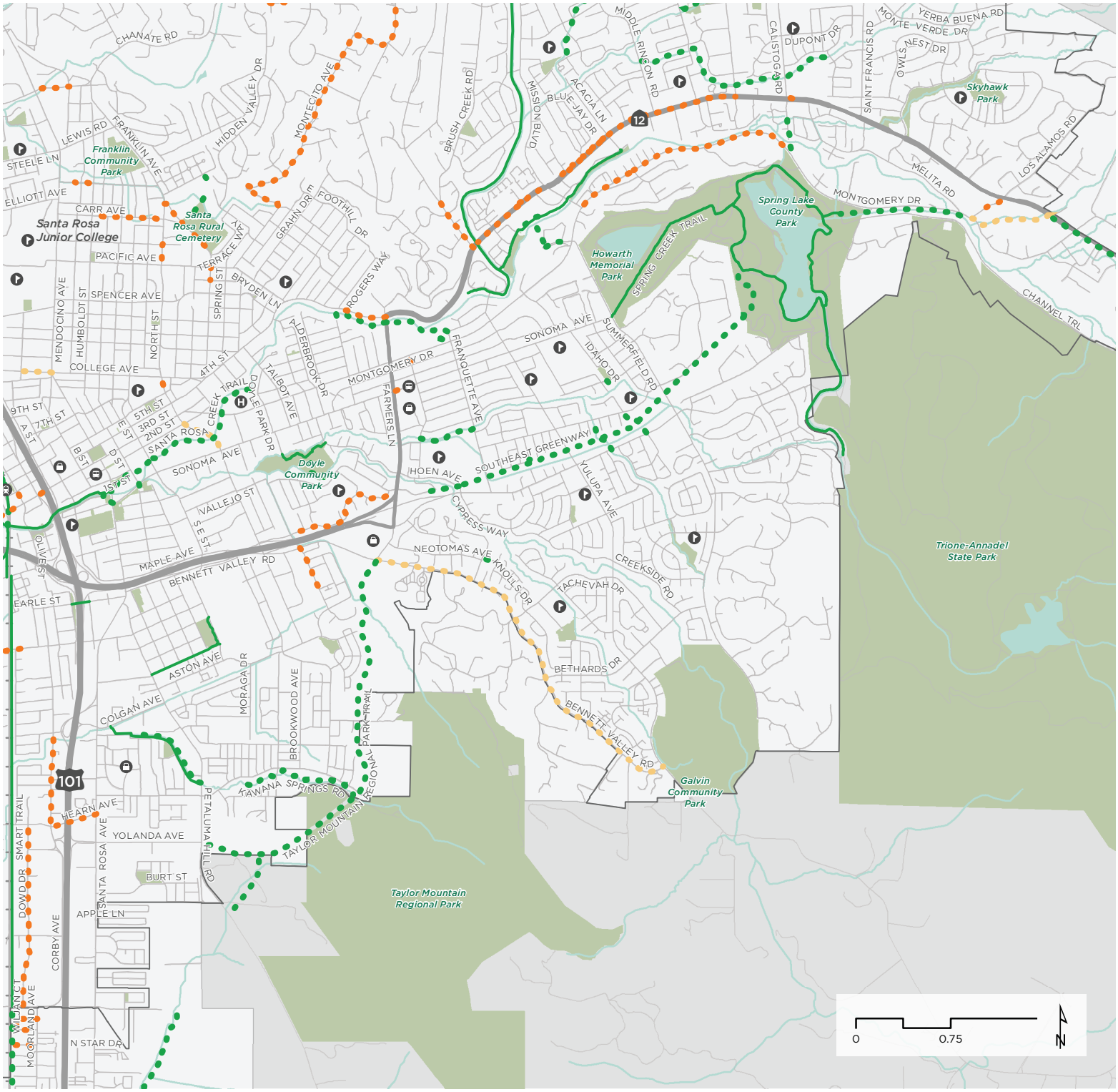


Figure 5-10

PEDESTRIAN PROJECTS (SOUTHEAST)

PROPOSED

- Class I Shared-Use Path
- Sidewalk
- Study

EXISTING

- Class I Shared-Use Path

DESTINATIONS + BOUNDARIES

- School
- Transit Station
- SMART Station
- Hospital
- Shopping Center
- Park
- City Limts
- Urban Growth Boundary

Crossings

In addition to network projects for bicycling and walking, locations for new or improved crossings have been gathered and consolidated through this Plan Update 2018 from the numerous public outreach events and a review of past plans including the Uncontrolled Crosswalk Analysis and multiple Safe Routes to School assessment reports.

Specific facility recommendations and designs for these locations will be developed by the City on a case-by-case basis due to the highly varied context at each intersection or midblock crossing location. Some locations represent multiple alternatives identified for possible crossings, and improvements may not ultimately be recommended at all locations. Some typical crosswalk markings and enhancements are described on the following pages, as well as in the Bicycle and Pedestrian Facility Guidelines in Appendix B.

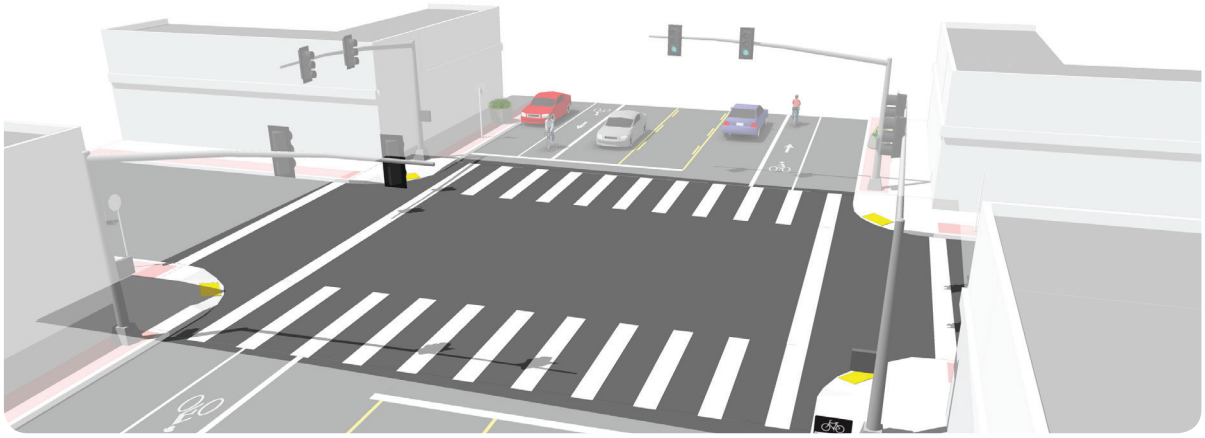
Crossing locations were also identified where a trail crossing of a creek may be developed. These locations are identified as trail bridges and will be considered separately from crossings of the roadway network.

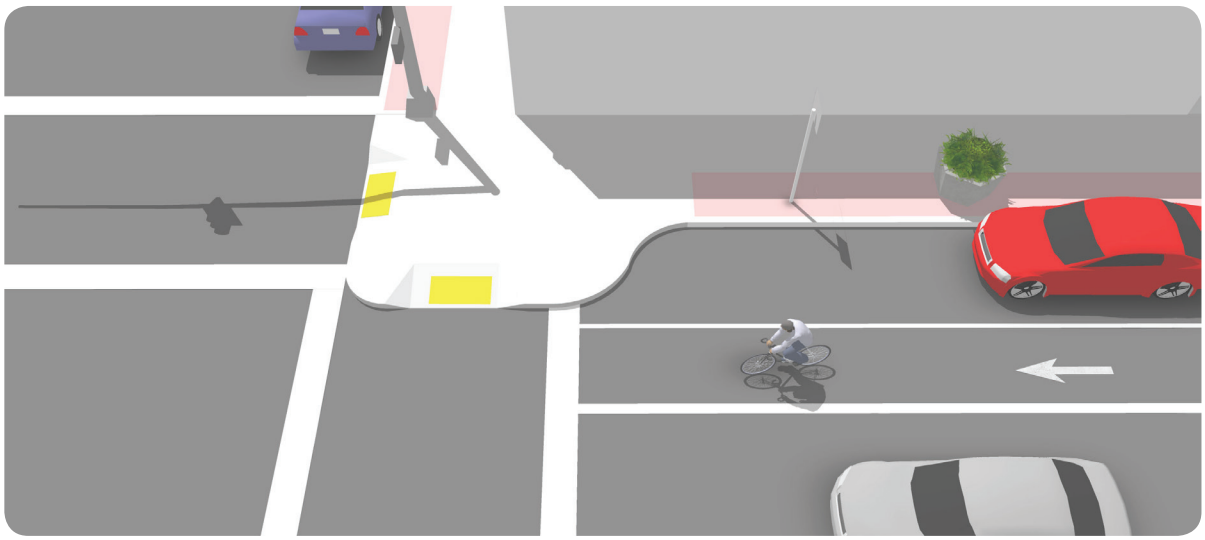
Crossing locations and trail bridges are mapped in Figure 5-13 through Figure 5-18.

CROSSWALK MARKINGS

While legal crosswalks exist at all intersections, crosswalk markings highlight crossings to motorists, increasing awareness that people may be crossing the street. Crosswalk markings can also be used to guide people walking to desired crossing locations, or to designate legal midblock crosswalks.

Standard “transverse” markings consist of two parallel lines that mark the edges of the crosswalk, shown at left and right in the illustration top right.





High visibility crosswalk markings can include “continental” crosswalks with bold white bars that run perpendicular to the pedestrian path of travel (shown top and bottom in the illustration top right), and “ladder” crosswalks which combine continental markings with the traditional transverse lines.

These markings are more noticeable to drivers and are typically used at uncontrolled crossings, where slower walkers are expected (near schools and senior centers), and where high numbers of pedestrian related crashes have occurred. In school areas, crosswalk markings are yellow.

CURB EXTENSIONS

Curb extensions improve visibility of pedestrians and reduce crossing times by shortening the length of the crossing. This may reduce pedestrian collisions by reducing the length of time that pedestrians are exposed to potential conflicts with motorists. Curb extensions also narrow the perceived roadway width for drivers, which may reduce speeds. At signalized intersections, curb extensions can reduce delays by allowing for shorter pedestrian “walk” phases due to the reduced crossing distance.

Curb extensions extend the sidewalk or curb line out into the parking lane on a street, reducing the effective street width. They can only be used where there is on-street parking, and should not encroach into bicycle lanes.

ADVANCE STOP OR YIELD LINE

Advance stop bars are placed six to ten feet before a marked crosswalk to indicate to motorists where they should stop. At uncontrolled or midblock crossings, yield lines are used instead of stop bars. Advance stop bars or yield lines improve visibility of pedestrians by discouraging drivers from encroaching into the crosswalk. This is especially important at uncontrolled crossings on multi-lane streets, where a vehicle stopped too close to a crosswalk may hide a pedestrian from view of an approaching driver in the second lane.

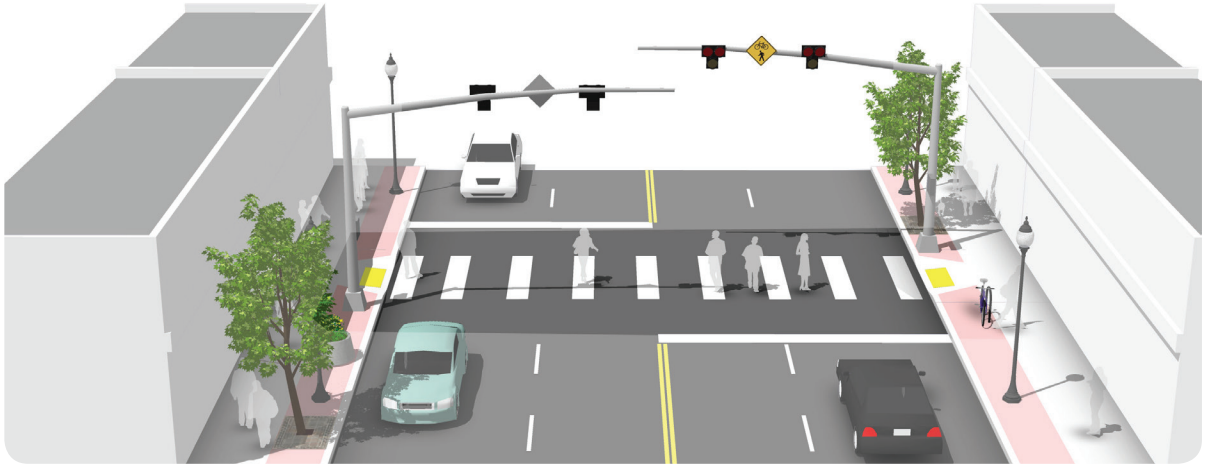
PEDESTRIAN REFUGE ISLAND

Pedestrian refuge islands can improve pedestrian comfort and reduce collisions by providing a safe waiting area in the median on wide or busy streets. This allows people walking to cross the roadway in two stages, waiting for a gap in one direction of oncoming traffic at a time.

The waiting area should be protected by a physical barrier on either side, such as raised median islands or planters. The crossing surface should remain level through the waiting area, and may be angled to encourage pedestrians to face oncoming traffic as they approach the second crossing leg. Refuge islands may be combined with beacons or other treatments to further improve challenging crossings.

RECTANGULAR RAPID FLASHING BEACON

Rectangular Rapid Flashing Beacons (RRFBs) are used to increase visibility of pedestrians at marked crosswalks where traffic signals or stop signs are not warranted. They consist of a pedestrian crossing sign supplemented by a pair of bright rectangular lights that flash in a rapid alternating pattern when a pedestrian presses a button. Many assemblies are solar powered stand-alone units that can be installed without costly wiring work.



PEDESTRIAN HYBRID BEACON

Pedestrian hybrid beacons, sometimes referred to as HAWK beacons, are a traffic control device that can be activated by a pedestrian to stop cross traffic. The beacon consists of three lights on an overhead mast arm that remain dark until a pedestrian presses a button to request a walk phase. Yellow lights flash in an alternating pattern to alert motorists that a red phase will be starting, followed by a solid red light that requires motorists to stop. A pedestrian signal shows a "walk" phase during this red signal, followed by a flashing hand and then "do not walk" phase. After the pedestrian phase concludes, the red signal goes dark and motorists may proceed.

LEAD PEDESTRIAN INTERVAL

Lead pedestrian intervals improve visibility of pedestrians at signalized intersections by beginning the "walk" phase a few seconds before the complementary green signal for drivers. This allows pedestrians to get a head start across the street, bringing them forward into the field of view of drivers who may be turning across the crosswalk.

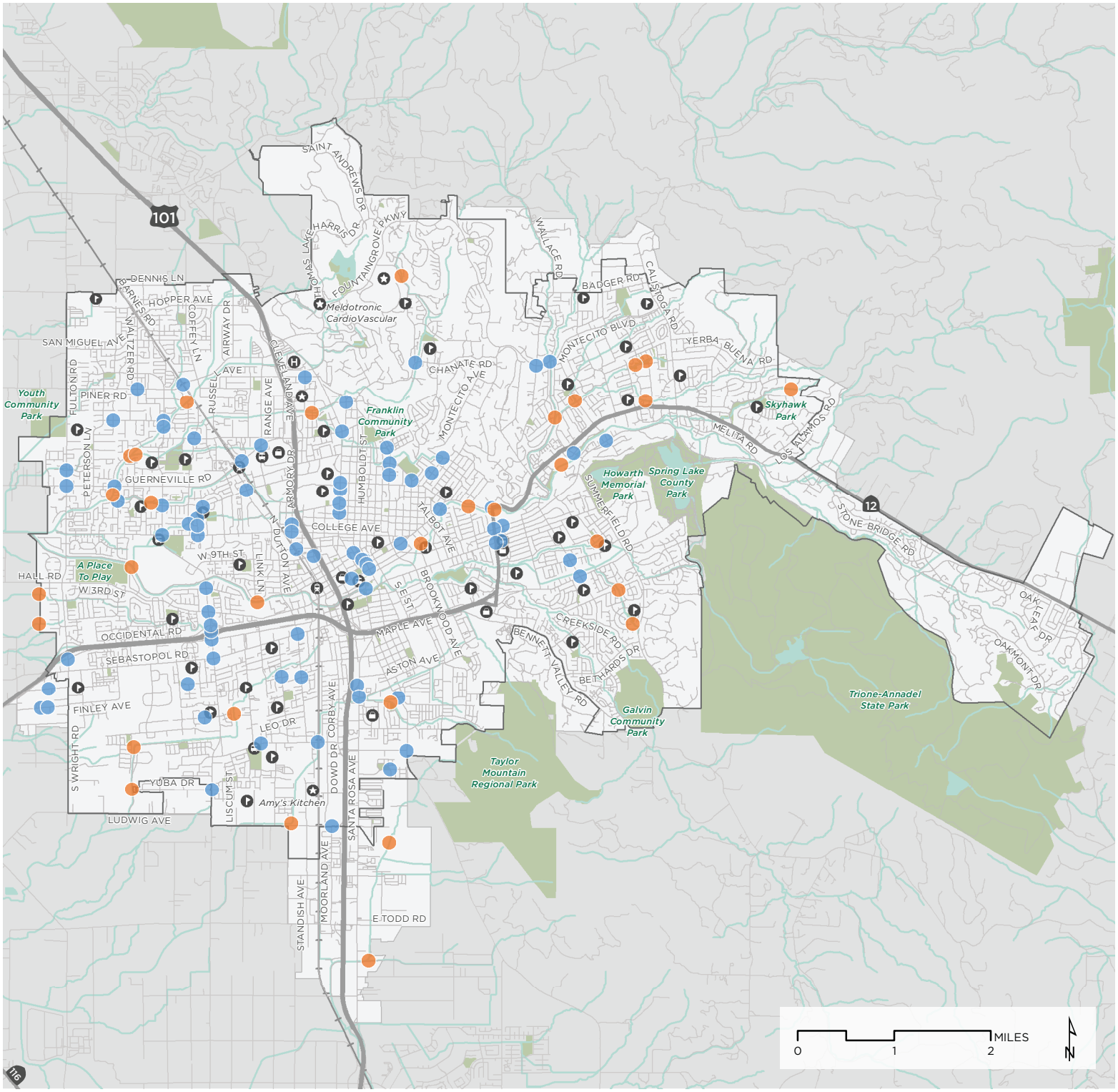


Figure 5-13

CROSSING LOCATIONS (CITYWIDE)

- Preferred Crossing Enhancement Location
- Trail Bridge

DESTINATIONS + BOUNDARIES

- School
- Major Employer
- Transit Station
- SMART Station
- Hospital
- Shopping Center
- Park
- City Limts
- Urban Growth Boundary

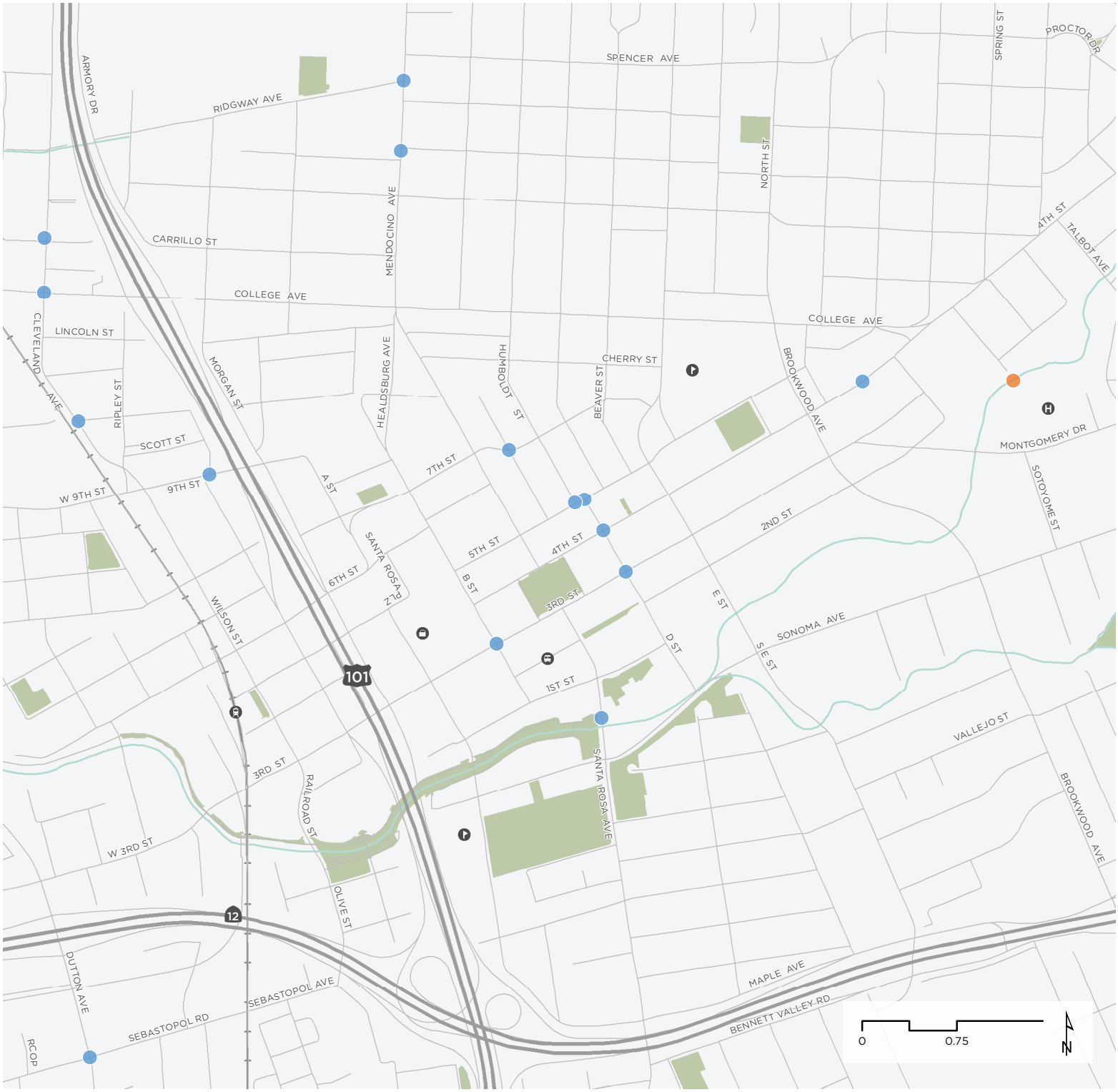


Figure 5-14

CROSSING LOCATIONS (DOWNTOWN)

- Preferred Crossing Enhancement Location
- Trail Bridge

DESTINATIONS + BOUNDARIES

- School
- Transit Station
- SMART Station
- Hospital
- Shopping Center
- Park
- City Limts
- Urban Growth Boundary

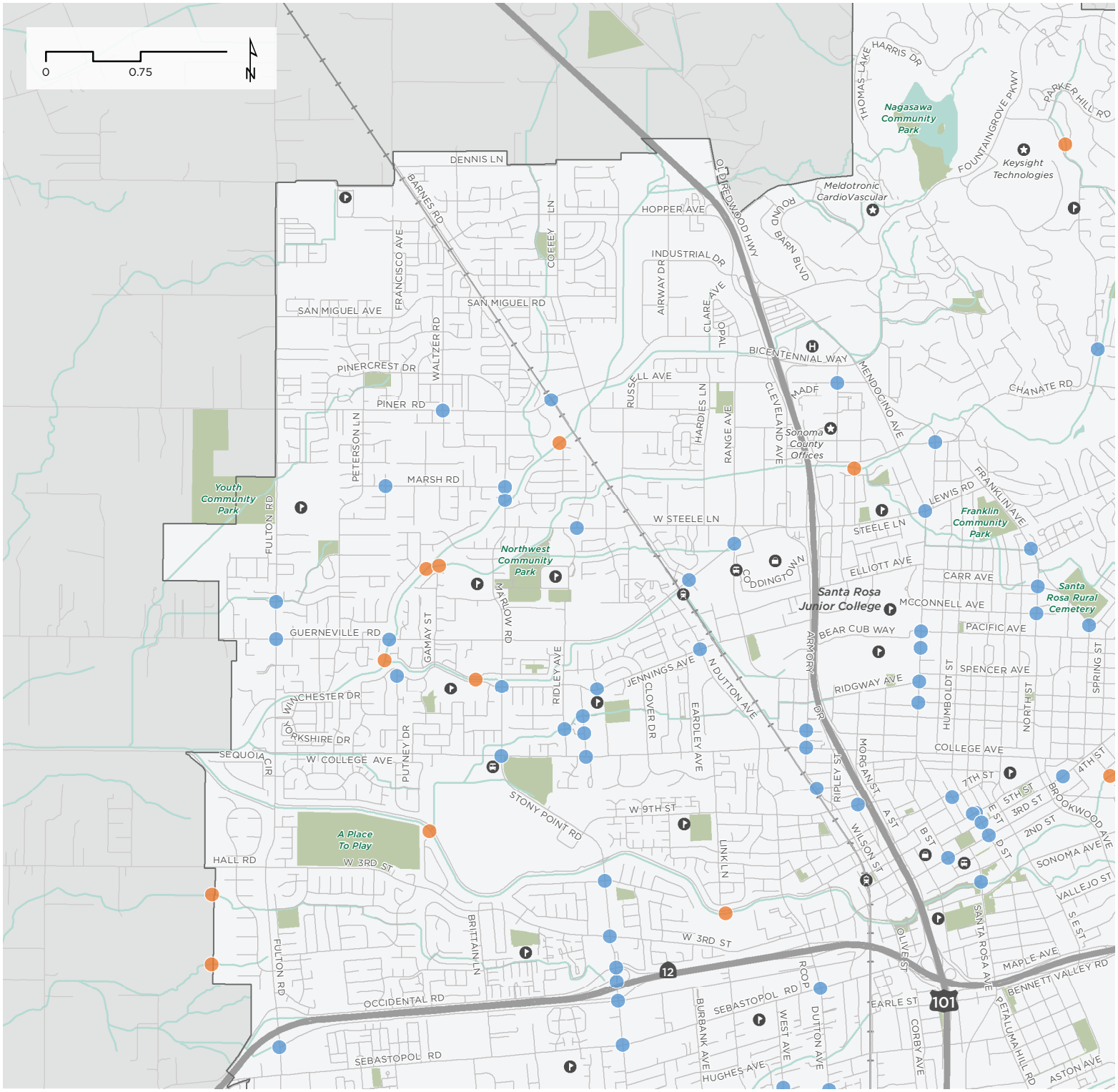


Figure 5-15

CROSSING LOCATIONS (NORTHWEST)

- Preferred Crossing Enhancement Location
- Trail Bridge

DESTINATIONS + BOUNDARIES

- School
- Major Employer
- Transit Station
- SMART Station
- Hospital
- Shopping Center
- Park
- City Limts
- Urban Growth Boundary

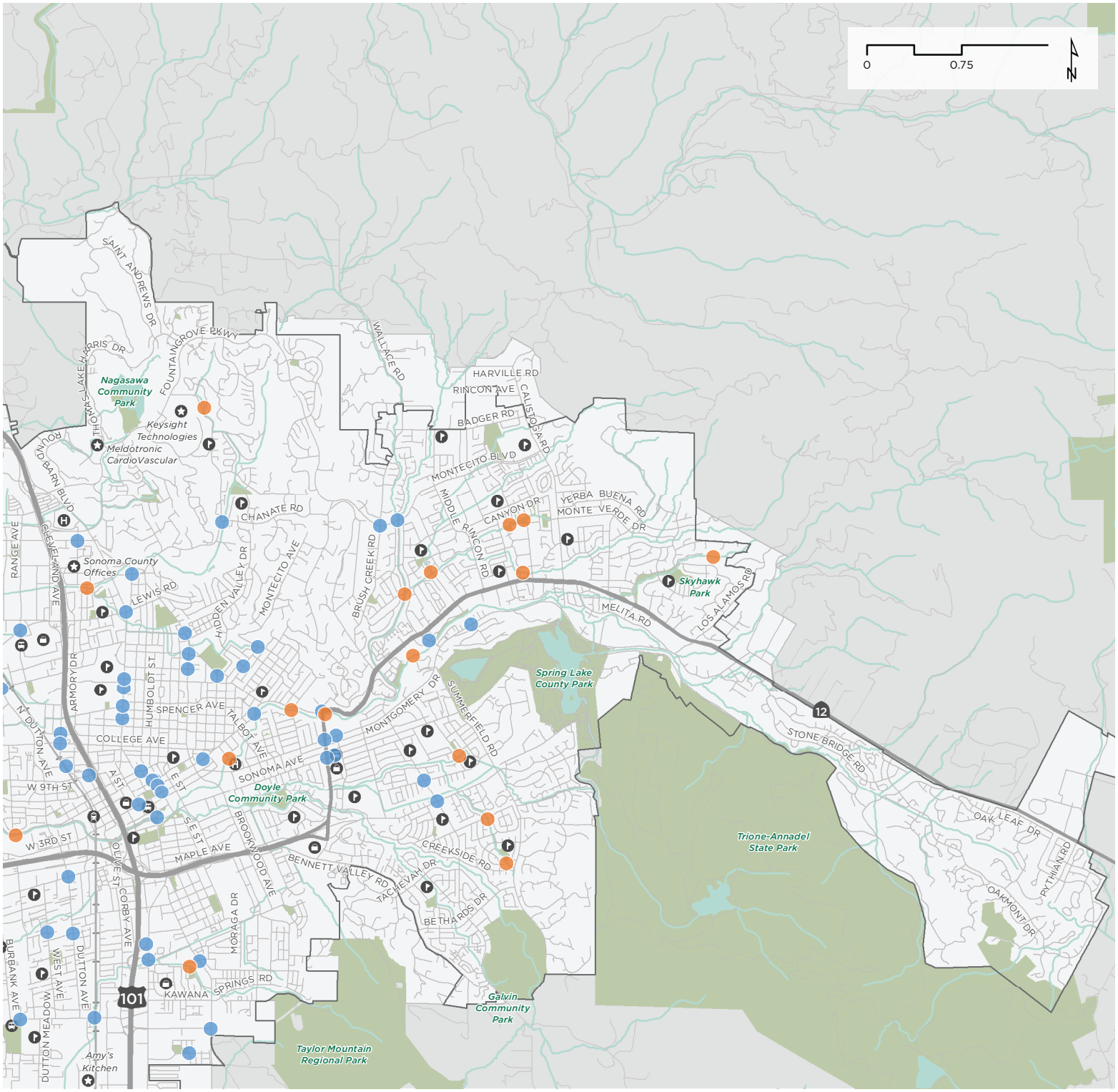


Figure 5-16

CROSSING LOCATIONS (NORTHEAST)

- Preferred Crossing Enhancement Location
- Trail Bridge

DESTINATIONS + BOUNDARIES

- School
- Major Employer
- Transit Station
- SMART Station
- Hospital
- Shopping Center
- Park
- City Limts
- Urban Growth Boundary

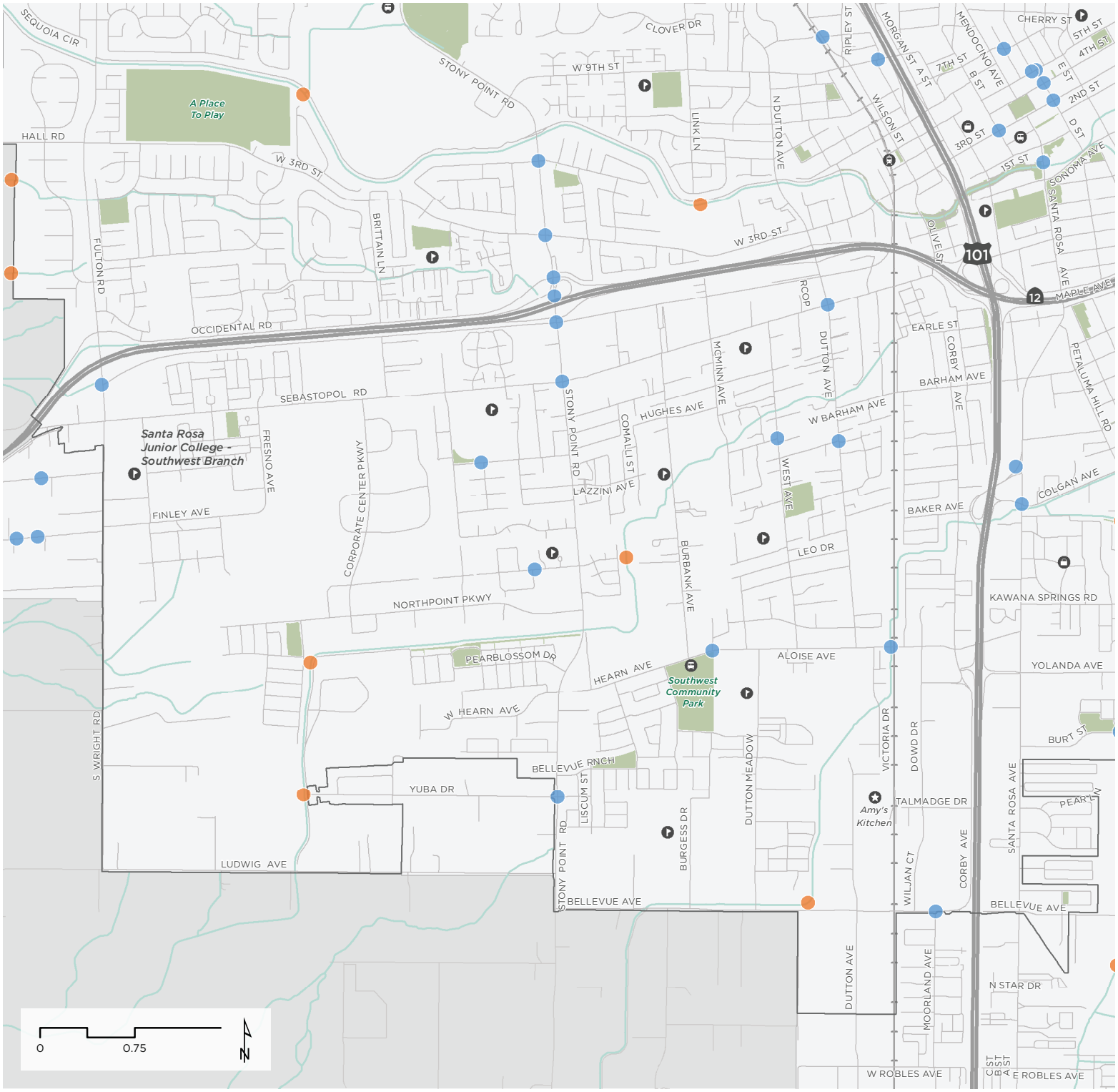


Figure 5-17

CROSSING LOCATIONS (SOUTHWEST)

- Preferred Crossing Enhancement Location
- Trail Bridge

DESTINATIONS + BOUNDARIES

- School
- Transit Station
- SMART Station
- Hospital
- Shopping Center
- Park
- City Limts
- Urban Growth Boundary

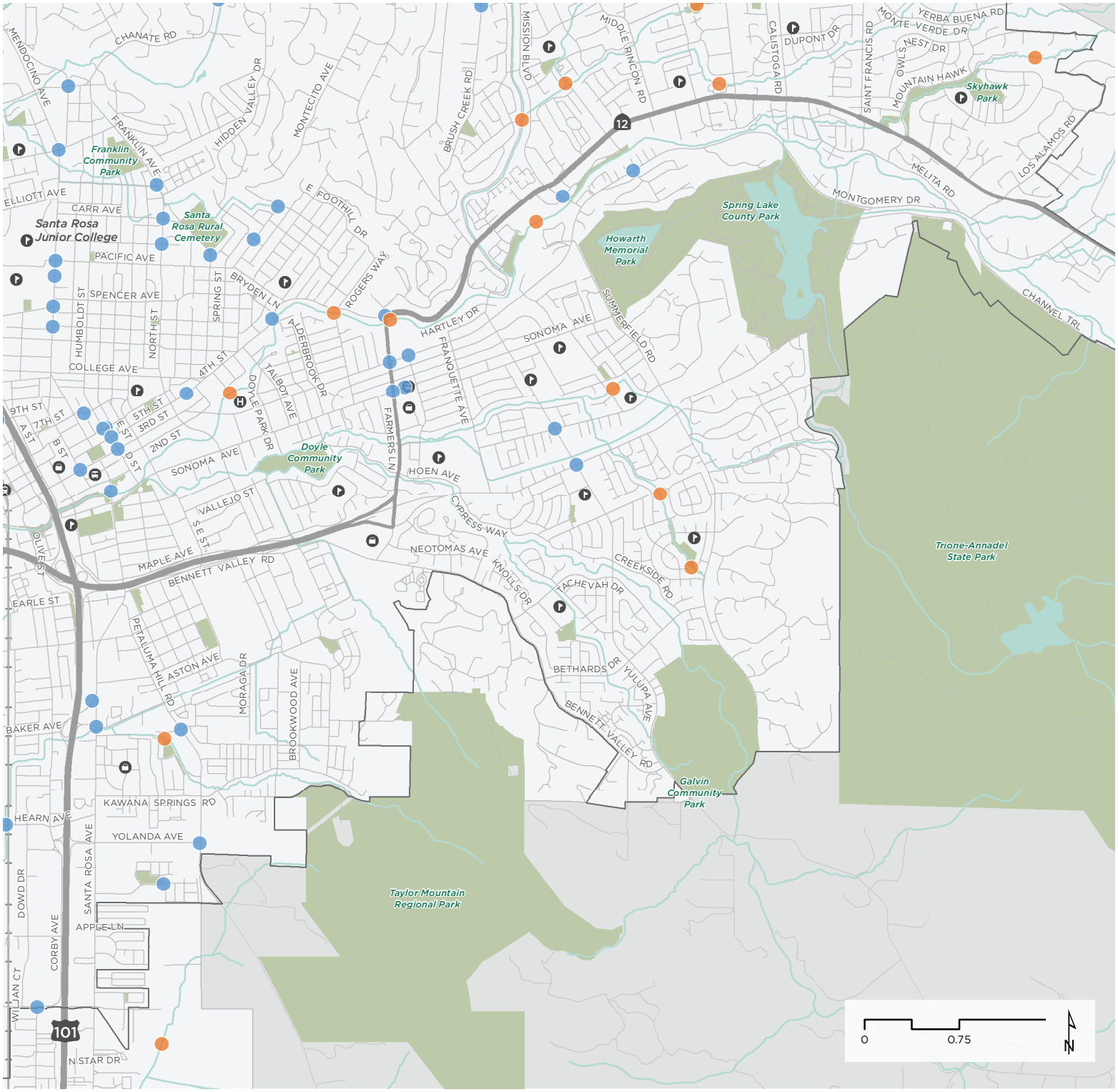


Figure 5-18

CROSSING LOCATIONS (SOUTHEAST)

- Preferred Crossing Enhancement Location
- Trail Bridge

DESTINATIONS + BOUNDARIES

- School
- Transit Station
- SMART Station
- Hospital
- Shopping Center
- Park
- City Limts
- Urban Growth Boundary

Studies

A number of locations, including both bicycle and pedestrian corridors, require greater community outreach and/or analysis than can be conducted as part of this planning process. At some locations, further study is needed to determine whether bicycling or walking facilities are feasible. At others, a preferred facility has been identified but further study or outreach is needed to develop a detailed design or alignment that balances the needs of all community members.

Studies are mapped with bicycle, pedestrian, and crossing projects on previous pages, and are described briefly below.

STONY POINT ROAD CORRIDOR STUDY

Stony Point Road is an important artery of the bicycle and pedestrian network in Santa Rosa, providing a north-south connection across State Route 12 from Guerneville Road to Sebastopol Road. It is also a busy, high-speed arterial street, with average daily traffic volumes between 20,000 and 30,000 and posted speed limits of 35 to 40 mph.

The corridor is also part of the HIN for both bicyclists and pedestrians, with fatal or severe injury collisions occurring at a higher frequency than other corridors in the community. This Plan Update 2018 recommends this corridor be studied from Guerneville Road to Sebastopol Road for bicycle or pedestrian facilities that increase comfort and may reduce the frequency and severity of collisions.

OAKMONT CONNECTION ALTERNATIVES

After the removal of a portion of the designated Bicycle Route 231, multiple alternative routes are identified for study to create a new walking and bicycling connection to SR 12 and the planned Sonoma Valley Trail through the Oakmont neighborhood. Some alternatives also have potential to create improved access for emergency vehicles into the Oakmont neighborhood. Community outreach produced differing opinions on acceptable locations for connections, suggesting a need for further study and more intensive engagement with neighborhood residents to identify a preferred route.

4TH STREET BIKEWAY

4th Street is an important connection from D Street in downtown Santa Rosa to Farmers Lane where it becomes State Route 12. This corridor has limited space available, and was identified as part of the pedestrian HIN during this Plan Update 2018. A study is necessary to evaluate alternatives to provide bicycling or walking facilities while balancing high traffic volumes and other needs.

4th Street near College Avenue is a wide, multi-lane street that lacks comfortable bicycling facilities.

MONTGOMERY DRIVE BICYCLE FACILITIES

Bicycle facilities are recommended for further study on Montgomery Drive from Summerfield Road eastward, ending near Spring Lake and Boas Drive. This entire corridor was recommended for Class II bicycle lanes in the 2010 plan, and the segment west of Mission Boulevard was identified as part of the HIN during this Plan Update 2018. Montgomery Drive is narrow through this section; providing bicycle facilities may require widening the road or providing a separate Class I shared use path.

A second study for bicycle facilities on Montgomery Drive is recommended in this Plan Update 2018 between Alderbrook Drive and Hahman Drive. This segment was also identified as a priority in the 2010 plan.

COLLEGE AVENUE COMPLETE STREETS STUDY

Between Kowell Lane and Morgan Street, College Avenue is a highly used corridor with limited right of way and a strong demonstrated need for bicycling and walking improvements. Between Link Lane and Mendocino Avenue, this corridor is part of the HIN identified during this Plan Update 2018. The width, lane configuration, and on-street parking presence vary along the corridor, creating challenges for people walking and bicycling. A complete streets study is recommended to develop a corridor plan that balances the needs of all modes of transportation.

CONNECTION FROM SMART TO CODDINGTOWN MALL

A study is recommended to identify a desirable route for people walking and bicycling between the SMART Santa Rosa North station and Coddingtown Mall, consistent with the station area plan. This may include an off-street connection between Range Avenue and Herbert Street, or across Steele Creek south of Guerneville Road. Once a preferred route is established and built, wayfinding signs should be installed to create a comfortable and easy-to-navigate connection.

BROOKWOOD AVENUE PEDESTRIAN IMPROVEMENTS

Brookwood Avenue from 2nd Street to Sonoma Avenue, across Santa Rosa Creek, was identified by the community during outreach for this Plan Update 2018. A study should evaluate opportunities to improve pedestrian access and comfort along this corridor, including considering pedestrian-scale lighting.

BENNETT VALLEY ROAD TRAIL

This study should evaluate alternatives to provide a Class I shared use path or other bicycling and walking connection along Bennett Valley Road from Farmers Lane to Yulupa Avenue. This Plan Update 2018 includes projects that connect to each end of this study: a Class I shared use path extending south from the intersection at Farmers Lane will connect to Yolanda Avenue, and Class II bicycle lanes will continue southeast on Bennett Valley Road from the intersection with Yulupa Avenue.

MCCONNELL AVENUE BICYCLE BOULEVARD

Between Mendocino Avenue and North Street, McConnell Avenue is a candidate to create a bicycle boulevard connection on McConnell Avenue. This connection was identified as a desired bikeway by the community during outreach for this Plan Update 2018, and will be studied for feasibility including consideration of traffic speeds and volumes, parking utilization, neighborhood outreach, and crossings or connections at either end of the new facility.

CAR-FREE ELLIOTT AVENUE

Elliott Avenue, on the north edge of the Santa Rosa Junior College Campus, is an attractive route for people walking and bicycling. The street could potentially have significantly increased active transportation uses pending the outcome of the Highway 101 overcrossing environmental review. Community members expressed a desire for the City to consider closing Elliott Avenue to car traffic and creating a bicycle and pedestrian mall connecting the future Highway 101 overcrossing and Mendocino Avenue.

ROSELAND CREEK TRAIL

The Roseland neighborhood, newly annexed into the City of Santa Rosa, developed as an unincorporated area of Sonoma County and lacks sidewalks or other pedestrian connections in places. A shared use path along Roseland Creek would create a comfortable connection for people walking and bicycling between Stony Point Road and Burbank Avenue, potentially creating an alternative that allows bicyclists and pedestrians to avoid Stony Point Road which was identified as part of the HIN.

CITYWIDE PROJECTS

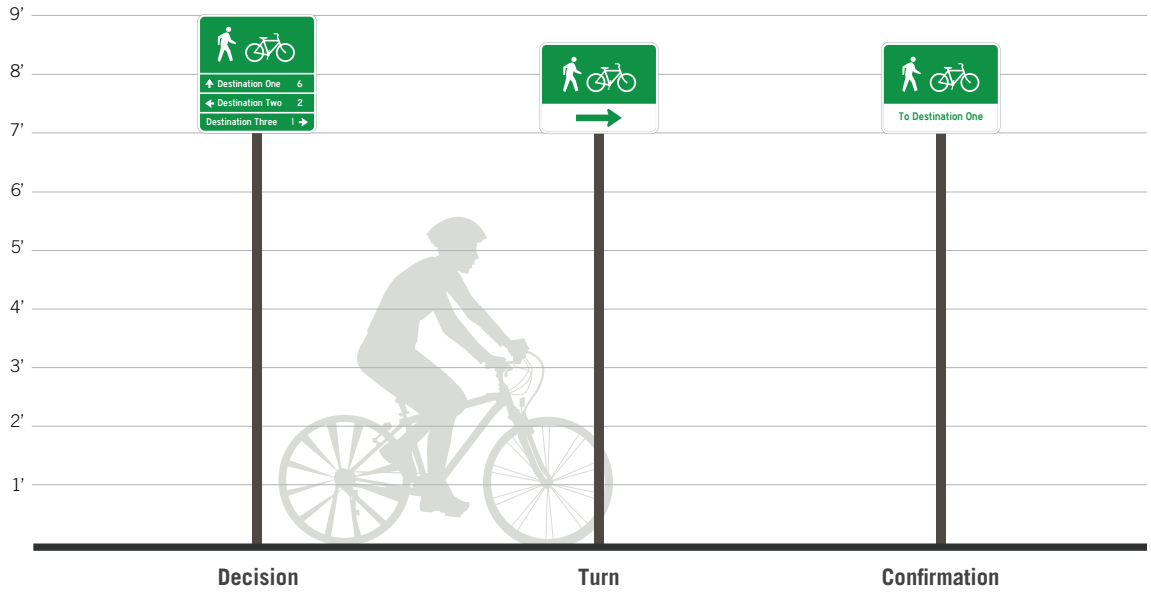
In addition to specific infrastructure projects and related programmatic efforts, some amenities are needed citywide to complete the active transportation network. These amenities should be installed as a matter of policy in conjunction with any City project as opportunities arise, or when development occurs. Citywide amenities recommended in this Plan Update 2018 include a comprehensive wayfinding program and secure bicycle parking.

Wayfinding

Wayfinding signs direct bicyclists or pedestrians along the existing network and to key community destinations. Signs typically include distance or time and direction (using an arrow) to key destinations. Santa Rosa currently does not have a consistent wayfinding sign program implemented throughout the city.

The California Manual on Uniform Traffic Control Devices (CA MUTCD) includes standard bicycle wayfinding signs, but they are also used for Class III Bicycle Route signs. This may cause confusion for bicyclists, and does not serve pedestrian wayfinding or trail users. Some cities have modified the standard sign to change "bike route" to "bikeway," and others have developed and installed non-standard enhanced wayfinding signs that include unique branding for the community. The non-standard option provides the most flexibility to meet community needs and serve both bicyclists and pedestrians.

This Plan Update 2018 recommends the City develop and implement a comprehensive wayfinding program for bicyclists and pedestrians, integrating this program with SMART station and downtown wayfinding initiatives.



Bicycle Parking

No bicycling network is complete without convenient and secure bicycle parking. Bicycle parking can take many forms, from a simple bicycle rack to secure storage in a locker or gated area. This Plan Update 2018 recommends the City continue to expand its bicycle parking as opportunities arise and new development occurs.

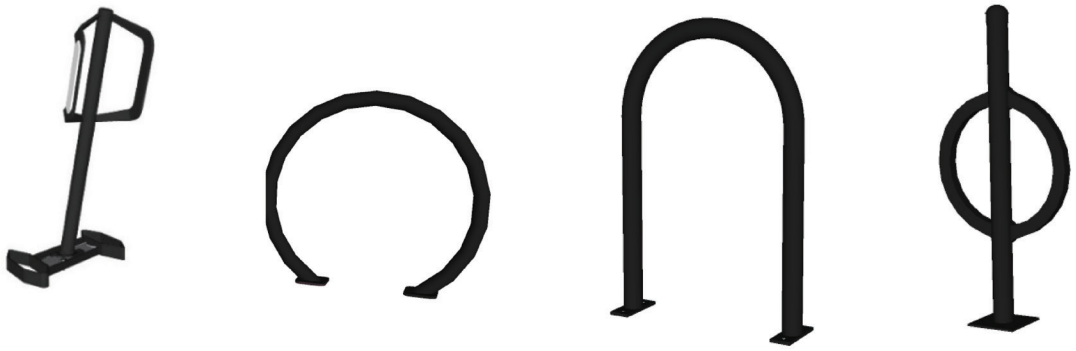
SHORT TERM BICYCLE PARKING

Bicycle parking can be categorized into short-term and long-term parking. Bicycle racks are the preferred device for short-term bicycle parking. These racks serve people who leave their bicycles for relatively short periods of time, typically for shopping or errands, dining, or recreation. Bicycle racks provide a high level of convenience and moderate security. The rack types illustrated below and recommended for use in Santa Rosa are consistent with the Association of Pedestrian and Bicycle Professionals (APBP) Essentials of Bike Parking: Selecting and Installing Bike Parking that Works (2015). The City may also choose to partner with local artist groups to pursue customized racks that serve as bicycle parking in addition to public art. Where possible, on-street bicycle corrals can be used to provide increased bicycle parking where high demand or limited sidewalk space exists.

LONG TERM BICYCLE PARKING

Long-term bicycle parking includes bike lockers and secure parking areas (SPAs) and serves people who intend to leave their bicycles for longer periods of time. Bike lockers may vary in design and operation including keyed lockers that are rented to one individual on an annual or monthly basis or e-lockers that can be reserved online in hourly increments and unlocked with a credit card or an access code.

These facilities provide a higher level of security than bicycle racks, and are typically found at transit stations, multifamily residential buildings, and commercial buildings, though they may also be useful in Downtown Santa Rosa, near SMART stations, or in other areas where bicyclists running multiple errands would benefit from a secure place to store parcels in addition to their bicycle.



Pedestrian Scale Lighting

Pedestrian scale lighting is a type of lighting with frequent lampposts at low height that illuminate the walking area. This typically includes poles 12 to 15 feet high spaced 25 to 30 feet apart, directly above walking areas. Pedestrian scale lighting not only increases visibility of pedestrians for drivers at night, it contributes to a more comfortable and inviting streetscape for people walking at night.

Pedestrian scale lighting should be appropriately designed to illuminate only the areas needed and be no brighter than necessary. Street trees should be appropriately maintained so they do not obstruct illumination from the lighting along sidewalks and pathways.

This Plan Update 2018 recommends the City evaluate locations where pedestrian scale lighting may improve pedestrian comfort and encourage walking, including Downtown, the junior college area, and trails.

Amenities

Sidewalk and trail furnishings like benches, shade structures, restrooms, water fountains, and trash receptacles contribute to a cleaner, more comfortable, and more pedestrian-oriented public realm. These elements not only encourage the activation of Santa Rosa's sidewalk and trail networks, they contribute to a more accessible pedestrian network for all residents. The City has adopted a Street Furnishings Palette as part of its Bicycle and Pedestrian Facility Guidelines for the downtown core area, which may be expanded to include recommended furnishings for trails and other areas of the community. Seniors and those with mobility impairments will benefit from frequent places to stop and rest, and this was a priority identified by the community during outreach for this Plan Update 2018.

This Plan Update 2018 recommends the City identify and pursue opportunities to provide amenities in the downtown, near transit stops, and along trails in the community.

PROGRAMS

This section describes recommended bicycle and pedestrian related programs for the City of Santa Rosa. The recommendations are organized in four E's:

Education programs are designed to improve safety and awareness. They can include programs that teach students how to safely cross the street, or teach drivers where to anticipate bicyclists and how to share the road safely.

Encouragement programs provide incentives and support to help people leave their car at home and try walking or bicycling instead.

Enforcement programs enforce legal and respectful walking, bicycling, and driving. They include a variety of approaches, ranging from police enforcement to neighborhood signage campaigns.

Evaluation programs are an important component of any investment. They help measure success at meeting the goals of this Plan Update 2018 and to identify adjustments that may be necessary.

The fifth E commonly included in discussions of active transportation is **Engineering**, which is reflected by the recommended infrastructure projects listed in this chapter.

Programs recommended on the following pages should include outreach and education in both English and Spanish to serve the diverse Santa Rosa community. Given limited staff time and resources available, programs should be implemented or continued as funding and resources allow. Partnering with local organizations and other agencies is a key strategy to sustainable program activity.

Education

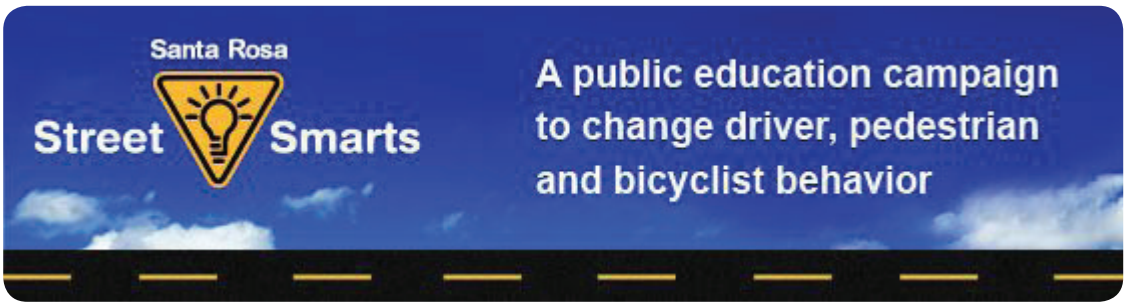
UPDATED "STREETSMARTS" CAMPAIGN

Santa Rosa has joined other California cities in implementing "StreetSmarts" media campaigns. StreetSmarts uses print media, radio, and television to educate the community about safe driving, bicycling, skateboarding, and walking behavior. As part of this campaign, the City distributed posters with messages that addressed issues such as: red light running, speeding, bicycle safety, crosswalk safety and compliance, school zone speed compliance, and stop sign compliance.

This Plan Update 2018 gives Santa Rosa an opportunity to update these messages to address the most current priorities they have heard from the community, including not texting while driving or walking, how to securely lock your bicycle, the importance of being seen at night as a pedestrian or bicyclist, and helping drivers understand where to anticipate bicyclists. One message identified by the community as a priority is increasing awareness of California's Three Foot Passing law, which requires drivers to overtake bicyclists only when there is sufficient room for a three-foot clearance. The County is currently running a related campaign that the City could support with their own artwork and messaging.

Artwork for the updated campaign could be created by local students as part of a Traffic Safety Poster Contest, or photos of local families on streets that will be familiar to the community could be used. Posters could also highlight and share information about newly completed projects, such as green transition areas. Funding could be provided by a grant from the California Office of Traffic Safety.

To maximize engagement and effectiveness of the campaign, the city can develop messaging and choose graphics with involvement from the Bicycle and Pedestrian Advisory Board, Sonoma County Bicycle Coalition, law enforcement, schools, business owners, civic leaders, and community advocates.



BICYCLE SAFETY EDUCATION FOR ADULTS

The Sonoma County Bicycle Coalition (SCBC) currently offers Smart Cycling classes once a month at their office in downtown Santa Rosa, in addition to periodically offering on-bicycle educational rides for adults. These courses are based on a curriculum from the League of American Bicyclists that focuses on how bicyclists should behave so they are safer, more predictable, and can be confident riding on streets both with and without dedicated bicycle facilities. The SCBC classes also incorporate photos and video clips of local streets to help students understand how various scenarios apply to real Santa Rosa locations.

This Plan Update 2018 recommends continuing these classes, which the City can support by advertising the classes and/or providing meeting space.

SAFE ROUTES TO SCHOOL

Santa Rosa benefits from a robust Safe Routes to School (SRTS) program coordinated by Sonoma County Transportation Authority (SCTA) and the Sonoma County Bicycle Coalition. Twenty-six schools in the City participate in activities with the SRTS program, but involvement varies from school to school.

This Plan Update 2018 recommends the City seek grant funding to prepare a SRTS Plan to document and evaluate effectiveness of existing program activities, and identify priority programs to expand to all schools. This should include Suggested Routes to School maps at all schools, which help families plan their walking or bicycling trip to school by highlighting enhanced crossings and bikeways, and continued participation in school walking audits to identify infrastructure improvements.

SAFE ROUTES TO SCHOOL
SONOMA COUNTY BICYCLE COALITION
www.sonomasaferoutes.org

Encouragement

HIRE A BICYCLE AND PEDESTRIAN COORDINATOR

This Plan Update 2018 recommends hiring a staff person who can work on bicycle and pedestrian projects and program coordination full time. This person ensures that all planning, public works, and transportation projects account for bicyclists and pedestrians. They can also write grant applications to fund projects and programs and be tasked to support all bicycle and pedestrian coordination with the public and neighboring jurisdictions.

If funding is not available to create a new position, the City may consider hiring interns to work on bicycle and pedestrian projects until a full-time staff member can be funded. Some organizations and foundations will fund staff member salaries, fellowships, or contractor salaries for a set period of time. The City may consider applying for grants from one or more of these foundations.

SOCIAL WALKS/RIDES

Supporting social walks and bicycle rides in Santa Rosa can provide many benefits to the community. People who are uncomfortable bicycling or walking alone, or who are unfamiliar with the best routes to use, will benefit from having a group to show them the way. Rides can also be used as informal education opportunities to remind participants about safe walking and bicycling behavior and sharing the road, or combined with other efforts like tours of historic neighborhoods.

This Plan Update 2018 recommends the City partner with or support local organizations who wish to host rides or walks, for example the Council on Aging and the Sonoma County Bicycle Coalition.

WALKING & BIKING AMBASSADORS

During the public outreach activities conducted for this Plan Update 2018, the community repeatedly expressed concerns about personal security and comfort when bicycling or walking in Santa Rosa, especially on the extensive creek trail network. These trails provide a high quality experience for walking and bicycling separated from high-traffic streets, but can be secluded with minimal surveillance.

An ambassador program could recruit volunteers to act as eyes on the trail, report maintenance needs, share educational materials and maps, and provide a friendly presence on the trail network. Staffing needs for this program could be limited to coordinating occasional volunteer training sessions. Trusted volunteers may be enlisted to help with program coordination, and grant funds could be pursued to offer a stipend to ambassadors or coordinators.

The Guadalupe River Park Conservancy in San Jose operates a volunteer trail ambassador program, where volunteers wear green vests to identify themselves and spend at least 45 minutes each week bicycling or walking on the trail. In addition to reporting maintenance needs, ambassadors carry small kits with supplies for basic first aid, bicycle repairs, graffiti removal, or other tasks based on their interest and preference.

This Plan Update 2018 recommends Santa Rosa consider a pilot Walking & Biking Ambassador program in partnership with the Bicycle & Pedestrian Advisory Board, the Southeast Greenway Team, and the Sonoma County Bicycle Coalition.

ADOPT-A-TRAIL PROGRAM

The City of Santa Rosa may consider a voluntary Adopt-a-Trail Program to assist with maintenance and cleanup of trails in the community. This program may be combined or coordinated with the Walking and Biking Ambassador Program, if desired.

The City of Sonoma supports maintenance of its trail network through a voluntary Adopt-a-Bike-Path Program. Participants commit to maintain their adopted section of pathway for one year, including maintaining it at least once per month. Maintenance activities performed as part of the program include litter removal and vegetation trimming, and participants are encouraged to discuss additional ideas with the Public Works Director. Path adopters are recognized on a sign on their section of trail.

Photo credit: Guadalupe River Park Conservancy

BIKE RACK PROGRAM

Bike Rack programs coordinate and streamline bike rack installations. The program could be managed by an intern who could work with staff and business owners to install bike racks and bike corrals citywide. This also ensures bike racks are properly installed as to not block sidewalks while still being usable for bicyclists.

Currently, there are no bike corrals installed in Santa Rosa. The City could evaluate installing bike corrals in high-traffic locations such as in vehicle parking spots on the corners of 4th and 5th Streets in downtown. This not only sends a statement that secure bike parking is important to the city and community members, but bike corrals increase visibility at intersections for all roadway users. An increase in visibility should reduce the risk of a collision in these locations.

The city could also develop customized bike racks. These racks can serve as a "brand," highlighting the Santa Rosa identity as a bicycle-friendly community and can double as art features.

Where appropriate, this program could also coordinate with local businesses to provide bicycle lockers or other secure parking for employees and long-term visitors. Secure long-term parking is a key component of the bicycle network to encourage employees to bicycle instead of driving, and helps reduce bicycle theft. Bicycle lockers should also be considered in downtown Santa Rosa and at commercial hubs to serve people shopping or running multiple errands who would like a secure place to store their bicycle and deposit purchases or other items during their trip.

BICYCLE FRIENDLY BUSINESS

BICYCLE FRIENDLY BUSINESS PROGRAM

Bicycle Friendly Business programs recognize businesses who make it easy and convenient for both employees and customers to arrive by bicycle. This requires different strategies to accommodate the different needs of customers and employees. To accommodate customers, providing bicycle parking and supporting City bicycling projects can make it safer and easier to travel by bicycle. Some businesses also choose to offer discounts or incentives to people who arrive by bicycle.

For employees, offering secure long-term parking for bicycles is key. This could include a secure gated bicycle parking area, or access to bicycle lockers. If space is not available for dedicated secure bicycle parking, business owners and landlords can consider allowing employees and tenants to bring bicycles

inside and store them in their workspace or another designated location. Providing changing areas, showers, or lockers to store belongings can also make it easier for employees to bicycle to work.

By recognizing businesses who support bicycling, Santa Rosa can support their local economy while fostering partnerships with the Chamber of Commerce and business owners to build community support for bicycling projects and programs. The League of American Bicyclists has a Bicycle Friendly Business program similar to the BFC program, and some communities have chosen to develop their own programs. Sutter Hospital was recently awarded the City's first Bicycle Friendly Business award from the League.

SMART CORRIDOR BIKE SHARE

In November 2017, the Metropolitan Transportation Commission (MTC) approved over $800,000 for a bike share pilot program in Sonoma and Marin counties along the SMART train corridor. The program is considering employing GPS-enabled dockless bikes that do not require bikes to be placed at more traditional docking stations. These counties predict that the presence of shared bikes around SMART stations could free up space currently being used by people bringing bikes onto SMART trains. Instead, people can used shared bike near stations for their first mile and last mile commutes.

SMART carried nearly 723,000 passengers and almost 65,500 bicycles in its first year of service from August 2017 to August 2018. This means one in nine riders are bringing a bicycle on board with them, and trains are quickly reaching capacity for bicycles. Supporting a regional bicycle sharing program could reduce the number of bicycles brought on board if riders have access to a shared bicycle at each end of their transit trip.

The City of Santa Rosa can support Sonoma County in these efforts, and help the county determine guidelines for the traditional or dockless bikes that best serve the needs of Santa Rosa residents. In addition, Santa Rosa can help advertise and gain interest for the bike sharing system.

The City may also study shared e-scooters as an alternative or complement to bike share. Shared scooter systems have become increasingly popular, and according to a survey of system users in Portland, up to 34 percent of scooter trips taken by residents replaced a trip that would otherwise have been taken in a car. Among visitors to the city, 48 percent of scooter trips replaced a car trip.

Enforcement

BAIT BIKE PROGRAM

Bike theft is a concern in the Santa Rosa community, with many residents identifying it as a barrier that currently discourages them from bicycling more often.

Bait bike programs involve a bicycle outfitted with a discrete tracking device monitored by the local police department. The bicycle should be nondescript and consistent with the character of bicycles ridden in the community. Periodically, the police department will lock the bait bike at a location where thefts have been reported, and monitor the tracking device. When the bicycle is stolen, police can then use the location data to recover the bicycle and cite the thief. These programs can be particularly effective in prosecuting 'organized' bicycle theft operations that remove bicycles from the community to be sold in bulk at another location.

Both Sonoma County and the City of Santa Rosa have used GPS tracking of "bait" items to apprehend thieves in the past. Sonoma County has implemented a bait bike program on occasion, and the Santa Rosa Police Department has used bait packages to target package thieves during the holiday season.

Citations should be monitored and routinely reviewed to ensure the bait bike program is not disproportionately targeting disadvantaged or minority communities in Santa Rosa. Similarly, bait bike deployment locations should be selected to provide geographic equity covering all parts of the City evenly.

An alternative model to this traditional bait bike program involves inexpensive Bluetooth devices being installed on as many bicycles as possible in the community. In Davis, CA, the local bike club used donations to purchase small trackers called Tiles and install them inconspicuously on bicycles as requested. The Tiles pair with a smartphone app that shows the location of your bicycle. If a stolen bicycle is reported as "lost" through the app, any smartphones with the Tile app in the vicinity of the missing bicycle will receive an alert and can help law enforcement retrieve the bicycle.

An outreach campaign should be paired with the launch of a bait bike program to publicize the effort and discourage theft by emphasizing that local police are taking bicycle theft seriously. It can also be a deterrent to thieves if they know the bicycle they are stealing may be a bait bike.

TARGETED ENFORCEMENT

The Santa Rosa Police Department currently conducts targeted enforcement periodically based on requests from the community or focus areas of grant funding received.

This Plan Update 2018 recommends continuing these efforts, with a focus on those behaviors that create the greatest risk or potential conflict, and care should be taken that programs do not unfairly target specific demographics or modes of transportation. This Plan Update 2018 also recommends continuing current educational enforcement activities, where officers stop individuals and discuss the unsafe behavior observed without issuing citations.

Behaviors and locations for targeted enforcement should be reviewed each year based on collision data and community input. Behaviors cited as challenges during public outreach for this Plan Update 2018 include drivers failing to stop at red lights and yield to pedestrians in crosswalks, parking in bicycle lanes, pedestrians crossing streets illegally, and bicyclists riding on the wrong side of the road.

Evaluation

ANNUAL REPORT CARD

An annual report card assesses the City's progress toward goals and objectives outlined in this Plan Update 2018, implementation of its projects and programs, and changing mode splits for active transportation. Annual report cards can also incorporate a review of effectiveness to evaluate costs and benefits of various efforts and adjust investments to maximize results.

This Plan Update 2018 recommends the City work with the BPAB to develop an Annual Report Card that tracks progress toward implementing this Plan Update 2018 and incorporates annual collision data, SRTS program and participation data, and other relevant information to highlight successes and challenges of improving walking and bicycling each year. Specific performance measures identified by the City and the community should be included in this card on an annual basis to track key metrics over time and better understand successes and challenge areas.

POLICY CHANGES

The following recommended changes include policies, operational changes, and municipal code revisions that support the goals of this Plan Update 2018 or address community-identified barriers to walking and bicycling in Santa Rosa.

Vision Zero Policy

Vision Zero is a traffic philosophy that rejects the idea that traffic crashes are accidents, and instead asserts that serious injuries or fatalities on the transportation system are preventable and unacceptable.

The more Santa Rosa understands where and why crashes happen, the more different departments can take actions to reduce them. The City can use this understanding to develop roadway designs that prioritize bicycling, walking, and other transportation facilities that enhance comfort and can be implemented quickly to adapt and respond to identified challenges.

The high-injury network identified in this 2018 Plan Update 2018 is a strong start to developing this understanding. Asking additional questions about the causes and locations of crashes can help the City re-prioritize funding for projects that target behaviors and locations that may be contributing to crashes:

- What are the total number of crashes (all modes)? Of these crashes, how many were fatal or severe injuries?
- What were the most striking contributing factors?
- How are the crashes affected by posted speed, road class, or other identifiable feature of the road?

An inclusive process and equitable outcomes are a core component of adopting Vision Zero. Santa Rosa has emphasized their commitment to equity in this 2018 Plan Update 2018 by offering inclusive outreach opportunities and identifying projects near schools, around housing for seniors and people with disabilities, and neighborhoods most reliant on public transportation. In addition, actions can be taken to address equity in enforcement.

As part of this Plan Update 2018, the City and the Bicycle and Pedestrian Advisory Board reached out to the City of Fremont to discuss their Vision Zero program.

This Plan Update 2018 recommends the City consider whether adoption of a Vision Zero Policy is an appropriate step to increase the City's existing commitment for all users of its diverse transportation systems. MTC awards additional points in their Regional Active Transportation Program competitive grant process for communities that have adopted a Vision Zero Policy.

The Vision Zero Network has resources and case studies available to guide cities as they develop and implement Vision Zero Action Plans. More information at:

- visionzeronetwork.org/project/roadmapforaction

TRADITIONAL APPROACH

Traffic deaths are ***inevitable***

Perfect human behavior

Prevent ***collisions***

Individual responsibility

Saving lives is ***expensive***

VS

VISION ZERO

Traffic deaths are ***preventable***

Integrate ***human failing*** in approach

Prevent ***fatal and severe crashes***

Systems approach

Saving lives is ***not expensive***

School Zone Speed Limits

On January 1, 2008, AB 321 took effect allowing local governments to extend school zones up to 1,000 feet and reduce speed limits within 500 feet of a school site to 15 mph in residential neighborhoods or on highways with speed limits of 30 mph or less.

In Santa Rosa from 2007 to 2017, nearly 300 crashes involving a bicyclist or pedestrian occurred within 500 feet of a school campus—146 crashes involving a bicyclist, and 138 crashes involving a pedestrian. More than 40 percent of these occurred during school hours, between 7 am and 4 pm.

At 15 mph, more than 90 percent of pedestrians are likely to survive a crash with only minor injuries. As speeds increase, however, crash severity increases dramatically. At 30 mph most crashes result in serious injuries to pedestrians, and nearly half may be fatal. At 40 mph, 90 percent of pedestrians will be killed in a crash. Reducing speeds even slightly can have a profound effect on safety for people walking and bicycling to school.

Cities that have already enacted this law include Berkeley, San Francisco, Los Angeles, and the City of Goleta.

This Plan Update 2018 recommends the City enact this law around eligible schools. AB 321 requires engineering and traffic surveys to be conducted to indicate that the existing speed limit is not appropriate. Santa Rosa can work with the Transportation and Public Works department to determine an evaluation and implementation schedule that accommodates staff capacity. In addition, Santa Rosa can work with local law enforcement to educate parents and drivers about the new policy and why certain school areas were selected.

Vehicle Miles Traveled

Transportation is the largest contributor to greenhouse gas emissions in Santa Rosa and the City's 2012 Climate Action Plan recommends several strategies to reduce the number of miles residents and visitors travel daily by automobile. Following the passage of Senate Bill (SB) 743, CEQA guidelines will change how transportation impacts are measured by transitioning from auto delay calculated as Level of Service (LOS) to vehicle miles traveled (VMT). This Plan Update 2018 recommends the City adopt VMT as its standard for evaluating vehicle miles travelled and greenhouse gas emission impacts of transportation projects.

To help make this transition, the Metropolitan Transportation Commission (MTC) offers Priority Development Area grants to assist municipalities in transitioning their general plans to implement VMT-based transportation impact standards.

Street Sweeping

Residential streets in Santa Rosa are currently swept once per month, and collector and arterial streets are swept more frequently. Despite this, community members expressed concerns about debris in bicycle lanes and on shared use paths.

This Plan Update 2018 recommends reviewing street sweeping practices and street sweeper driver training to ensure on-street bicycle lanes are swept at least monthly, and that they are cleared of any glass or other debris following a collision.

Vegetation Maintenance

In many places in Santa Rosa, landscaping and vegetation near sidewalks and bikeways has overgrown into the travelway and creates challenges for people walking and bicycling. Overgrown vegetation can not only create mobility challenges by narrowing the usable travelway, it can limit visibility and contribute to debris on the pathway. Routinely trimming back vegetation and mowing pathway shoulders contributes to a safer and more comfortable active transportation environment.

This Plan Update 2018 recommends the City promote the online MySantaRosa application for reporting vegetation in need of maintenance to property owners, and develop a policy to respond to reports within a reasonable timeframe.

Waste Tote Placement

In areas with curbside trash or recycling collection, waste totes improperly placed in bicycle lanes can create challenges for people riding bicycles either by placing them at risk of colliding with a tote or by forcing them to merge into the travel lane to avoid the obstacle.

This Plan Update 2018 recommends the City provide clear instruction on its website and in utility bills mailed to residents about proper placement of waste totes. Where on-street parking exists, totes should be placed near the curb within the parking aisle. Where no on-street parking exists, residents should be instructed to place totes against the curb to minimize intrusion into the bicycle lane.

The City should also consider working with waste management companies to add reflective markings to totes to increase their visibility at night and reduce the risk of a bicyclist colliding with a misplaced tote, in addition to stenciling "Do Not Place In Bicycle Lane" on totes to remind residents of proper placement.

Bicycle Parking at Large Events

Chapter 11-40 of the Santa Rosa Municipal Code currently addresses the procedures and requirements to apply for an event permit within the City. This Plan Update 2018 recommends revising Section 11040.040 Permit – Conditions for Issuance to require events expected to draw more than 5,000 attendees must provide secure, attended bicycle parking for attendees at no charge. Key considerations include:

- A space that is enclosed and secured on three sides ("corral") must be provided, with the fourth side consisting of tables for checking in bicycles
- The corral must be in a visible and easily accessible location within one block of the event
- Bicycle parking must be offered for the full duration of the event, including the bicycle parking attendants having access to the location at least one hour before and one hour after the event for setup and break down
- Availability and location of free bicycle parking must be noticed on all event promotion where transportation or directional information for the event is advertised, in the same format and with an equal amount of space as parking and transportation information for other modes
- Bicycle parking must be attended and monitored at all times with a number of staff sufficient for the size of the event and whether attendees are expected to arrive for a single start time or arrive throughout the event
- Bicycles will be checked in and returned with a claim check to ensure the correct bicycle is released to each person, and bicycle valet attendants will record and share the number of bicycles parked at the event in order to better estimate the space needed for the following year
- The valet bicycle parking service provider shall have insurance; should the event sponsor provide the bicycle parking service, bicycles checked in must be insured against theft

The City of Oakland operates a successful bicycle parking policy for large events, and may be a resource to Santa Rosa.

This page intentionally left blank

06

IMPLEMENTATION PLAN

This Plan Update 2018 includes projects, programs, and policy changes intended to create a more walkable, bikeable Santa Rosa. Implementation of this Plan Update 2018 will require community support and political leadership in addition to significant funding.

This chapter outlines a strategy towards implementation of the infrastructure projects and includes the following sections:

- **Project Evaluation** presents the method and data sources used to prioritize projects for implementation, along with a summary of the results
- **Funding Strategies** provides an overview of competitive funding sources and eligibilities for the projects in this Plan Update 2018

The intent of evaluating projects is to create a strategic list to guide implementation. The project list and evaluation results are flexible concepts that serve as guidelines. Over time as development occurs or other changes to land uses and the transportation network take place, this framework can be used to reevaluate remaining projects and continue pursuing implementation of this Plan Update 2018.

A detailed list of all projects is included in Appendix A. Typical costs for each type of infrastructure project are included in the Bicycle and Pedestrian Facility Guidelines in Appendix B.

PROJECT EVALUATION

The evaluation strategy described in this chapter reflects a systematic approach to determine each project's community benefit in a manner that is feasible, fundable, and sustainable.

Studies for crossings and corridor improvements were evaluated and ranked on an individual basis, separate from proposed infrastructure projects.

Implementation Categories

Projects are sorted into four Implementation Categories based on the results of two evaluations: project priority and project feasibility. Each project was scored "high" or "low" on each axis, resulting in the four implementation categories represented in the graphic below.

PROJECT EVALUATION / IMPLEMENTATION STRATEGY

Two evaluation strategies were used to arrive at four categories representing varying phases and approaches to project implementation

PRIORITY EVALUATION

Based on the following criteria:

Collision Reduction | Connectivity | Comfort Network | Gap Closure | Equity

Projects were scored and then considered either:

LOW or HIGH

PRIORITY

FEASIBILITY EVALUATION

Based on the complexity and typical cost of the project:

Hardscape Improvements | Signs & Striping

LOW | HIGH

FEASIBILITY

Based on the results from the two evaluations, projects are sorted into four:

IMPLEMENTATION CATEGORIES

PRIORITY	LOW	HIGH
HIGH	**LONG TERM IMPROVEMENT** — Projects for further study and evaluation. Seek grant funding to advance those projects.	**SHORT TERM IMPROVEMENT** — High priority and easy to implement projects for short term development.
LOW	**LOW PRIORITY** — Low priority, challenging projects that may be pursued long term, but are not a priority at this time.	**OPPORTUNITY IMPROVEMENT** — Lower priority projects that may become an opportunity if funding or partnership occurs.

FEASIBILITY

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, or more significant funding for construction.

Opportunity improvements represent projects rated lower 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 lower 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 are part of a long term vision for active transportation.

Projects are summarized by implementation category in Table 6-1 and Table 6-2, and mapped in Figure 6-1 through Figure 6-4.

Table 6-1: Linear Projects (Number of Projects and Mileage) by Implementation Category

	SHORT TERM		LONG TERM		OPPORTUNITY		LOW PRIORITY		TOTAL	
PROJECT TYPE	**NO.**	**MILES**	**NO.**	**MILES**	**NO.**	**MILES**	**NO.**	**MILES**	**NO.**	**MILES**
Class I Shared Use Paths			24	16.2			45	22.7	**69**	**38.9**
Class II Bicycle Lanes	18	5.2	7	3.1	68	26.6	22	13.6	**115**	**48.5**
Class II Buffered Bicycle Lanes	2	1.1	2	0.8					**4**	**1.9**
Class III Bicycle Routes	5	1.9			111	33.4			**116**	**35.3**
Class III Bicycle Boulevards					1	0.3	7	2.2	**8**	**2.5**
Class IV Separated Bikeways	1	1.8	1	0.1			1	0.3	**3**	**2.2**
Sidewalk			7	1.7			61	19.5	**68**	**21.2**
Total	**26**	**10.0**	**41**	**21.9**	**180**	**60.3**	**136**	**58.3**	**383**	**150.5**

Table 6-2: Crossing Locations by Implementation Category

CROSSING TYPE	SHORT TERM	LONG TERM	OPPORTUNITY	LOW PRIORITY	TOTAL
Proposed Crossing Enhancement Locations	10	5	17	7	**39**
Trail Bridges		2		29	**31**
Total	**10**	**7**	**17**	**36**	**70**

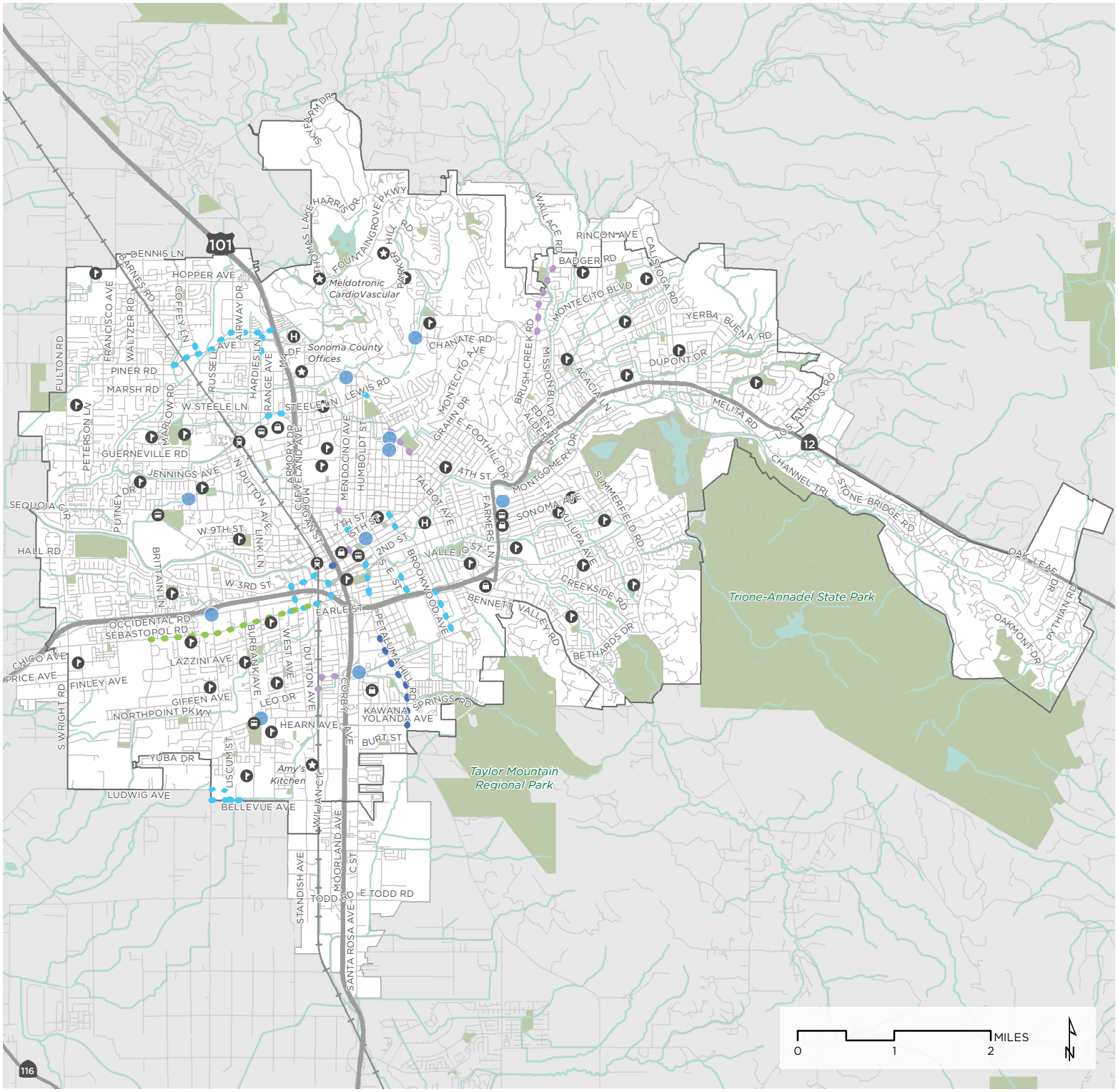


Figure 6-1

SHORT TERM IMPROVEMENTS

- Class II Bicycle Lane
- Class IIB Buffered Bicycle Lane
- Class III Bicycle Route
- Class IV Separated Bikeway
- Crossing Location

DESTINATIONS + BOUNDARIES

- Santa Rosa Junior College
- Transit Station
- SMART Station
- Major Employer
- Hospital
- Shopping Center
- Park
- City Limts
- Urban Growth Boundary

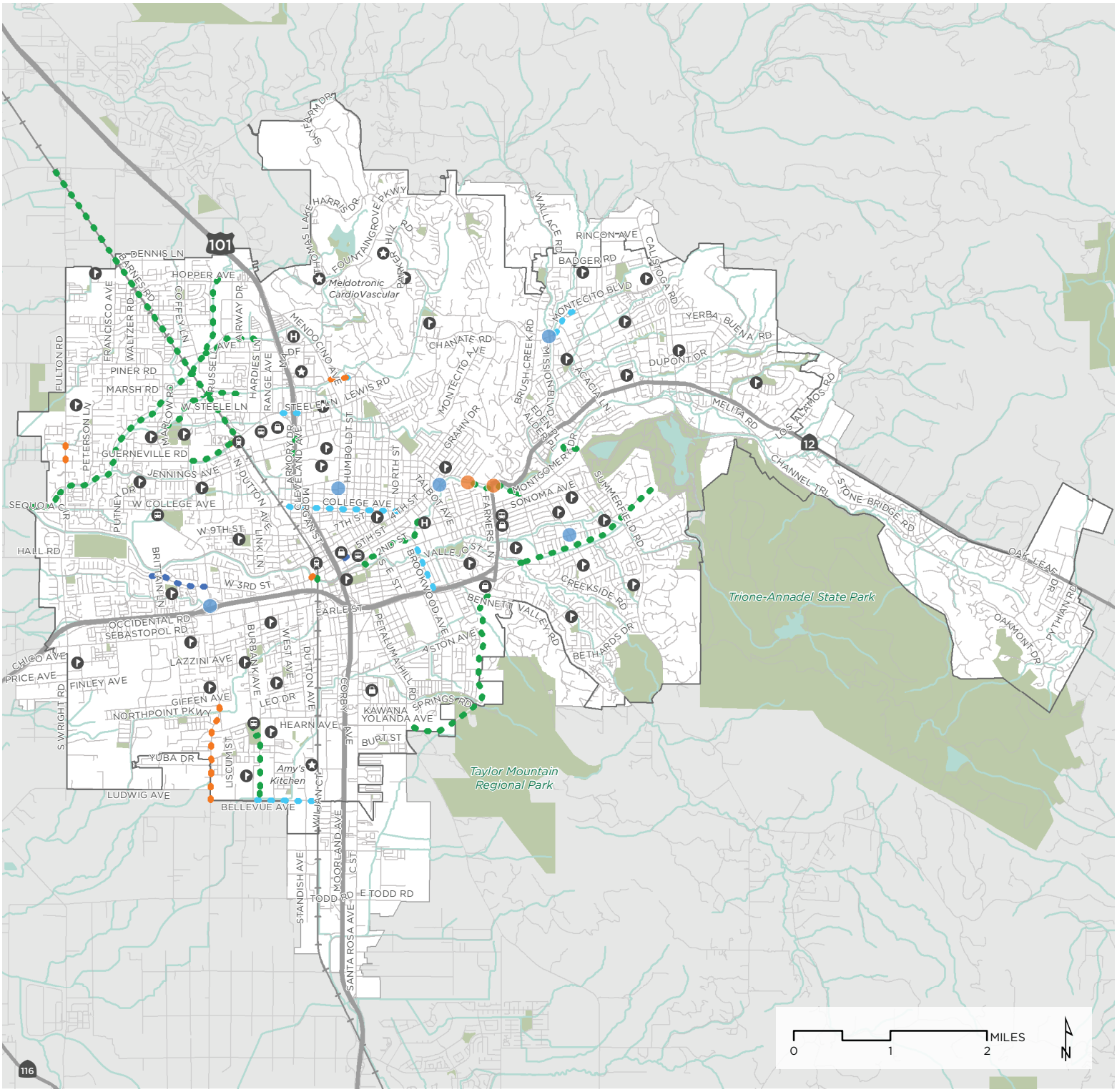


Figure 6-2

LONG TERM IMPROVEMENTS

- Class I Shared-Use Path
- Class II Bicycle Lane
- Class IIB Buffered Bicycle Lane
- Class IV Separated Bikeway
- Sidewalk
- Crossing Location
- Trail Bridge

DESTINATIONS + BOUNDARIES

- Santa Rosa Junior College
- Transit Station
- SMART Station
- Major Employer
- Hospital
- Shopping Center
- Park
- City Limts
- Urban Growth Boundary

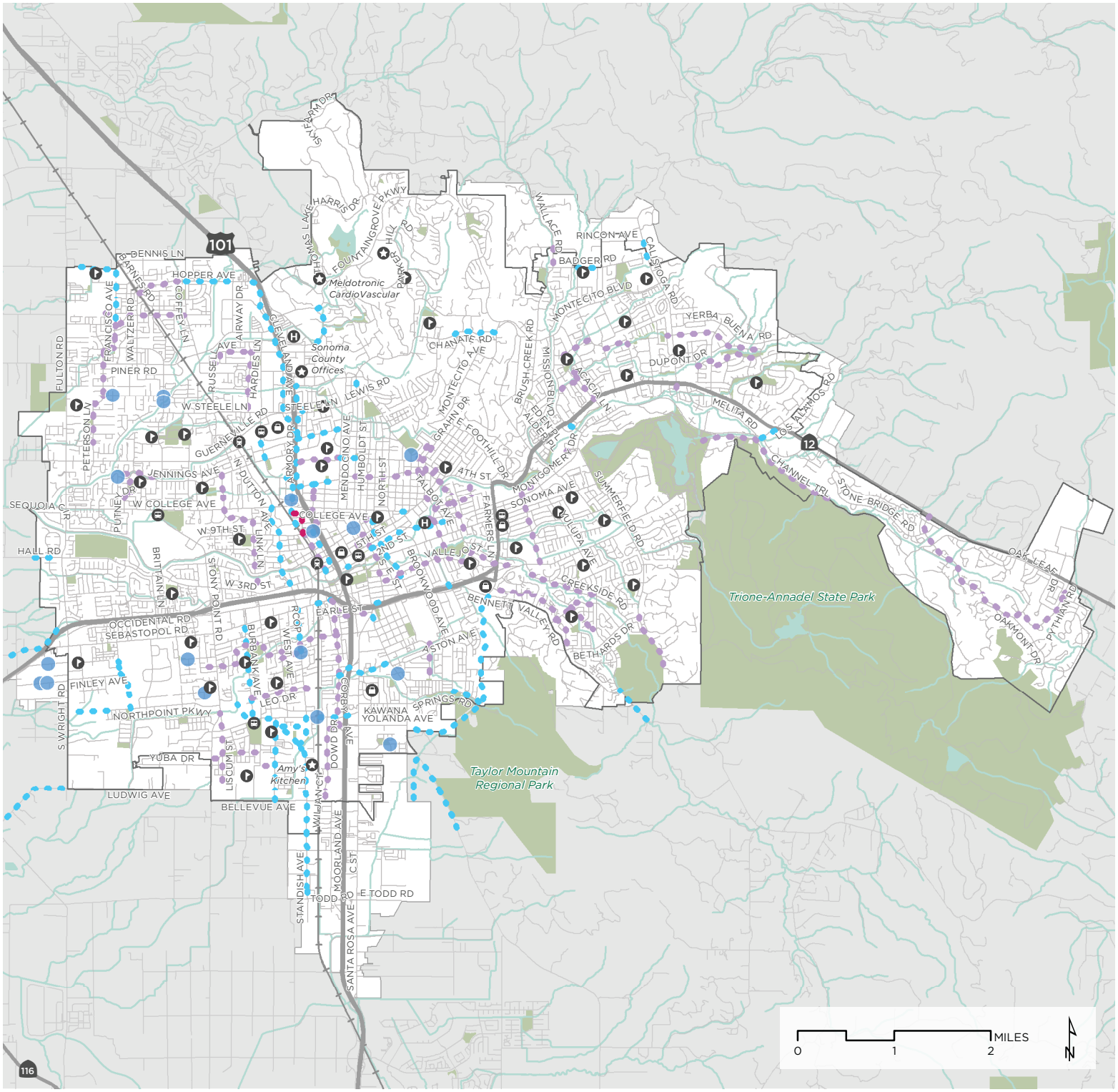


Figure 6-3

OPPORTUNITY IMPROVEMENTS

- Class II Bicycle Lane
- Class III Bicycle Route
- Class IIIB Bicycle Boulevard
- Crossing Location

DESTINATIONS + BOUNDARIES

- Santa Rosa Junior College
- Transit Station
- SMART Station
- Major Employer
- Hospital
- Shopping Center
- Park
- City Limts
- Urban Growth Boundary

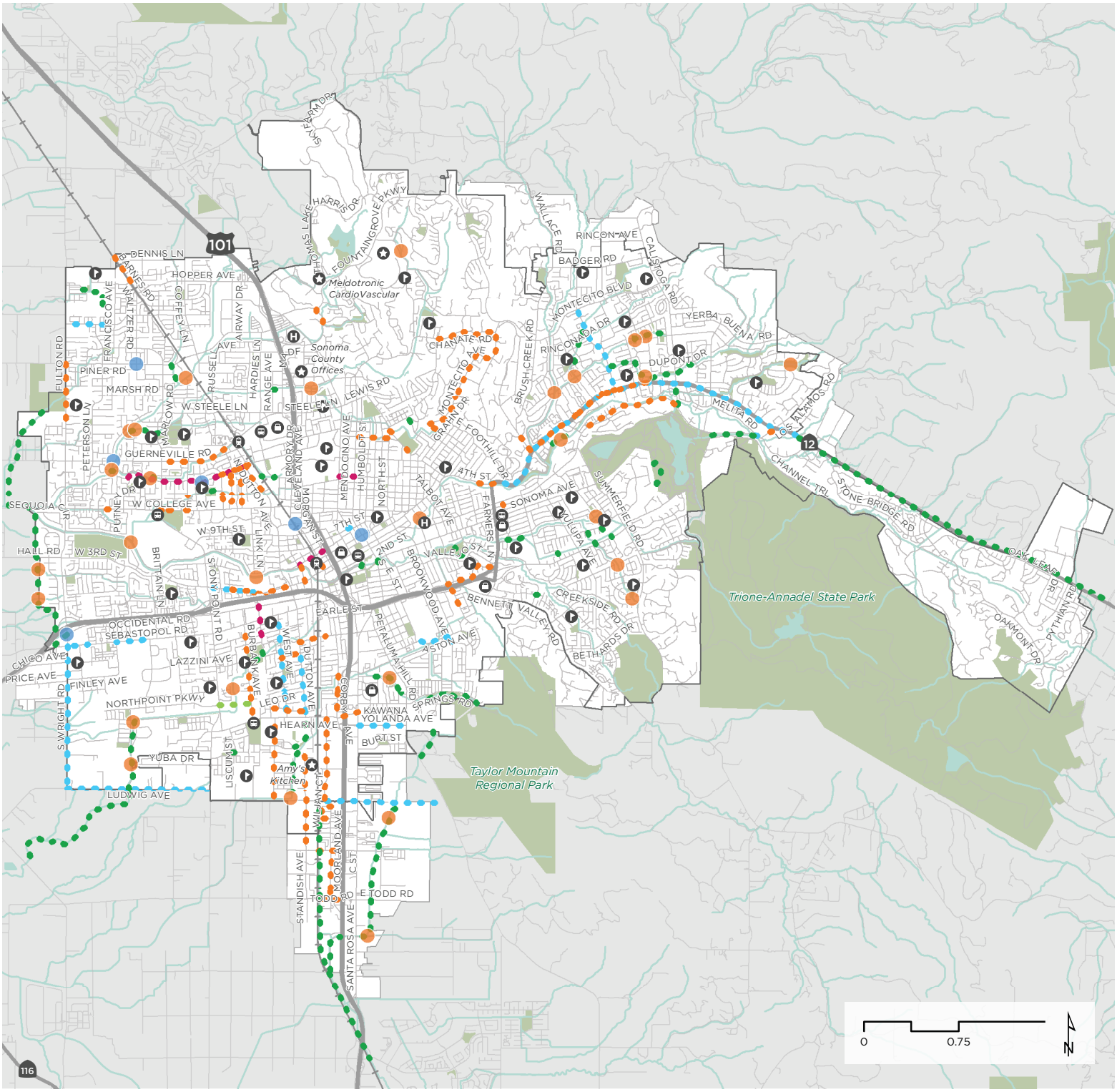


Figure 6-4

LOW PRIORITY IMPROVEMENTS

- Class I Shared-Use Path
- Class II Bicycle Lane
- Class IIIB Bicycle Boulevard
- Class IV Separated Bikeway
- Sidewalk
- Crossing Location
- Trail Bridge

DESTINATIONS + BOUNDARIES

- Santa Rosa Junior College
- Transit Station
- SMART Station
- Major Employer
- Hospital
- Shopping Center
- Park
- City Limts
- Urban Growth Boundary

Priority Evaluation

Using data from early phases of this Plan Update 2018 process, five criteria listed in Table 6-3 were used to evaluate the priority of infrastructure projects. Input from the community, the Bicycle and Pedestrian Advisory Board, and the Waterways Advisory Committee informed the weighting of these criteria in evaluating overall priority.

Each project received a priority score out of ten possible points, with projects scoring 6 or more considered high priority and projects scoring 5 or less considered low priority.

Feasibility Evaluation

In addition to evaluating the priority of each project, this implementation strategy also considers the complexities to design, construct, and maintain the project in a feasibility evaluation. Typically, projects were rated as high or low feasibility based on the bikeway class, project type, or other treatments included. Some projects were reassigned after this initial evaluation based on site-specific considerations.

HIGH FEASIBILITY

In general, high feasibility projects include:

- Most Class II Bicycle Lanes and Class II Buffered Bicycle Lanes, where right of way is available or a road diet is feasible
- Class III Bicycle Routes

LOW FEASIBILITY

In general, low feasibility projects include:

- Class I Shared Use Paths
- Class II Bicycle Lanes and Class II Buffered Bicycle Lanes that may require parking removal, additional right of way, or further study
- Class III Bicycle Boulevards
- Class IV Separated Bikeways
- Sidewalks
- Trail Bridges

Table 6-3: Priority Evaluation Criteria

CRITERIA	DESCRIPTION
Collision Reduction	Collisions involving bicyclists or pedestrians from September 2007 through August 2017 were analyzed to identify a High Injury Network (HIN) in Santa Rosa, where bicycle or pedestrian related collisions that result in either fatalities or severe injuries are occurring at a relatively high frequency in relation to the citywide street network. For more information about the HIN, see Chapter 3. Projects located on HIN corridors were awarded points. Class I shared use paths, which are not located on the existing street network, were awarded points if they provide a parallel alternative route to a HIN corridor. Trail bridge projects along Class I paths that provide these alternative routes were also awarded points.
Connectivity	Improving walking and bicycling access to destinations including schools and transit hubs was identified as a priority by the Santa Rosa community. Projects within one quarter-mile of a SMART station, Santa Rosa City Bus transit station, or school were awarded points.
Comfort Network	Speed limits, travel lanes, daily traffic volumes, and other information about Santa Rosa streets was analyzed to develop a Level of Traffic Stress (LTS) score from one to four for every street segment in the city, with low scores representing relatively low-stress segments and high scores representing high-stress segments. For more information about this analysis, see Chapter 3. Projects along streets with an average LTS score of 3 or 4 were awarded points. Because Class I shared use paths and trail bridges provide a walking and bicycling path completely separated from potential traffic stress, all Class I and trail bridge projects were awarded points.
Gap Closure	Closing gaps in the bicycling and walking network is important to create a seamless, connected transportation facility. Network projects that close a gap between two existing facilities were awarded points. Crossing projects were awarded points if a sidewalk or trail exists on both sides of the crossing.
Equity	Active transportation investments in disadvantaged communities support equity and provide access to transportation choices for neighborhoods that may be more reliant on bicycling, walking, or transit. Projects located in a Community of Concern identified by the Metropolitan Transportation Commission (MTC) were awarded points. For more information about Community of Concern boundaries in Santa Rosa, see Chapter 3. Boundaries may change; the most recent boundaries are published by MTC.

First Phase

The Short Term and Long Term Implementation Categories together include nearly 70 linear projects likely to provide a great benefit to walking and bicycling in the Santa Rosa community. Given limited resources compared to this volume of improvements, this Plan Update 2018 recommends the City focus on a short list of transformative projects and studies to be implemented first. This list includes 28 projects from both the Short Term and Long Term categories, and is expected to be reevaluated in the future as projects are completed.

First Phase projects are listed alphabetically by location in Table 6-4 through Table 6-7. This order is not intended to reflect any one project being prioritized above another.

Table 6-4: First Phase – Class I Shared Use Paths

TYPE	LOCATION	CROSS STREET A	CROSS STREET B
Class I Shared Use Path	Highway 101 Overcrossing	Coddingtown Mall	Santa Rosa Junior College
Class I Shared Use Path	Jennings Avenue	at SMART Tracks	–
Class I Shared Use Path	Roseland Creek Trail	Burbank Avenue	McMinn Avenue
Class I Shared Use Path	SMART Trail: Segment A Segment B Segment C	 Prince Memorial Greenway 4th Street Guerneville Road	 3rd Street 6th Street City Limits
Class I Shared Use Path	Southeast Greenway	Farmers Lane	Spring Lake Park
Class I Shared Use Path	Taylor Mountain Regional Park Trail	Bennett Valley Road/ Farmers Lane	Petaluma Hill Road/ Yolanda Avenue

Table 6-5: First Phase – On Street Bikeways

TYPE	LOCATION	CROSS STREET A	CROSS STREET B
Class II Buffered Bicycle Lanes	3rd Street	Davis Street	Morgan Street
Class II Bicycle Lanes	7th Street	B Street	Mendocino Avenue
Class II Bicycle Lanes	Dutton Avenue	3rd Street	Sebastopol Road
Class II Bicycle Lanes	Guerneville Road	Range Avenue	Illinois Avenue
Class II Bicycle Lanes	Piner Road	Marlow Road	Cleveland Avenue
Class II Bicycle Lanes	Range Avenue	Piner Road	Russell Avenue
Class II Bicycle Lanes	Santa Rosa Avenue	Sonoma Avenue	Maple Avenue
Class II Bicycle Lanes	Sebastopol Road	Avalon Avenue	Sebastopol Ave
Class III Bicycle Route	B Street	4th Street	3rd Street

Table 6-6: First Phase – Sidewalks

TYPE	LOCATION	CROSS STREET A	CROSS STREET B
Sidewalk	3rd Street	70 ft east of Roberts Avenue	250 ft west of Wilson Street
Sidewalk	Chanate Road	Mendocino Avenue	Lomitas Avenue
Sidewalk	Fulton Road	Appletree Drive	Guerneville Road
Sidewalk	Guerneville Road	Marlow Road	Ridley Avenue
Sidewalk	Sonoma Avenue	Farmers Lane	Village Court Transit Hub

Table 6-7: First Phase – Studies

TYPE	LOCATION	CROSS STREET A	CROSS STREET B
Study	4th Street	D Street	Farmers Lane
Study	Brookwood Avenue	2nd Street	Sonoma Avenue
Study	College Avenue	Kowell Lane	Morgan Street
Study	Elliott Avenue	Armory Drive	Mendocino Avenue
Study	Montgomery Drive	Alderbrook Drive	Hahman Drive
Study	Northeast Connections: Santa Rosa Creek Trail Channel Trail Melita Road Channel Trail	 Melita Road SR 12 SR 12 Stone Bridge Road	 SR 12 Channel Drive Stone Bridge Road Channel Drive
Study	Roseland Creek Trail	Stony Point Road	Burbank Avenue
Study	Stony Point Road	Guerneville Road	Sebastopol Road

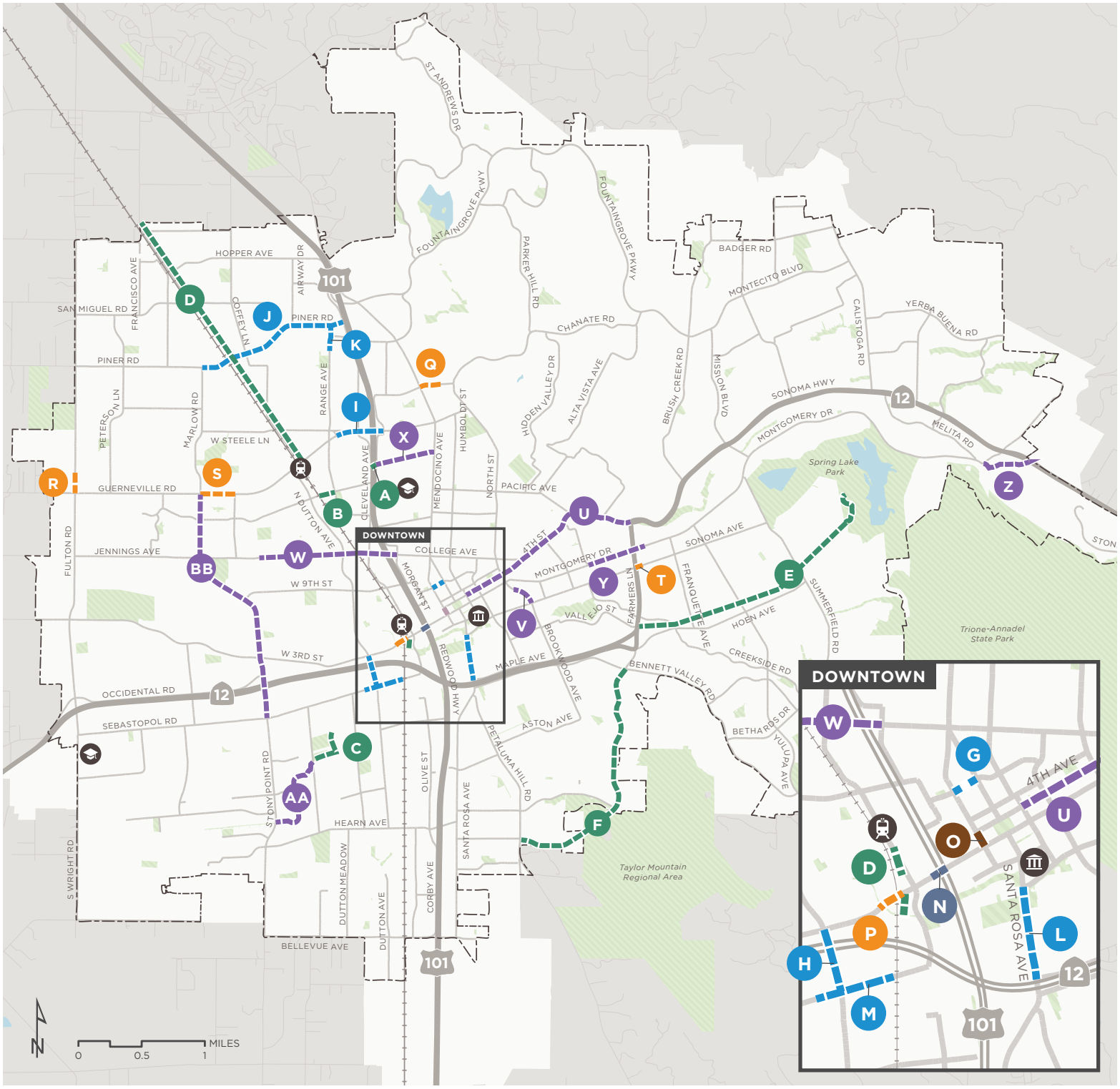


Figure 6-5

FIRST PHASE PROJECTS

DESTINATIONS + BOUNDARIES

- City Hall
- SMART Station
- Santa Rosa Junior College
- City Limts
- Park
- Urban Growth Boundary
- Shared-Use Path (Class I)
- Bicycle Lane (Class II)
- Buffered Bicycle Lane (Class IIB)
- Bicycle Route (Class III)
- Sidewalk
- Study

SHARED-USE PATH

A Highway 101 Overcrossing
(CODDINGTOWN MALL TO SANTA ROSA JUNIOR COLLEGE)

B Jennings Avenue
(AT SMART TRACKS)

C Roseland Creek Trail
(BURBANK AVE TO MCMINN AVE)

D SMART Trail:
SEGMENT A (PRINCE MEMORIAL GREENWAY TO 3RD ST)
SEGMENT B (4TH ST TO 6TH ST)
SEGMENT C (GUERNEVILLE RD TO CITY LIMITS)

E Southeast Greenway
(FARMERS LN TO SPRING LAKE PARK)

F Taylor Mountain Regional Park Trail
(BENNETT VALLEY RD/FARMERS LN TO PETELUMA HILL RD/YOLANDA AVE)

BICYCLE LANE

G 7th Street
(B ST TO MENDOCINO DR)

H Dutton Avenue
(3RD ST TO SEBASTOPOL RD)

I Guerneville Road
(RANGE AVE TO ILLINOIS AVE)

J Piner Road
(MARLOW RD TO CLEVELAND AVE)

K Range Avenue
(PINER RD TO RUSSELL AVE)

L Santa Rosa Avenue
(SONOMA AVE TO MAPLE AVE)

M Sebastopol Road
(AVALON AVE TO SEBASTOPOL AVE)

BUFFERED BICYLE LANE

N 3rd Street
(DAVIS ST TO MORGAN ST)

BICYCLE ROUTE

O B Street
(3RD ST TO 4TH ST)

SIDEWALK

P 3rd Street
(70FT EAST OF ROBERTS AVE TO 250FT WEST OF WILSON ST)

Q Chanate Road
(MENDOCINO AVE TO LOMITAS AVE)

R Fulton Road
(APPLETREE DRIVE TO GUERNEVILLE ROAD)

S Guerneville Road
(MARLOW ROAD TO RIDLEY AVENUE)

T Sonoma Avenue
(FARMERS LN TO VILLAGE COURT TRANSIT HUB)

STUDY

U 4th Street
(D ST TO FARMERS LN)

V Brookwood Avenue
(2ND ST TO SONOMA AVE)

W College Avenue
(KOWELL LN TO MORGAN ST

X Elliott Avenue
(ARMORY DR TO MENDOCINO AVE)

Y Montgomery Drive
(ALDERBROOK DR TO HAHMAN DR)

Z Northeast Connections:
SANTA ROSA CREEK TRAIL (MELITA RD TO SR 12)
CHANNEL TRAIL (SR 12 TO CHANNEL DR)
MELITA ROAD (SR 12 TO STONE BRIDGE RD)
CHANNEL TRAIL (STONE BRIDGE RD TO CHANNEL DR)

AA Roseland Creek Trail
(STONY POINT RD TO BURBANK AVE)

BB Stony Point Road
(GUERNEVILLE RD TO SEBASTOPOL RD)

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 statewide and federal grant programs, are described on the following pages.

Eligibilities for the funding programs listed in this section are summarized in Table 6-8 on page 6-14.

Local and Regional Funding Sources

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 Sonoma County Transportation Authority (SCTA).

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

In Sonoma County, One Bay Area grant funds are administered by SCTA. The program emphasizes funding for projects within Priority Development Areas in the region that are in-line with housing and land-use goals. Santa Rosa has received two One Bay Area 2 grants, including a project funding the design of a bicycle and pedestrian bridge over Highway 101.

Funds are programmed by SCTA.

TRANSPORTATION DEVELOPMENT ACT ARTICLE 3

Transportation Development Act Article 3 (TDA 3) provides funding annually for bicycle and pedestrian projects. Two percent 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 SCTA.

MEASURE M (2004)

Measure M is a one-quarter cent sales tax in Sonoma County to fund transportation projects including maintenance and traffic safety improvement projects. Four percent of revenues are set aside for bicycle and pedestrian projects. Two projects in Santa Rosa have already been identified by the SCTA as priorities to receive funding: the Santa Rosa Creek Trail, the Highway 101 bicycle and pedestrian overcrossing, and bicycle lanes on Old Redwood Highway, Mendocino Avenue, and Santa Rosa Avenue.

Funds are programmed by SCTA.

MEASURE M (2018)

Measure M is a one-eighth cent sales tax to improve and protect Sonoma County's parks, safeguard water and wildlife, and expand walking, bicycling, and hiking trails. Trail maintenance projects and active transportation projects that improve access to regional parks and trails will be eligible for Measure M's expenditure list.

Funds are anticipated to be programmed by Sonoma County Regional Parks (SCRP).

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 the Metropolitan Transportation Commission.

State and Federal 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 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 programed 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 percent 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 programed 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 programed by the CTC.

OFFICE OF TRAFFIC SAFETY

Under the Fixing America's Surface Transportation (FAST) Act, five percent of Section 405 funds are dedicated to addressing nonmotorized 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 trials for both motorized and nonmotorized trail use. Eligible products include: trail maintenance and restoration, trailside and trailhead facilities, equipment for maintenance, new trail construction, and more.

Funds are programed 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 are 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 California Natural Resources Agency.

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 the CTC.

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 with guidance from the CTC.

Table 6-8: Funding Source Eligibilities by Project Type

FUNDING SOURCE	ON-STREET BIKEWAYS	TRAILS	SAFE ROUTES TO SCHOOL	SAFE ROUTES TO TRANSIT	CROSSING/ INTERSECTIONS	PROGRAMS	STUDIES
Local and Regional Programs							
Transportation Funds for Clean Air (SCTA)	●	●	●	●	●		
Bicycle Facilities Program (BAAQMD)	●	●	●	●			
One Bay Area (MTC)	●	●	●	●			
Transportation Development Act, Article 3 (SCTA)	●	●	●	●	●		
Measure M (2004 - SCTA)	●	●	●	●	●		
Measure M (2018 - SCRP)		●					
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)						●	
Recreational Trails Program (CA DPR)		●					
Affordable Housing & Sustainable Communities (CA HCD)	●			●		●	
Cultural, Community, and Natural Resources (CA NRA)		●					
Urban Greening Grants (CA NRA)	●	●	●	●			
Local Partnership Program	●		●	●	●		
Road Maintenance and Rehabilitation Program	●		●	●			

ENVIRONMENTAL IMPACT

Pursuant to the California Environmental Quality Act (CEQA), an Initial Study was prepared for the 2010 Bicycle and Pedestrian Master Plan, which resulted in a Mitigated Negative Declaration that was approved by the City Council on February 15, 2011 (Resolution No. 27834). CEQA Guidelines section 15162 provides that no additional review is required where a negative declaration has been adopted for a project and there are no substantial changes to the project or changed circumstances which will result in new or more severe environmental impacts and there is no new information showing the project will have significant effects not discussed in the negative declaration.

No substantial changes have been proposed in the Master Plan Update that would result in new or more severe environmental impacts than were analyzed in the 2010 Master Plan mitigated negative declaration; there have been no changes in circumstances resulting in new or more severe impacts; and there is no new information indicating that the project will have one or more significant effects not discussed in the previous mitigated negative declaration. Therefore, further environmental review is not required.

This page intentionally left blank

A.

RECOMMENDATION TABLES

APPENDIX A. RECOMMENDATION TABLES

This appendix includes tables listing the network and crossing recommendations summarized and mapped in Chapter 5. Projects within each table are listed alphabetically by street name.

Table A-1: Class I Shared Use Paths

LOCATION	FROM	TO	MILES
Bellevue Ranch Trail	Liscum St	Arrowhead Dr	0.15
Calistoga Rd (extension)	Calistoga Rd	Montgomery Dr	0.20
Coffey Creek Trail	Piner Rd	Piner Creek Trail	0.21
Colgan Creek	Colgan Creek	Dutton Ave/Hearn Ave	0.14
Colgan Creek Trail	Southwest Community Trail	near Bellevue Ave	0.55
Ducker Creek Trail	Benicia Dr	Culebra Way	0.12
Ducker Creek Trail	Middle Rincon Rd	Benicia Dr	0.31
Francisco Ave Trail	N Village Dr/ Van Patter Dr	Claiborne Cir (extension)	0.45
Guerneville Rd	Ridley Ave	SMART Trail	0.39
South of Guerneville Rd	SMART Rail Line	Herbert Ln	0.05
Highway 101 Overcrossing	Edwards Ave	Elliott Ave	0.42
Idaho Dr	Spring Creek Dr	Spring Creek	0.14
Jennings Ave	SMART Railroad Tracks	Range Ave	0.13
Jennings Ave (extension)	Cleveland Ave	Armory Dr	0.03
Jennings Park connector	Clover Ln	New York Dr	0.14
Joe Rodota Trail	N Wright Rd	Sebastopol Rd	0.19

Continued

Table A-1: Class I Shared Use Paths

LOCATION	FROM	TO	MILES
Kawana Springs Creek Restoration	Petaluma Hill Rd/ Lumas Ct	Santa Rosa Plaza	0.44
Kawana Springs Rd	Kawana Ter	Turquoise Way	0.61
Matanzas Creek Trail	Doyle Park Dr	Vallejo St	0.21
Neotomas Ave (extension)	Ronne Dr	Neotomas Ave	0.05
Oaklake Green Park	Oak Lake Ave	Garfield Park Ave	0.10
Paulin Creek Trail	McBride Ln	Cleveland Ave	0.08
Piner Creek North Fork	Piner Creek	Airway Dr	0.05
Piner Creek Trail	Santa Rosa Creek Trail	SMART Trail	2.35
Piner Creek Trail	Marlow Rd	Piner Creek Trail	0.33
Piner Creek Trail	SMART path	City limits	1.14
Piner Creek Trail	Marlow Rd	Hardies Ln	1.14
Prince Memorial Greenway	Prince Memorial Greenway north	Sonoma Ave/ Santa Rosa Ave	0.08
Rae Street Park	Sonoma Ave	Brown St	0.03
Roseland Creek Trail	Burbank Ave	McMinn Ave	0.32
Roseland Creek Trail	Llano Rd	Ludwig Ave/Daniels Dr	0.17
Roseland Creek Trail	Maitland Ave	Ludwig Ave	0.72
Russell Creek Trail	Piner Rd	Range Ave/ Bicentennial Way	1.65
Santa Rosa Ave	1st St	Prince Memorial Greenway	0.05
Santa Rosa Creek Trail	Santa Rosa Ave	E Street	0.27
Santa Rosa Creek Trail	Doyle Park Dr	E St	0.66
Santa Rosa Creek Trail	Farmers Ln	Shortt Rd/Marian Ln	0.28
Santa Rosa Creek Trail	Shadow Ln	Santa Rosa Creek	0.15
Santa Rosa Creek Trail	Mission Circ (extension)	Calloway Dr/ Streamside Dr	0.12
Santa Rosa Memorial Park Trail	Parsons	Poppy Dr	1.67
Santa Rosa Rural Cemetery	Franklin Ave (extension)	Pasons Dr	0.05

Continued

Table A-1: Class I Shared Use Paths

LOCATION	FROM	TO	MILES
Santa Rosa Southeast Greenway Extension	Spring Lake Park	Sonoma Valley Trail (planned)	0.63
Santa Rosa West County Connector	Santa Rosa Creek Trail	Joe Rodota Trail	1.49
SE Greenway Connector	Southeast Greenway	Spring Lake Path	0.27
Shadow Ln	Santa Rosa Creek Trail (extension)	Montgomery Dr	0.16
SMART Rail Line	Prince Memorial Greenway	W 3rd St	0.07
SMART Rail Line	6th St/W 6th St	4th St	0.12
SMART Trail	Guerneville Rd	River Rd (Fulton)	3.39
SMART Trail	Golf Course Dr (Rohnert Park)	Bellevue Ave	2.77
SMART Trail	6th St/W 6th St	4th St	1.08
SMART Trail	SMART Trail/Frances St (extension)	Range Ave/Frances St	0.09
Southeast Greenway	Hoen Ave/Hoen Frontage Rd	Spring Lake Park Campground Road	1.62
Southeast Greenway	Elkhorn Ct/Kodiak Ct	Hoen Ave/Mariposa Dr	0.68
Southeast Greenway	Wanda Way	Camden Ct	0.05
Southeast Greenway	Vallejo St	Hoen Frontage Rd	0.16
Southeast Greenway	Sierra Creek Ln	Princeton Way	0.17
Southwest Community Trail	Hearn Ave	Colgan Creek Trail	0.88
Spring Creek Trail	Hahman Dr/ Rock Creek Dr	Franquette Ave	0.49
State Rte 12	Melita Rd	Shady Acres Ln	3.68
State Rte 12	Middle Rincon Rd	El Encanto Way (extension)	1.07
Steele Creek Trail	Zinfandel Ave	Marlow Rd	0.11
Steele Creek Trail	Hyman Ln (extension)	Zinfandel Ave	0.09
Tanglewood Park Trails	Tanglewood Ct	Oak Lake Ave	0.36
Taylor Mountain Regional Park Trail	Bennett Valley Rd/ Farmers Ln	Petaluma Hill Rd/ Yolanda Ave	0.50
Taylor Mountain Regional Park Trail	Petaluma Hill Rd	City Limit	0.14
Todd Creek	Highway 101	Scenic Ave	0.62
Woodacre Trail	Fulton Rd	Woodacre Trail/ Guerneville Rd	1.22

Table A-2: Class II Bicycle Lanes

LOCATION	FROM	TO	MILES
1st St	B St	A St	0.10
2nd St	D St	E St	0.10
2nd St	Second Street	Montgomery Dr	0.33
W 3rd St	Rusch Ct	Stony Point Rd	0.49
W 3rd St	N Dutton Ave	SMART Railroad Tracks	0.32
7th St	B St	Mendocino Ave	0.10
7th St	Mendocino Ave	Humboldt St	0.09
Armory Dr	Ridgeway Ave	Elliott Ave	0.23
Aston Ave	Brookwood Ave	Hendley St	0.40
Badger Rd	Middle Rincon Rd	Baird Rd	0.26
Baker Avenue connector	Corby Ave	Santa Rosa Ave	0.22
Bellevue Ave	Stony Point Rd	Colgan Creek Trail	0.29
Bellevue Ave	Burgess Dr	SMART Railroad Tracks	0.63
Bellevue Ave	SMART Railroad Tracks	Moorland Ave	0.14
Bellevue Ave	Corby Ave	Santa Rosa Ave	0.27
Bellevue Ave	Santa Rosa Ave	Eastern end	0.31
Bellevue Ave (extension)	E Bellevue Ave	Petaluma Hill Rd	0.60
Bennett Valley Rd	Bennett Valley Rd/ City Limit	Mitchell Rd	1.40
Bennett Valley Rd	Yulupa Ave	City Limit	0.17
Bicentennial Way	Fountaingrove Pkwy	Mendocino Ave	0.47
Brigham Ave	Mount Olive Dr/ Maple Ave	Bennett Valley Rd	0.08
Brookwood Ave	College Ave	2nd St	0.25
Brookwood Ave	Maple Ave	Sonoma Ave	0.48
Brookwood Ave	Maple Ave	Allan Way/Aston Ave	0.52

Continued

Table A-2: Class II Bicycle Lanes

LOCATION	FROM	TO	MILES
Burbank Ave	Roundelay Ln	Hearn Ave	1.00
Calistoga Rd	Rincon Ave	Badger Rd	0.17
Chanate Rd	Lomitas Ave	Humboldt St	0.10
Chanate Rd	Bonita Vista Ln	Montecito Ave	0.65
Cleveland Ave	Frances St	Carrillo St	0.23
Cleveland Ave	Carrillo St	Lincoln St	0.13
Cleveland Ave	Lincoln St	9th St	0.27
Cleveland Ave	Hopper Ave	Industrial Dr	0.28
Cleveland Ave	Industrial Dr	Guerneville Rd	1.17
Cleveland Ave	Guerneville Rd	Coddingtown Center	0.35
Coffey Ln	Empire Industrial Ct	Piner Rd	0.10
College Ave	W College Ave	Mendocino Ave	0.58
College Ave	Mendocino Ave	4th St	0.73
College Ave	Monroe St/Allison Way	4th St	0.05
County Center Dr	Administration Dr	Steele Ln	0.31
Davis St	9th St	7th St	0.17
Davis St	6th St	3rd St	0.17
Dutton Ave	W 3rd St	Sebastopol Rd	0.25
Dutton Ave	Dutton Meadow (extension)	Dutton Ave (extension)	0.38
Dutton Ave	Sebastopol Rd	Torzelli Ln/South Ave	0.45
Dutton Ave	Torzelli Ln/South Ave	Hearn Ave	0.68
Dutton Ave	250 Ft N of Duke Ct	City Limit	0.84
Dutton Ave	City Limit	W Robles Avenue	0.17
N Dutton Ave	W 9th St	W 3rd St	0.55

Continued

Table A-2: Class II Bicycle Lanes

LOCATION	FROM	TO	MILES
N Dutton Ave	W College Ave	W 9th St	0.32
Dutton Ave extension	Hearn Ave	Dutton Ave extension	0.32
Dutton Ave extension	Dutton Ave	Dutton Ave extension	0.05
Dutton Ave extension	near Birch Meadow St	Burbank Ave	0.68
Dutton Ave extension	Colgan Creek	Dutton Ave	0.26
Dutton Meadow	Hearn Ave	Bellevue Ave	0.86
E St	Bennett Valley Rd	Hendley St	0.08
S E St	Wheeler St	Clark St	0.10
S E Street	Wheeler St	Bennett Valley Rd	0.25
Elliott Ave	Armory Dr	Mendocino Ave	0.47
Frances St	150 W of Briggs Ave	Cleveland Ave	0.16
Francisco Ave	City Limit	San Miguel Ave	1.01
Franklin Ave	Mervyn Ave	Crest Dr/Lewis Rd	0.15
Fresno Ave	New Zealand Ave	Finley Ave	0.21
Fresno Ave (extension)	Finley Ave	Northpoint Pkwy	0.58
Guerneville Rd	Range Ave	Cleveland Ave	0.17
Guerneville Rd/Steele Ln	Cleveland Ave	Illinois Ave	0.20
Hall Rd	City Limit	Countryside Drive	0.19
Hearn Ave	Whitewood Dr	Santa Rosa Ave	0.42
Hopper Ave	Coffey Ln	Airway Dr	0.49
Humboldt St	Chanate Rd/ Belvedere Way	Mervyn Ave	0.09
Illinois Ave/Armory Dr	Steele Ln	Elliott Ave	0.31
Kawana Springs Rd	Brookwood Ave	Kawana Ter	0.33
King St/E St/S E St	S E St/Clark St	College Ave/King St	0.37

Continued

Table A-2: Class II Bicycle Lanes

LOCATION	FROM	TO	MILES
Lewis Rd	Humboldt St	Franklin Ave	0.11
Linwood Ave	Aston Ave	Brookwood Ave	0.10
Los Alamos Rd	Melita Rd	State Rte 12	0.19
Ludwig Ave	S Wright Rd	City Limit	0.98
Ludwig Ave	City Limit	Stony Point Rd	0.50
Ludwig Ave	Stony Point Rd	Bellevue Ave	0.28
Ludwig Ave	S Wright Rd	Llano Rd	0.10
Maple Ave	Brown St	Santa Rosa Ave	0.14
Melita Rd	Montgomery Dr	Los Alamos Rd	0.06
Miller Rd Trail	Petaluma Hill Rd	Bellevue Ave (extension)	0.52
Mission Blvd	State Rte 12	Montgomery Dr	0.19
Montecito Blvd	Mission Blvd	Middle Rincon Rd	0.38
Montgomery Dr	2nd St	Talbot Ave	0.39
Northpoint Pkwy	Corrigan St	S Wright Rd	0.40
Occidental Rd	Occidental Rd/City Limit/Fulton Rd	Occidental Rd/City Limit/Piezzi Rd	0.94
Olive St	Railroad St	Sebastopol Ave	0.20
Pacific Ave	Mendocino Ave	Humboldt St	0.16
Petaluma Hill Rd	City Limit	Hopi Trail	0.93
Petaluma Hill Rd	Santa Rosa Ave	Barham Ave/Pressley St	0.16
Piner Rd	Pinercrest Dr/Marlow Rd	Cleveland Ave	1.22
Railroad Street	3rd St	Santa Rosa Creek	0.12
Range Ave	Piner Rd	Russell Ave	0.20
Range Ave	Guerneville Rd	Edwards Ave	0.31
Range Ave	Edwards Ave	Jennings Ave	0.10

Continued

Table A-2: Class II Bicycle Lanes

LOCATION	FROM	TO	MILES
Ridgway Ave	Morgan St	Mendocino Ave	0.27
Ridgway Ave	Morgan St	Armory Dr	0.06
San Miguel Rd	Fulton Rd	Francisco Ave	0.51
Santa Rosa Ave	Santa Rosa Creek	Sonoma Ave	0.06
Sebastopol Ave	Sebastopol Rd	Olive St	0.14
Sebastopol Rd	N Wright Rd	Leddy Ave	0.12
Sebastopol Rd	Leddy Ave	Louis Krohn Dr	0.09
Sebastopol Rd	Fresno Ave	Corporate Center Pkwy	0.34
Sebastopol Rd	Avalon Ave	Sebastopol Ave	0.31
Standish Avenue	W Robles Ave	Todd Rd	0.50
State Rte 12	Farmers Ln	Melita Rd	3.90
Taylor Mountain Regional Park Trail	Bennett Valley Rd/ Farmers Ln	Petaluma Hill Rd/ Yolanda Ave	2.03
S Wright Rd	Sebastopol Rd	Ludwig Ave	1.47
Yolanda Ave	Petaluma Hill Rd	Santa Rosa Ave	0.50

Table A-3: Class II Buffered Bicycle Lanes

LOCATION	FROM	TO	MILES
3rd St	Davis St	Morgan St	0.07
W 3rd St	Brittain Ln/Malibu Cir	Stony Point Rd	0.60
Petaluma Hill Rd	Yolanda Ave	Barham Ave/Pressley St	2.01

Table A-4: Class III Bicycle Routes

LOCATION	FROM	TO	MILES
5th St	Humboldt St	D St	0.01
7th St	Humboldt St	Beaver St	0.11
Acacia Ln	Las Raposas Ct	State Rte 12	0.35
Alderbrook Dr	Sonoma Ave	4th St	0.57
B St	4th St	3rd St	0.06
Barham Ave	Olive St	W Barham Ave	0.25
W Barham Ave	Barham Ave	Dutton Ave	0.18
Barndance Ln	Stony Point Rd	Liscum St	0.11
Beachwood Dr/ Baker Ave	SMART Trail	Corby Ave	0.33
Bear Cub Way	Armory Dr	Mendocino Ave	0.49
Beaver St	7th St	Cherry St	0.05
Blacksmith Wy	Arrowhead Dr	Silver Spur	0.24
Brown St	Rae St	Wheeler St	0.18
Brush Creek Road	Montecito Blvd	Urban Growth Boundary	0.80
Bryden Ln	Montecito Ave	St Helena Ave	0.53
Burgess Dr	Bellevue Ave	Dutton Meadow	0.15
Calistoga Rd	State Rte 12	Firestone Pl	0.07

Continued

Table A-4: Class III Bicycle Routes

LOCATION	FROM	TO	MILES
Channel Dr	Channel Trl	Montgomery Dr/ Channel Dr	0.09
Cherry St	Beaver St	E St	0.08
Clairborne Cir (extension)	Francisco Ave Trail	Claiborne Cir/ Francisco Ave	0.13
Clover Dr	Jennings Ave	W College Ave	0.37
Clover Dr	W College Ave	Link Ln	0.37
Clyde Ave	Morley Way	4th St	0.12
Colby Ave/Colby Ave Ext	Hearn Ave	Dowd Dr	0.24
Comalli St	Hughes Ave	Lazzini Ave	0.17
Corby Ave	Earle St	Hearn Ave	1.04
Creekside Rd	Cypress Way	Yulupa Ave	0.54
Cypress Way	Hoen Ave	Creekside Rd	0.32
D St	5th St	3rd St	0.11
D St	3rd St	Sonoma Ave	0.19
Delport Ave	West Ave	McMinn Ave	0.17
Ditty Ave/Russell Ave	Ditty Ave/Coffey Ln	Russell Ave/Hardies Ln	0.64
Dowd Dr	Corby Ave Extension	Talmadge Dr	0.41
Doyle Park Dr	Talbot Ave	Doyle Park	0.44
Dutton Ave	W Barham Ave	Torzelli Ln/South Ave	0.11
Earle St	S A St	Santa Rosa Ave	0.17
Earle St	S Davis St	Corby Ave	0.14
El Encanto Dr/St Francis Rd/Desoto Dr/Owls Nest Dr	Beach Ave/Marit Dr	San Ramon Way/ Owls Nest Dr	0.81
Elizabeth Way	Pacific Ave	Parsons Dr	0.20
Exeter Dr/Putney Dr	Jennings Ave	W College Ave	0.41
Florence St	Hewett St	Duncan St	0.05

Continued

Table A-4: Class III Bicycle Routes

LOCATION	FROM	TO	MILES
Florence St	Duncan St	Duncan St	0.03
Francisco Ave	San Miguel Rd	Pinercrest Dr	0.24
Franquette Ave	Montgomery Dr	Spring Creek	0.42
Franquette Ave	Spring Creek	Hoen Ave	0.32
Gamay St	Zinfandel Ave	Jennings Ave	0.02
Hansen Dr	Middle Rincon Rd	Jack London Dr	0.26
Hardies Ln	Russell Ave	Terry Rd	0.39
Hardies Ln	Terry Rd	W Steele Ln	0.24
Hartley Drive	Montgomery Dr/ Franquette Ave	Yulupa Ave/Hartley Dr	0.25
Hewett St	Umland Dr	Florence St	0.09
Hopper Ave	Barnes Rd	Coffey Ln	0.51
Hospital Trail	Doyle Park Dr/Parker Dr	Santa Rosa Creek	0.06
Hughes Ave	McMinn Ave	Burbank Ave	0.17
Hughes Ave	Comalli St	Burbank Ave	0.11
Imwalle St	W Third St	Santa Rosa Creek Trail	0.18
Jack London Dr	Hansen Dr	Klondike Ct	0.05
Knolls Dr	Lornadell Ln	Lornadell Ln	0.03
Knolls Dr	Lornadell Ln	Bethards Dr	0.66
Lazzini Ave	Comalli St	Stony Point Rd	0.22
Lazzini Ave	Stony Point Rd	Marble St	0.17
Leo Drive	Burbank Ave	SMART Trail	0.70
Leonard Ave	Talbot Ave/Doyle Park Dr	Alderbrook Dr	0.20
Leonard Ave/Shortt Rd	Alderbrook Dr/ Leonard Ave	Shortt Rd/Marian Ln	0.32
Link Ln	Umland Dr	W 9th St	0.41

Continued

Table A-4: Class III Bicycle Routes

LOCATION	FROM	TO	MILES
Link Ln	Lodi St	W 9th St	0.16
Lornadell Ln	Neotomas Ave	Knolls Dr	0.05
McMinn Ave	Delport Ave	Hughes Ave	0.15
Mendocino Ave	College Ave	4th St	0.41
Monte Verde Dr	Garfield Park Ave	Calistoga Rd	0.06
Monte Verde Dr	Calistoga Rd	San Ramon Way	0.99
Montecito Ave	El Capistrano Way	Pacific Ave/Bryden Ln	0.09
Moraga Dr	Aston Ave	Tokay St	0.38
Morgan St	9th St	Ridgeway Ave	0.67
Morley Way	Park Way	Bryden Ln	0.04
Neotomas Ave	Farmers Ln	Ronne Dr	0.46
Neotomas Ave	Tachevah Dr	Tuscan Dr	0.05
Neotomas Ave	Tuscan Dr	Compadre Dr	0.04
Neotomas Ave	Compadre Dr	Tamarisk Dr/Tamarisk Ct	0.10
Neotomas Ave	Tamarisk Dr/Tamarisk Ct	Wawona Dr/Wawona Ct	0.04
Neotomas Ave	Cielo Ct	Maynes Ct	0.03
Neotomas Ave	Wawona Dr/Wawona Ct	Cielo Ct	0.05
Neotomas Ave	Maynes Ct	Yulupa Ave	0.04
Oakmont Dr	Valley Oaks Dr	State Rte 12	1.53
Old Stony Point Rd/Liscum St	Roseland Creek	Ludwig Ave	0.79
Olive St	Sebastopol Ave	Earle St	0.22
Peterson Ln	Pinercrest Dr	Piner Rd	0.16
Peterson Ln/Pinercrest Dr/Francisco Ave	Appletree Dr/Laylani Ct	San Miguel Rd	1.39
Pinercrest Dr	Francisco Ave	Peterson Ln	0.12

Continued

Table A-4: Class III Bicycle Routes

LOCATION	FROM	TO	MILES
Proctor Dr	Clyde Ave	Park Way	0.03
Prospect Ave	Sherbrook Dr	Acacia Ln	0.25
Pythian Rd	State Rte 12	Valley Oaks Dr	0.81
Rinconada Dr	Mission Blvd	Middle Rincon Rd	0.42
Ronne Dr	Neotomas Ave	Neotomas Ave Trail Connection	0.01
Russell Ave	Range Ave	Hardies Ln	0.11
Russell Ave	Coffey Ln	Hardies Ln	0.38
San Miguel Rd	Francisco Ave	SMART Rail Line	0.43
San Miguel Rd	SMART Rail Line	Coffey Ln	0.34
Santa Rosa Ave	4th St	3rd St	0.07
Shadow Ln	Montgomery Dr	Santa Rosa Creek Trail	0.12
Sherbrook Dr	Mission Blvd	Prospect Ave	0.04
Sherbrook Dr	Mission Blvd	Sherbrook Dr west	0.05
Sorrento Way	Acacia Ln	Culebra Way/Acacia Ln	0.12
South Ave	Dutton Ave	West Ave	0.20
Spencer Ave	St Helena Ave	Spring St	0.62
Spencer Ave/Proctor Dr/Park Way	Humboldt St	Morley Way	0.83
Spring St	Spencer Ave	Pacific Ave	0.12
St Helena Ave	Bryden Ln	Spencer Ave/Proctor Dr	0.70
Summerfield Rd	Bethards Dr	Woodview Dr	0.60
Tachevah Dr	Bennett Valley Rd	Yulupa Ave	0.55
Talbot Ave	4th St	Doyle Park Dr/ Leonard Ave	0.14
Trowbridge St	Link Ln	Umland Dr	0.11
Umland Dr	Trowbridge St	Hewett St	0.06

Continued

Table A-4: Class III Bicycle Routes

LOCATION	FROM	TO	MILES
Vallejo St	S E St	End of street	1.28
Valley Oaks Dr	Pythian Rd	Oakmont Dr	0.11
Wallace Rd	City Limit	Badger Rd	0.20
Wheeler St	Brown St	S E St	0.21
Willjam Court	Talmadge Dr	Bellevue Ave	0.34
Wilson St	9th St	3rd St	0.43
Zinfandel Ave	Steele Creek Trail	Gamay St	0.22
Zinfandel Ave	Jennings Ave/Gamay St	Zinfandel Ave/ Piner Creek Trail	0.18

Table A-5: Class III Bicycle Boulevards

LOCATION	FROM	TO	MILES
3rd St/Montgomery Dr	E St	2nd St	0.34
6th St	W 6th St	Davis St	0.10
W 6th St	Pierson St	6th St	0.17
Colgan Ave	Santa Rosa Ave	Petaluma Hill Rd	0.35
Humboldt St	Mervyn Ave	Lewis Rd	0.15
Humboldt St	Lewis Rd	Pacific Ave	0.60
Humboldt St	Pacific Ave	College Ave	0.53
Humboldt St	College Ave	5th St	0.29
Jennings Ave	Exeter Dr	N Dutton Ave	1.30
Jennings Ave	N Dutton Ave	SMART Railroad Tracks	0.07
Jennings Ave	Range Ave	Cleveland Ave	0.30
Middle Rincon Rd	Montecito Ctr	State Rte 12	0.93
Pierson St	Santa Rosa Creek Trail	W 6th St	0.02
Roseland Ave/ McMinn Ave	Roseland Ave/ Joe Rodota Trail	McMinn Ave/Hughes Ave	0.32
Sonoma Ave	Hahman Dr	Yulupa Ave	0.46
Spencer Ave	Humboldt St	Mendocino Ave	0.50
West Ave	Sebastopol Rd	South Ave	0.45
West Ave	South Ave	Hearn Ave	0.63

Table A-6: Class IV Separated Bikeways

LOCATION	FROM	TO	MILES
3rd St	Morgan St	B St	0.17
Guerneville Rd	Westberry Dr/N Dutton Ave	SMART Santa Rosa North Station Tracks	0.06
Northpoint Pkwy (extension)	Stony Point Rd	Burbank Ave	0.33
Sebastopol Rd	Corporate Center Pkwy	Sebastopol Ave	1.78

Table A-7: Sidewalks

LOCATION	FROM	TO	MILES
Baker Ave	100 feet west of Santa Rosa Ave	Santa Rosa Ave	0.04
3rd St	Morgan St	Davis St	0.07
W 3rd St	250ft West of Wilson St	70ft East of Roberts Ave	0.11
W Third St	Surrey Dr	N Dutton Ave	0.69
4th St	Rogers Way	State Rte 12	0.05
W Barham Ave	Dutton Ave	250ft East of Beachwood Dr	0.28
Barnes Rd	Windrose Ln	Dennis Ln	0.33
Bicentennial Way	Lake Park Dr	Fountaingrove Pkwy	0.16
Brookwood Ave	College Ave	5th St	0.08
Brush Creek Rd	State Rte 12	Los Olivos Rd	0.27
Burbank Ave	Hearn Ave	Sebastopol Rd	0.99
Carr Ave	Humboldt St	North St	0.32
Chanate Rd	Bonita Vista Ln	Montecito Ave	0.68
Chanate Rd	Lomitas Ave	Mendocino Ave	0.17
Clover Dr	Clover Ln	W College Ave	0.20
W College Ave	Marlow Rd/Stony Point Rd	Albion Pl	0.12
W College Ave	Ridley Ave	Tyara Way	0.08

Continued

Table A-7: Sidewalks

LOCATION	FROM	TO	MILES
W College Ave	Marlow Rd/Stony Point Rd	Sparrow Creek St	0.12
W College Ave	Halyard Dr	Dorrit Ave	0.19
Corby Ave	Baker Ave	Hearn Ave	0.45
Corporate Center Pkwy	Griffen Ave	Northpoint Pkwy	0.10
Dowd Dr/Wijan Ct	Hearn Ave	Bellevue Ave	0.87
Dutton Ave	Duke Ct	W Robles Ave	1.02
N Dutton Ave	Decker St	W 9th St	0.06
N Dutton Ave	Jennings Ave	Tesconi Cir	0.22
S Dutton Ave	Bellevue Ave	Hearn Ave	0.85
Eardley Ave	Jennings Ave	W College Ave	0.43
Eddy Dr/Robin Way/Barbara Dr	Moorland Ave	Moorland Ave	0.25
Franklin Ave	North St	Carr Ave	0.13
Franklin Ave	Monroe St	Terrace Way	0.47
Fulton Rd	Piner Rd	Wishing Well Way	0.68
Fulton Rd	Appletree Dr	Guerneville Rd	0.16
Gloria Dr	Dutton Ave	Westland Dr	0.42
Gordon Ln	Bennett Valley Rd	Saint Irene Way	0.30
Guerneville Rd	Marlow Rd	Ridley Ave	0.28
Guerneville Rd	Lance Dr	Ridley Ave	0.41
Guerneville Rd	Lance Dr	Lance Dr	0.10
Hahman Dr	Montgomery Dr	Midway Dr	0.05
Hearn Ave	Santa Rosa Ave	Corby Ave	0.22
Jennings Ave	Clover Dr	Herbert St	0.37
Lance Dr	Jennings Ave	Eardley Ct (extension)	0.08

Continued

Table A-7: Sidewalks

LOCATION	FROM	TO	MILES
Lance Dr	Jennings Ave	W College Ave	0.05
Los Alamos Rd	Villa Los Alamos	State Rte 12	0.10
McDonald Ave	Pacific Ave	Park St	0.06
Montecito Ave	Chanate Rd	Norte Way	1.59
Montgomery Dr	Jackson Dr	Mission Blvd	0.31
Montgomery Dr	325ft west of Calistoga Rd	Jackson Dr	0.77
Moorland Ave	W Robles Ave	Todd Rd	0.50
Mount Olive Dr	Brigham Ave	Vallejo St	0.60
Neville Way	West end	Moorland Ave	0.11
North St	McConnell Ave	Pacific Ave	0.10
Pierson St	W 3rd St	W 6th St	0.18
Ridley Ave	Tonja Way	Brooklyn Dr	0.06
W Robles Ave	SMART Railroad Tracks	East end	0.25
Silva Ave	Humboldt St	Slater St	0.09
Sonoma Ave	Village Ct	Farmers Ln	0.06
South Ave	West Ave	Vineyard Ct	0.16
State Rte 12	Sonoma Hwy	S Boas Dr	0.91
State Rte 12	Mission Blvd	Brush Creek Rd	0.42
State Rte 12	Sonoma Hwy	Sonoma Hwy	0.26
State Rte 12	Randall Ln/State Rte 12	Prospect Ave/ State Rte 12	0.17
State Rte 12	Redwing Dr	Acacia Ln	0.11
State Rte 12	Java St	Middle Rincon Rd	0.16
State Rte 12	Calistoga Rd	State Rte 12 (north)	0.14
State Rte 12	Calistoga Rd	State Rte 12 (south)	0.02

Continued

Table A-7: Sidewalks

LOCATION	FROM	TO	MILES
Stony Point Rd	Bellevue Ave	Northpoint Pkwy	1.00
Todd Road	SMART Railroad Tracks	S Moorland Ave	0.21
Wilson St	4th St	3rd St/W 3rd St	0.07

Table A-8: Studies

LOCATION	FROM	TO	MILES
4th St	D St	Farmers Ln	1.56
Bennett Valley Rd	Farmers Ln	Yulupa Ave	1.85
Brookwood Ave	2nd St	Sonoma Ave	0.23
Channel Trail	State Rte 12	Channel Dr/Channel Trail	0.50
Channel Trail	Channel Dr/Channel Trail	Stone Bridge Rd (extension)	0.11
Coddingtown Mall transit center connector	Range Ave	Guerneville Rd	0.34
College Ave	Mendocino Ave	Glenn St	0.15
W College Ave	Kowell Ln	Morgan St	1.09
Elliott Ave	Armory Dr	Mendocino Ave	0.33
Guerneville Rd/ Range Ave	Range Ave	SMART-Santa Rosa North Station Tracks	0.34
Marlow Rd/Stony Point Rd	Stony Point Rd/ Sebastopol Rd	Marlow Rd/ Guerneville Rd	0.16
McConnell Ave	Mendocino Ave	North St	2.00
Melita Rd (extension)	State Rte 12	Stone Bridge Rd	0.40
Montgomery Dr	Alderbrook Dr	Hahman Dr	0.47
Montgomery Dr	Summerfield Rd	Boas Dr	1.08
Roseland Creek Trail	Burbank Ave	Stony Point Rd	0.75
Santa Rosa Ave	Sonoma Ave	Maple Ave/S A St	0.37
Santa Rosa Creek Trail	Melita Rd	State Rte 12	0.39
Stony Point Rd	State Rte 12 overpass	State Rte 12 overpass	0.06

Table A-9: Crossing Locations

CROSS STREET A	CROSS STREET B
3rd St	B St
3rd St	D St
4th St	D St
4th St	Between Chinn St and Pierce St
4th Street	Alderbrook Ln
5th St	D St
5th St	Humboldt St
7th St	Riley St
9th St	Davis St
Baker Ave	Santa Rosa Ave
Bellevue Ave	Moorland Ave
Breeze Way	Petaluma Hill Rd
Brooklyn Dr	Ridley Ave
Brooklyn Dr	Manhattan Way
Burt St	Parkcreek Dr
Carr Ave	North St
Chanate Rd	Lomitas Ave
Chanate Rd	Parker Hill Rd
Chico Ave	midblock, 900ft west of S Wright Rd
Cleveland Ave	Carrillo St
Colgan Ave	Santa Rosa Ave
College Ave	Cleveland Ave
W College Ave	Manhattan Way
W College Ave	Stony Point Rd / Marlow Rd

CROSS STREET A	CROSS STREET B
Delport Ave	West Ave
Dutton Ave	Jennings Ave
Farmers Ln	Montgomery Dr
Farmers Ln	Sonoma Ave
Fulton Rd	Appletree Dr
Fulton Rd	Guerneville Rd
Gardner Ave	Richards Manor Dr
Giffen Ave	Lathrop Dr
Glenbrook Dr	Stony Point Rd
Guerneville Rd	Santa Rosa Creek Trail
Guerneville Rd	Herbert Ln / Coffey Ln
Hearn Ave	SMART Trail
Howard St	Mendocino Ave
Jennings Ave	Dudley Pl
Jennings Ave	Halyard Dr
Jennings Ave	Marlow Rd
Joe Rodota Trail	Stony Point Rd
Joe Rodota Trail	N Wright Rd
Marsh Rd	Marlow Rd
Marsh Rd	Holiday St
Mayette Ave	Yulupa Ave
McConnell Ave	North St
Mendocino Ave	Steele Ln / Lewis Rd
Mendocino Ave	Pacific Ave

Continued

Table A-9: Crossing Locations

CROSS STREET A	CROSS STREET B
Mission Circle	Quigg Drive
Montecito Ave	El Capistrano Way
Montecito Ave	Norte Way
Montecito Blvd	Bridgewood Dr
Montecito Blvd	Brush Creek Rd
Montgomery Dr	Hahman Dr
Montgomery Dr	Jackson Dr
New York Dr	Manhattan Way
Petaluma Hill Rd	Yolanda Ave
Piner Creek Trail	Marlow Rd
Piner Rd	Waltzer Rd
Piner Rd	Oak Village Dr
Price Ave	midblock, west of Wright Charter School
Price Ave	midblock, east of Wright Charter School
Range Ave	Guerneville Rd
Ridgway Ave	Mendocino Ave
Russell Ave	Ventura Ave
Santa Rosa Creek Trail	Santa Rosa Ave
Santa Rosa High School	Mendocino Ave
Scott St	Cleveland Ave
Sebastopol Rd	Stony Point Rd
Sebastopol Rd	Dutton Ave
Silva Ave	Franklin Ave
Sonoma Ave	Village Ct
Sonoma Hwy	Farmers Ln
South Ave	Dutton Ave
W Steele Ln	Apache St
Stony Point Rd	State Rte 12 overpass
Stony Point Rd	Yuba Dr
Stony Point Rd	W 3rd St
Stony Point Rd	Occidental Rd
Terrace Way	Franklin Ave
Westland Dr	Hearn Ave
Yulupa Ave	Hoen Ave

Table A-10: Trail Bridges

CROSS STREET A	CROSS STREET B
850 ft south of Bellevue Ave	1000 ft east of Terrimay Ln
Acacia Ln	near Prospect Ave
Hunter Creek Trail	near Santa Rosa Ave
Kawana Springs Creek Restoration	near Bedford St
near Alejandro Dr	near San Antonio Dr
near Bellevue Ave	near Juniper Ave
near Boas Dr	near Charmain Dr
near Boas Dr	near Tunisia Ave
near Fresno Ave	near Maitland Ave
near Idaho Dr	near Princeton Way
near Meyers Dr	near Administration Dr
near Sacramento Avenue	Brookshire Circle
near Stagecoach Rd	near Bent Tree Pl
near Sunhawk Dr	near Nighthawk Dr
near Tanglewood Ct	Tanglewood Park Trail
near Trombetta St	near Giffen Ave

CROSS STREET A	CROSS STREET B
Piner Creek Trail	Steele Creek
Piner Creek Trail	near Chapman Way
Piner Creek Trail	near Cherokee Avenue
Piner Creek Trail	near Gamay Street
Roseland Creek	Yuba Dr
Santa Rosa Creek Trail	near Calloway Dr
Santa Rosa Creek Trail	Farmers Ln
Santa Rosa Creek Trail	near Rogers Way
Santa Rosa Creek Trail	near Leland St
Santa Rosa Creek Trail	near Charro Dr
Santa Rosa Creek Trail	near Link Ln
Santa Rosa West County Connector	near Sea Biscuit Ct
Santa Rosa West County Connector	near Saddlehorn Ct
Sherbrook Dr	near Shady Oak Pl
Steele Creek Trail	Near Nyla Pl

B.

BICYCLE & PEDESTRIAN FACILITY GUIDELINES

Table of Contents

Chapter 1

CONTEXT 3
- Introduction 4
- Guidance Basis 6
- Design Needs of Pedestrians 8
- Design Needs of Bicyclists 12

Chapter 2

PEDESTRIAN TOOLBOX 13
- Marked Crosswalks 14
- Raised Pedestrian Crossings 16
- Sidewalk Zones 18
- Curb Ramps 20
- Curb Extensions 22
- Median Refuge Islands 23
- Pedestrian Signalization Improvements 24
- Rectangular Rapid Flashing Beacon 26
- Pedestrian Hybrid Beacon 27

Chapter 3

BICYCLE TOOLBOX 29
- Lane Reconfigurations and Road Diets 30
- Bicycle Boulevards 32
- Shared Lane Markings 34
- Standard Bike Lanes 36
- Buffered Bike Lanes 38
- One-Way Separated Bike Lanes 40
- Two-Way Separated Bike Lanes 42
- Lateral Shift 44
- Protected Intersection 46
- Separated Bicycle Signal Phase 48
- Separated Bikeway Barriers 50
- Separated Bikeways at Driveways (& Minor Streets) 52
- Bicycle Box 54
- Colored Pavement Treatments 56

Chapter 4

MIXED USE TOOLBOX 59
- Shared Use Paths 60
- Sidepaths 62

alta PLANNING + DESIGN

Chapter I

Context

Introduction

Updating the City of Santa Rosa's Bicycle and Pedestrian Master Plan is intended to promote pedestrian and bicycle activity and comfort level by identifying policies, programs, and infrastructure improvements in the City.

This Design Guide has been developed to complement the City's Bicycle and Pedestrian Master Plan update and other nationally recognized efforts to promote pedestrian and bicycle comfort level. The chapter will present a toolbox of current engineering standards and design approaches to implement bicycle and pedestrian enhancements.

What, Why, Where, When and How?

Future roadway planning, engineering, design and construction will continue to strive for a balanced transportation system that includes a seamless, accessible bicycle and pedestrian network and encourages bicycle and pedestrian travel wherever possible.

There are many reasons to integrate bicycle and pedestrian facilities into typical roadway development policy. The goal of a transportation system is to better meet the needs of people - whether in vehicles, bicyclists or pedestrians - and to provide access to goods, services, and activities.

Supporting active modes gives users important transportation choices, whether it is to make trips entirely by walking or cycling, or to access public transit. Often in urban or suburban areas, walking and cycling are the fastest and most efficient ways to perform short trips.

Convenient non-motorized travel provides many benefits, including reduced traffic congestion, user savings, road and parking facility savings, economic development, and a better environment by helping reduce the greenhouse gases as identified in the Climate Action Plan.

Compatible design does more than help those who already walk or bicycle. It encourages greater use of non-motorized transportation.

The design guidelines and recommendations in this document are for use on City of Santa Rosa roadways. Projects must not only be planned for their physical aspects as facilities serving specific transportation objectives; they must also consider effects on the aesthetic, social, economic and environmental values, needs, constraints and opportunities in a larger community setting. This is commonly known as Context Sensitive Design, and should be employed when determining which standard is applicable in each scenario.

All walkway and bikeway design guidelines in this document meet or exceed the minimums set by the Americans with Disabilities Act Accessible Design.

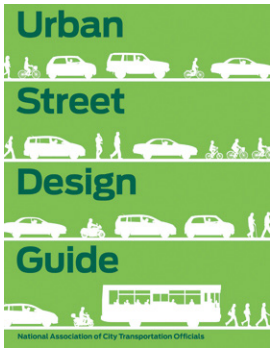
All traffic control devices, signs, pavement markings used and identified in this document must conform to the “California Manual on Uniform Traffic Control Devices” (CAMUTCD) as supplemented and adopted by Caltrans and Caltrans Design Manual.

Whenever possible and appropriate City of Santa Rosa’s Traffic & Construction Standards, the California Building Code (CBC), and the National Association of City Transportation Officials (NACTO)’s standards should be used for all facilities. There are situations where standards cannot be achieved due to geometric or environmental constraints, or may not be appropriate, due to a special situation. Engineering judgment may determine that for specific situations, the dimensions may be reduced.

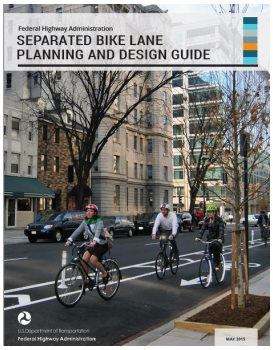
Guidance Basis

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 pedestrian- and bicycle-friendly, accessible community. The guidelines are not, however, a substitute for a more thorough evaluation by a professional engineer prior to implementation of facility improvements. The following guidelines are referred to in these guidelines.

National Guidance



The National Association of City Transportation Officials' **(NACTO) Urban Bikeway Design Guide (2012) and Urban Street Design Guide (2013)** *are collections of nationally recognized street design standards, and offers guidance on the current state of the practice designs.*



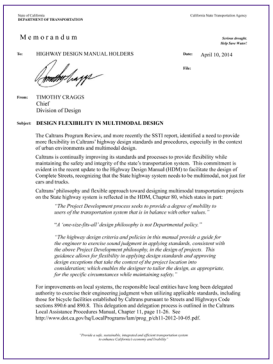
Separated Bike Lane Planning and Design Guide (2015) *is the latest national guidance on the planning and design of separated bike lane facilities released by the Federal Highway Administration (FHWA). The resource documents best practices as demonstrated around the U.S., and offers ideas on future areas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

California Guidance

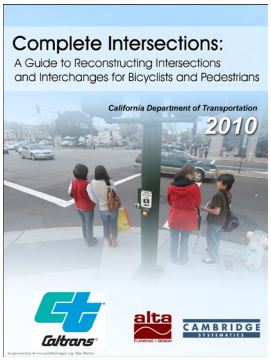
The **California Manual on Uniform Traffic Control Devices (CAMUTCD) (2014)** *is an amended version of the FHWA MUTCD 2009 edition modified for use in California. While standards presented in the CA MUTCD substantially conform to the FHWA MUTCD, the state of California follows local practices, laws 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 multimodal access, livability and sustainability within the transportation system. The guide recognizes the overlapping and sometimes competing needs of main streets.*

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.*



The Caltrans Memo: **Design Flexibility in Multimodal Design (2014)** *encourages flexibility in highway design. The memo stated that "Publications such as the National Association of City Transportation Officials (NACTO) "Urban Street Design Guide" and "Urban Bikeway Design Guide," ... are resources that Caltrans and local entities can reference when ma king 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 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.*

Design Needs of Pedestrians

The CA MUTCD recommends a normal walking speed of 3.5 ft per second when calculating the pedestrian clearance interval at traffic signals. The walking speed can drop to 3 ft 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.

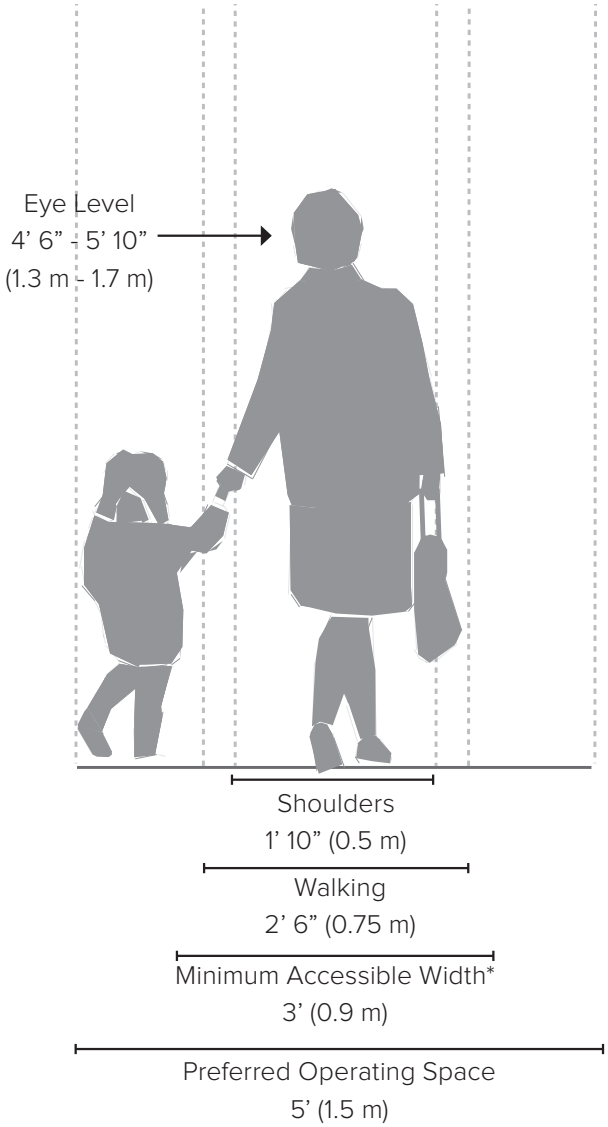
Types of Pedestrians

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.

Disabled Pedestrian Design Considerations

The table below summarizes common physical and cognitive impairments, how they affect personal mobility, and recommendations for improved pedestrian-friendly design.

IMPAIRMENT	EFFECT ON MOBILITY	DESIGN SOLUTION
Physical Impairment Necessitating Wheelchair and Scooter Use	Difficulty propelling over uneven or soft surfaces.	Firm, stable surfaces and structures, including ramps or beveled edges.
	Cross-slopes cause wheelchairs to veer downhill or tip sideways.	Cross-slopes of less than two percent.
	Require wider path of travel.	Sufficient width and maneuvering space.
Physical Impairment Necessitating Walking Aid Use	Difficulty negotiating steep grades and cross slopes; decreased stability and tripping hazard.	Cross-slopes of less than two percent. Smooth, non-slippery travel surface.
	Slower walking speed and reduced endurance; reduced ability to react.	Longer pedestrian signal cycles, shorter crossing distances, median refuges, and street furniture.
Hearing Impairment	Less able to detect oncoming hazards at locations with limited sight lines (e.g. driveways, angled intersections, channelized right turn lanes) and complex intersections.	Longer pedestrian signal cycles, clear sight distances, highly visible pedestrian signals and markings.
Vision Impairment	Limited perception of path ahead and obstacles; reliance on memory; reliance on non-visual indicators (e.g. sound and texture).	Accessible text (larger print and raised text), accessible pedestrian signals (APS), guide strips and detectable warning surfaces, safety barriers, and lighting.
Cognitive Impairment	Varies greatly. Can affect ability to perceive, recognize, understand, interpret, and respond to information.	Signs with pictures, universal symbols, and colors, rather than text.



*At point of contact

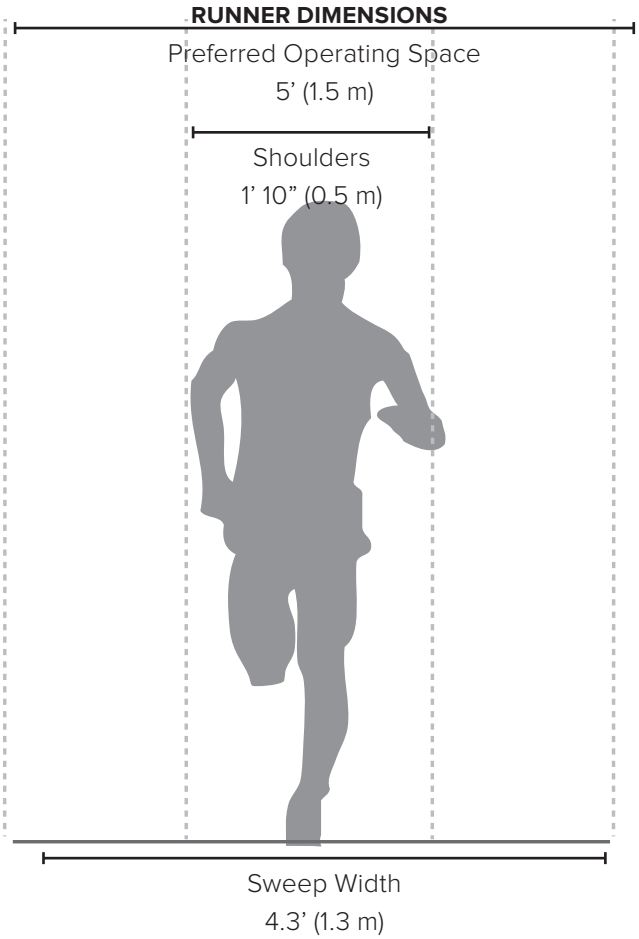
PEDESTRIAN CHARACTERISTICS BY AGE

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

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

Design Needs of Runners

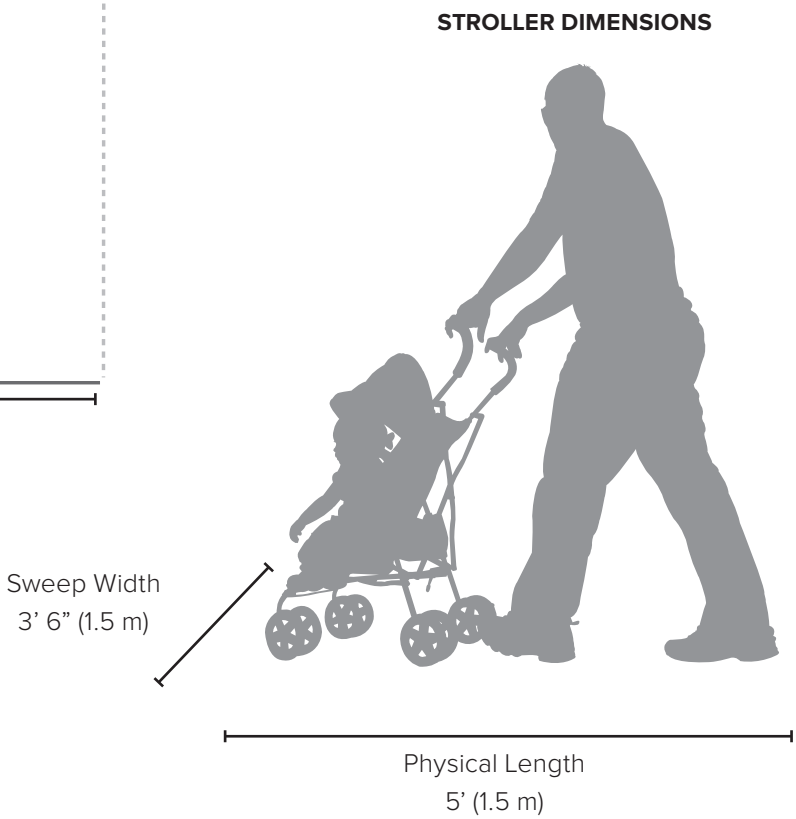
Running is an important recreation and fitness activity commonly performed on shared use paths. Many runners prefer softer surfaces (such as rubber, bare earth or crushed rock) to reduce impact. Runners can change their speed and direction frequently. If high volumes are expected, controlled interaction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



Design Needs of Strollers

Strollers are wheeled devices pushed by pedestrians to transport babies or small children. Stroller models vary greatly in their design and capacity. Some strollers are designed to accommodate a single child, others can carry 3 or more. Design needs of strollers depend on the wheel size, geometry and ability of the adult who is pushing the stroller.

Strollers commonly have small pivoting front wheels for easy maneuverability, but these wheels may limit their use on unpaved surfaces or rough pavement. Curb ramps are valuable to these users. Lateral overturning is one main safety concern for stroller users.



Design Needs of Wheelchair Users

As the American population ages, the age demographics in Santa Rosa may also shift, and the number of people using mobility assistive devices (such as manual wheelchairs, powered wheelchairs) will increase.

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.

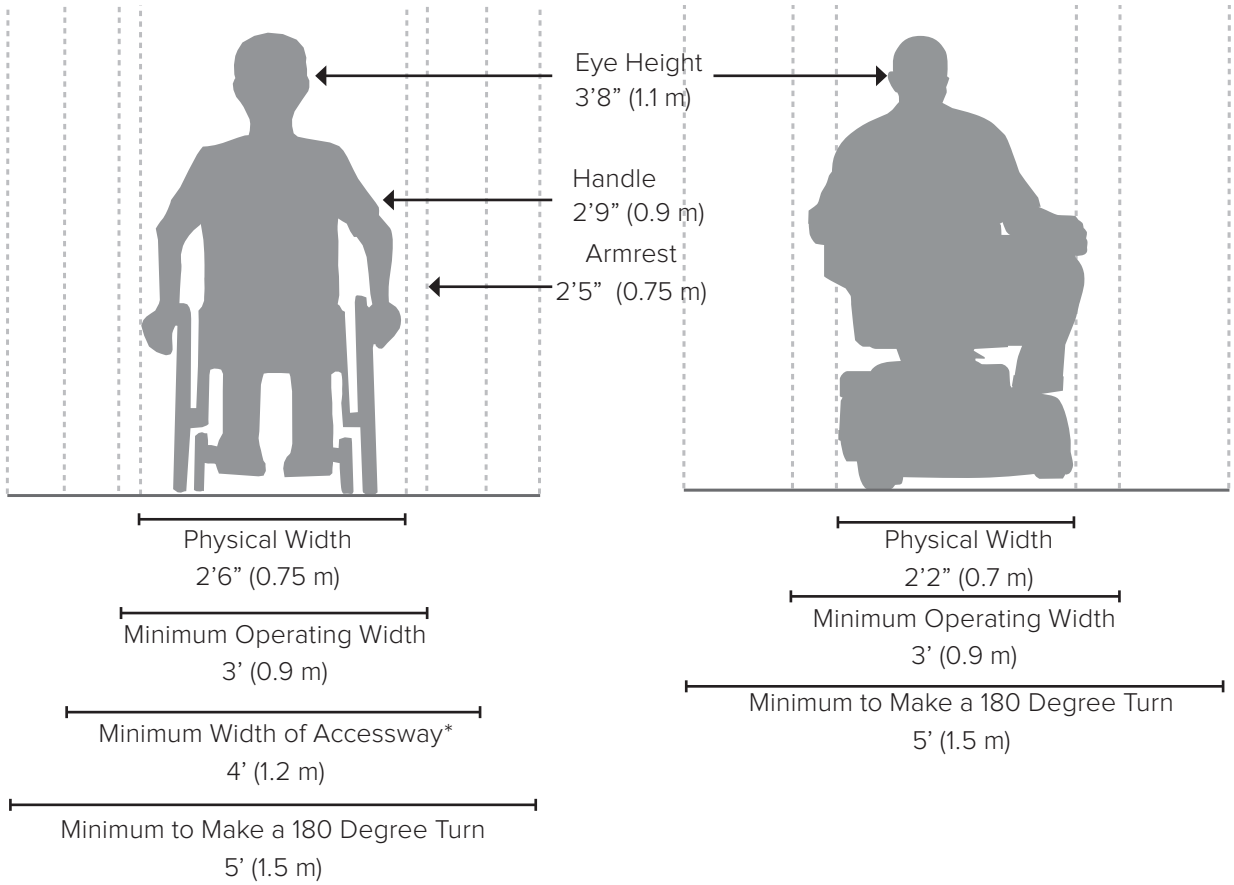
Power wheelchairs use battery power to move the wheelchair. The size and weight of power wheelchairs limit their ability to negotiate obstacles without a ramp. Various control units are available that enable users to control the wheelchair movement, based on their ability (e.g., joystick control, breath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

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.

Wheelchair User Dimensions



*Provide 5’ x 5’ passing zone every 200’ if travel way is at minimum width

Design Needs of Bicyclists

The facility designer must have 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.

By understanding the unique characteristics and needs of bicyclists, a facility designer can provide quality facilities and minimize user risk.

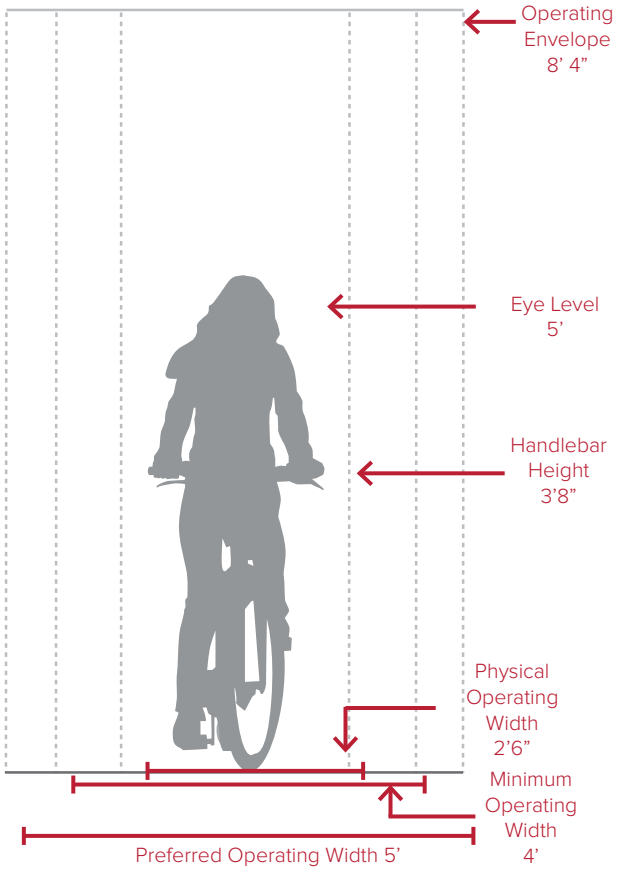
Bicycle as a Design Vehicle

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 Bicycle Rider figure 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.

Bicycle Rider - Typical Dimensions



Bicycle as Design Vehicle - Design Speed Expectations

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.

Chapter 2

Pedestrian Toolbox

Marked Crosswalks

A marked crosswalk signals to motorists that they must yield to pedestrians and encourages pedestrians to cross at designated locations. Installing crosswalks alone will not necessarily enhance the comfort level of crossings. At mid-block locations, crosswalks can be marked where there is a demand for crossing and there are no nearby marked crosswalks.

Typical Use

All crosswalks should be marked at signalized intersections. 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

- The crosswalk should be located to align as closely as possible with the through pedestrian zone of the sidewalk corridor.
- Users should not have to leave the crosswalk or reorient themselves from the crosswalk when accessing the curb ramp onto the sidewalk.
- See page 20 for design guidelines for curb ramps.

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.

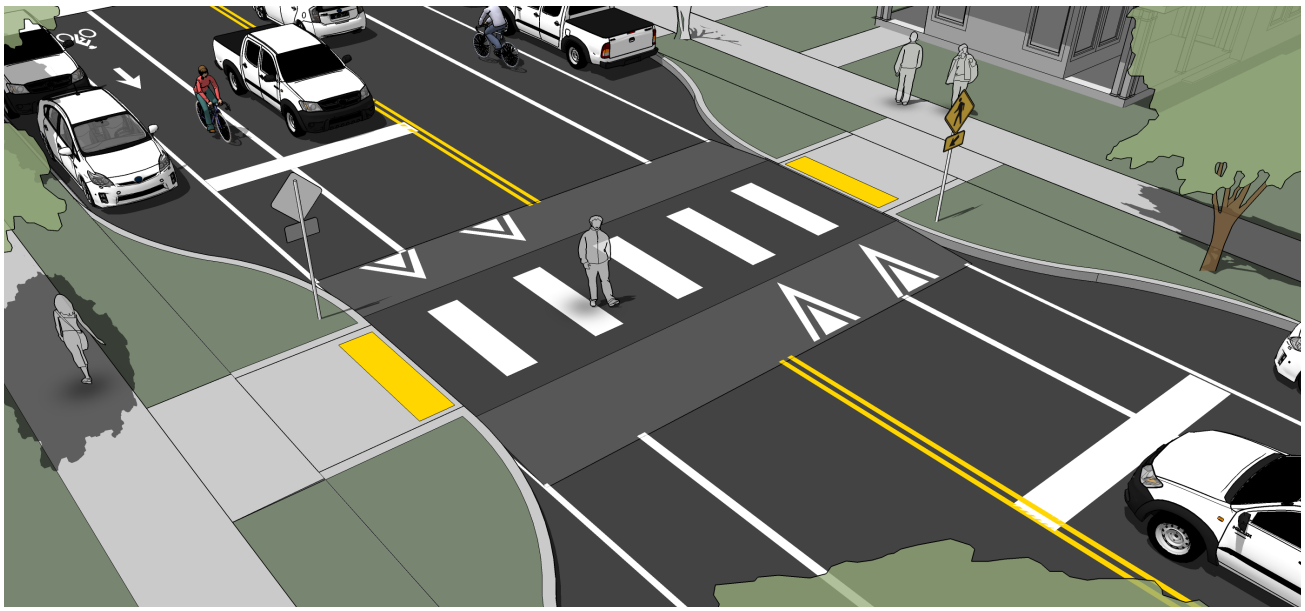
Due to various number of crosswalk styles in use, signing standards, color and aesthetics, other factors will affect the final cost.

Maintenance of markings should also be considered.

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

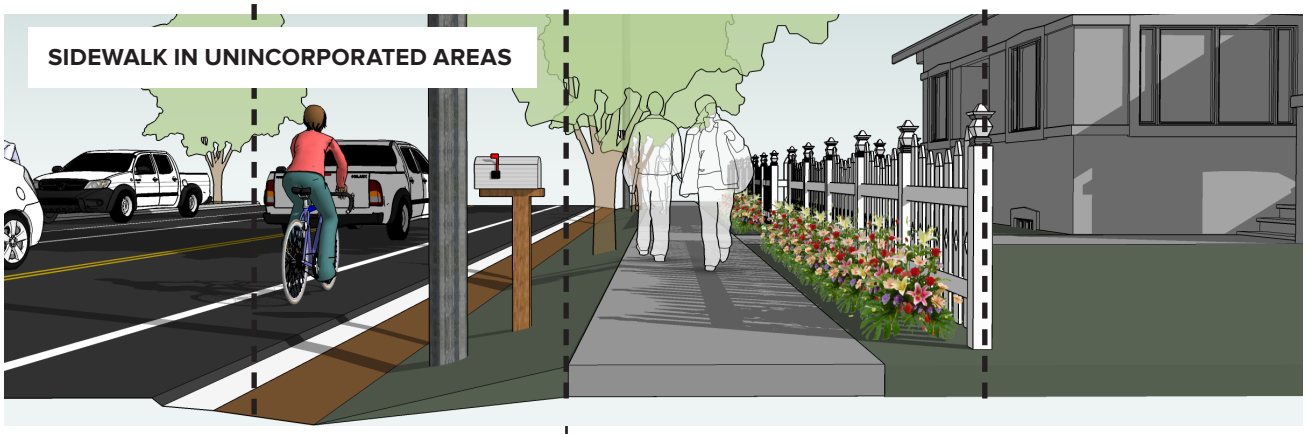
Because the effectiveness of marked crossings depends entirely on their visibility, maintaining marked crossings should be a high priority. Ensure drainage pipes used to channel stormwater past the raised intersection are kept free of debris, to prevent stormwater from backing up and pooling.

Approximate Cost

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

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 Uses

- 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 (1-4 dwelling units per acre).
- 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.
- In unincorporated areas of Santa Rosa, no curb and gutter is necessary to establish a sidewalk. Instead, the sidewalk should feature a wide furnishing zone, which may be configured as an open ditch for stormwater catchment and infiltration. Ditches can be retrofitted into bioswales or raingardens for filtration and water purification.

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

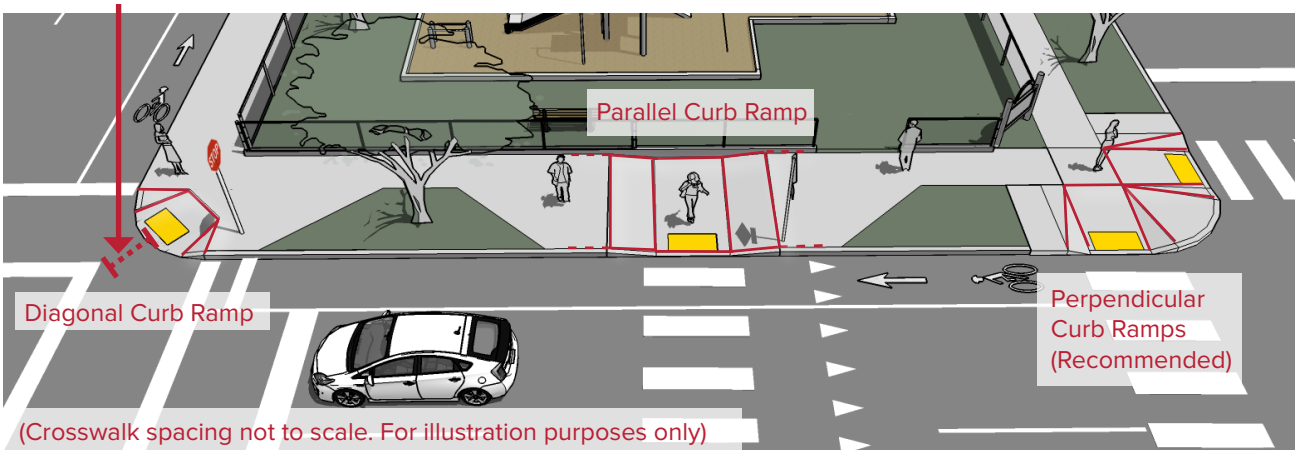
Cost of standard sidewalks range from about $25 per square foot for concrete sidewalk. This cost can increase with additional right-of-way acquisition or addition of landscaping, lighting or other aesthetic features. As an interim measure, an asphalt concrete path can be placed until such time that a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

Curb Ramps

Curb ramps are the design elements that allow all users to make the transition from the street to the sidewalk. A sidewalk without a curb ramp can be useless to someone in a wheelchair, forcing them back to a driveway and out into the street for access. There are a number of factors to be considered in the design and placement of curb ramps.

Diagonal ramps shall include a clear space of at least 48" within the crosswalk for user maneuverability

Curb ramps shall be located so that they do not project into vehicular traffic lanes, parking spaces, or parking access aisles. Three configurations are illustrated below.



Typical Use

- Curb ramps must be installed at all intersections and midblock locations where pedestrian crossings exist, as mandated by federal legislation (1973 Rehabilitation Act and ADA 1990). All newly constructed and altered roadway projects must include curb ramps. In addition, existing facilities must be upgraded to current standards when appropriate.
- The edge of an ADA compliant curb ramp shall be marked with a tactile warning device (also known as truncated domes) to alert people with visual impairments to changes in the pedestrian environment. Contrast between the raised tactile device and the surrounding infrastructure is important so that the change is readily evident to partially sighted pedestrians. These devices are most effective when adjacent to smooth pavement so the difference is easily detected.

Design Features

- The level landing at the top of a ramp shall be at least 4 feet long and at least the same width as the ramp itself. The slope of the ramp shall be compliant to current standards.
- If the ramp runs directly into a crosswalk, the landing at the bottom will be in the roadway.
- If the top landing is within the sidewalk or corner area where someone in a wheelchair may have to change direction, the landing must be a minimum of 4'-0" long (in the direction of the ramp run) and at least as wide as the ramp, although a width of 5'-0" is preferred.

Not recommended: diagonal curb ramp configuration on Marlow Road at Monroe School.

Recommended: SMART Crossing at College Avenue provides bidirectional curb ramps for crossing in both directions.

Further Considerations

Where feasible, separate directional curb ramps for each crosswalk at an intersection should be provided rather than having a single ramp at a corner for both crosswalks. Although diagonal curb ramps might save money, they orient pedestrians directly into the traffic zone, which can be challenging for wheelchair users and pedestrians with visual impairment. Diagonal curb ramp configurations are not recommended.

Curb return radii need to be considered when designing directional ramps. While curb ramps are needed for use on all types of streets, the highest priority locations are in downtown areas and on streets near transit stops, schools, parks, medical facilities, shopping areas.

Materials and Maintenance

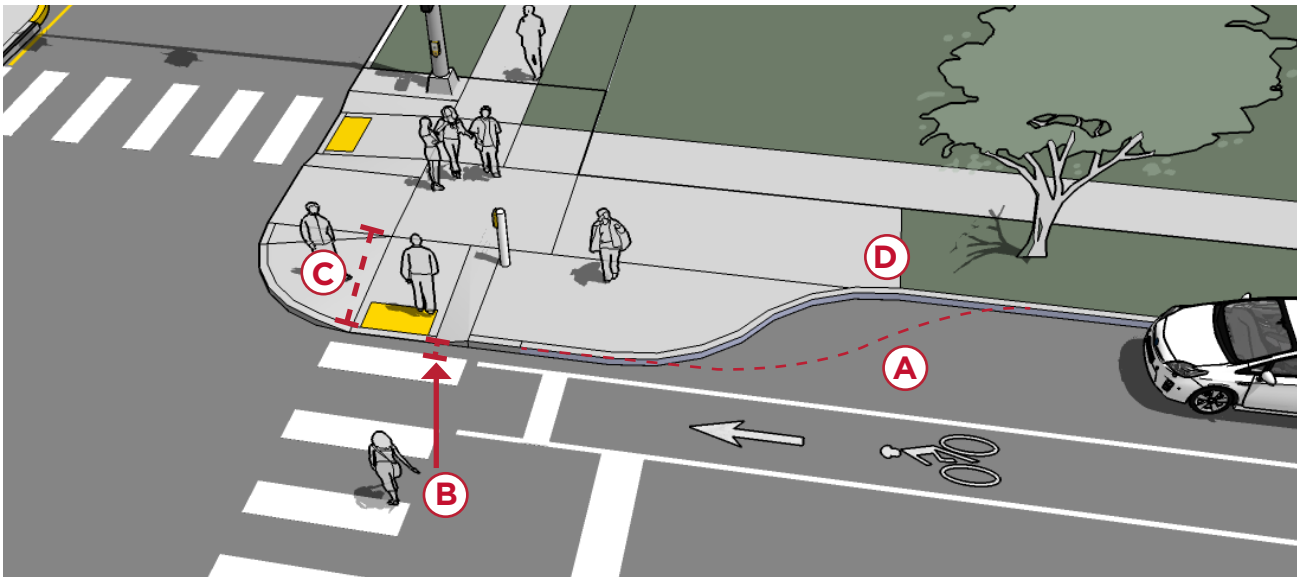
It is critical that the interface between a curb ramp and the street be maintained adequately. Asphalt street sections can develop potholes at the foot of the ramp, which can catch the front wheels of a wheelchair.

Approximate Cost

The cost is approximately $5,000-$10,000 per curb ramp depending on drainage and right-of-way.

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.



Typical Use

- Within parking lanes appropriate for any crosswalk where it is desirable to shorten the crossing distance and there is a parking lane adjacent to the curb.
- May be possible within non-travel areas on roadways with excess space.
- Particularly helpful at midblock crossing locations.
- Curb extensions should not impede bicycle travel in the absence of a bike lane.
- Curb extensions are often utilized as in-lane transit stops, allowing passengers to board and alight outside of the pedestrian through zone.

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.

Design Features

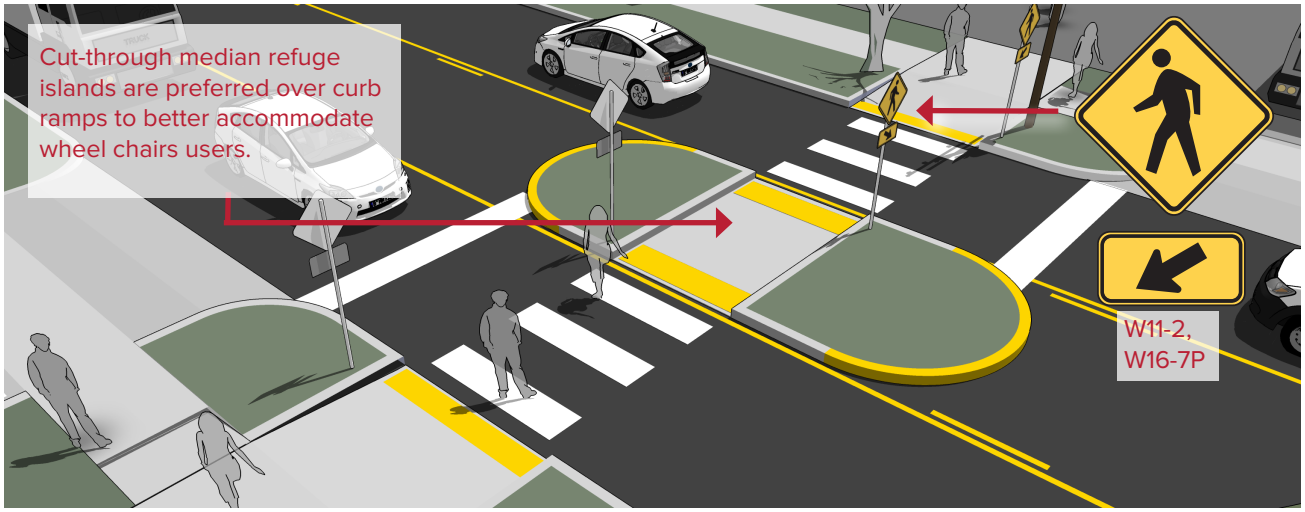
- **A** For purposes of efficient street sweeping, the minimum radius for the reverse curves of the transition is 10 ft and the two radii should be balanced to be nearly equal.
- **B** When a bike lane is present, the curb extensions should terminate one foot short of the parking lane to enhance bicyclist access.
- **C** Reduces pedestrian crossing distance by 6-8 ft.
- **D** Planted curb extensions may be designed as a bioswale for stormwater management.

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.

Median Refuge Islands

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



Typical Use

- Refuge islands an be applied on any roadway with a left turn center lane or median that is at least 6' wide. Islands are appropriate at signalized or unsignalized crosswalks.
- 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' wide between travel lanes (to accommodate wheelchair users) and at least 20' long (40' minimum preferred).
- Provide double centerline marking, reflectors, and "KEEP RIGHT" signage (CA MUTCD R4-7a) in the island on streets with posted speeds above 25 mph.

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.

Design Features

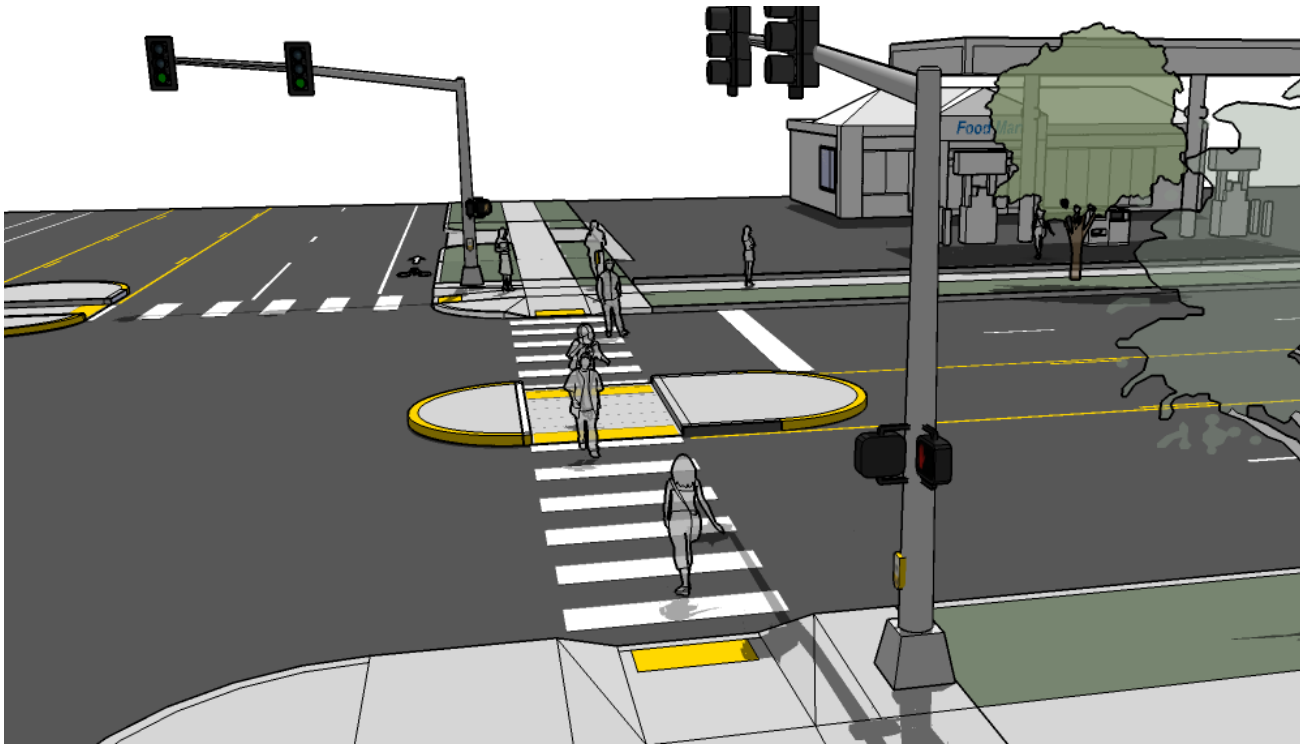
- Median refuge islands can be installed on roadways with existing medians or on multi-lane roadways where adequate space exists
- Median Refuge Islands should always be paired with crosswalks, and should include advance pedestrian warning signage when installed at uncontrolled crossings.
- On multi-lane roadways, consider configuration with active warning beacons for improved yielding compliance.

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.

Pedestrian Signalization Improvements

Pedestrian signal heads indicate to pedestrians when to cross at a signalized crosswalk. All traffic signals should be equipped with pedestrian signal indications except where pedestrian crossing is prohibited by signage. Pedestrian signals should be used at traffic signals wherever warranted, according to the CA MUTCD.



Typical Use

» Countdown pedestrian signals are particularly valuable for pedestrians, as they indicate whether a pedestrian has time to cross the street before the signal phase ends. Countdown signals should be used at all new and rehabilitated signalized intersections. Countdown timers are now standard at all signalized crossings in Santa Rosa.

» Adequate pedestrian crossing time is a critical element of the walking environment at signalized intersections. The length of a signal phase with parallel pedestrian movements should provide sufficient time for a pedestrian to safely cross the adjacent street.

» There are several types of signal timing for pedestrian signals, including concurrent, exclusive, “Leading pedestrian interval” (LPI), and all-red interval. In general, shorter cycle lengths and extended walk intervals provide better service to pedestrians and encourage better signal compliance. For optimal pedestrian service, fixed-time signal operation usually works best.

» Leading Pedestrian Intervals (LPI) are used to reduce right turn and permissive left turn vehicle and pedestrian conflicts. The through pedestrian interval is initiated first, in advance of the concurrent through/right/permissive left turn interval. The LPI minimizes vehicle-pedestrian conflicts because it gives pedestrians a 3-10 second headstart into the intersection, thereby making them more visible, and reducing crossing exposure time. Accessible Pedestrian Signals (APS) are recommended with an LPI.

Range Ave at Guerneville Rd

Design Features

- The CA MUTCD recommends that traffic signal timing assumes a pedestrian walking speed of 3.5 ft per second.
- At crossings where older pedestrians or pedestrians with disabilities are expected, crossing speeds as low as 3 ft per second should be assumed. Special pedestrian phases can be used to provide greater visibility or more crossing time for pedestrians at certain intersections.
- Pedestrian pushbuttons may be installed at locations where pedestrians are expected intermittently. When used, pushbuttons should be well signed and within reach and operable from a flat surface for pedestrians in wheelchairs and with visual disabilities. They should be conveniently placed in the area where pedestrians wait to cross. Section 4E.09 within the CA MUTCD provides detailed guidance for the placement of push buttons to ensure accessibility.

Further Considerations

- When push buttons are used, they should be located so that someone in a wheelchair can reach the button from a level area of the sidewalk without deviating significantly from the natural line of travel into the crosswalk. Push button should be marked (for example, with arrows) so that it is clear which signal is affected.
- In areas with very heavy pedestrian traffic, consider an all-pedestrian signal phase to give pedestrians free passage in the intersection when all motor vehicle traffic movements are stopped.
- At locations with very high pedestrian volumes, such as downtown, an exclusive pedestrian signal phase called a "Pedestrian Scramble" can be provided to reduce vehicle turning conflicts.

Materials and Maintenance

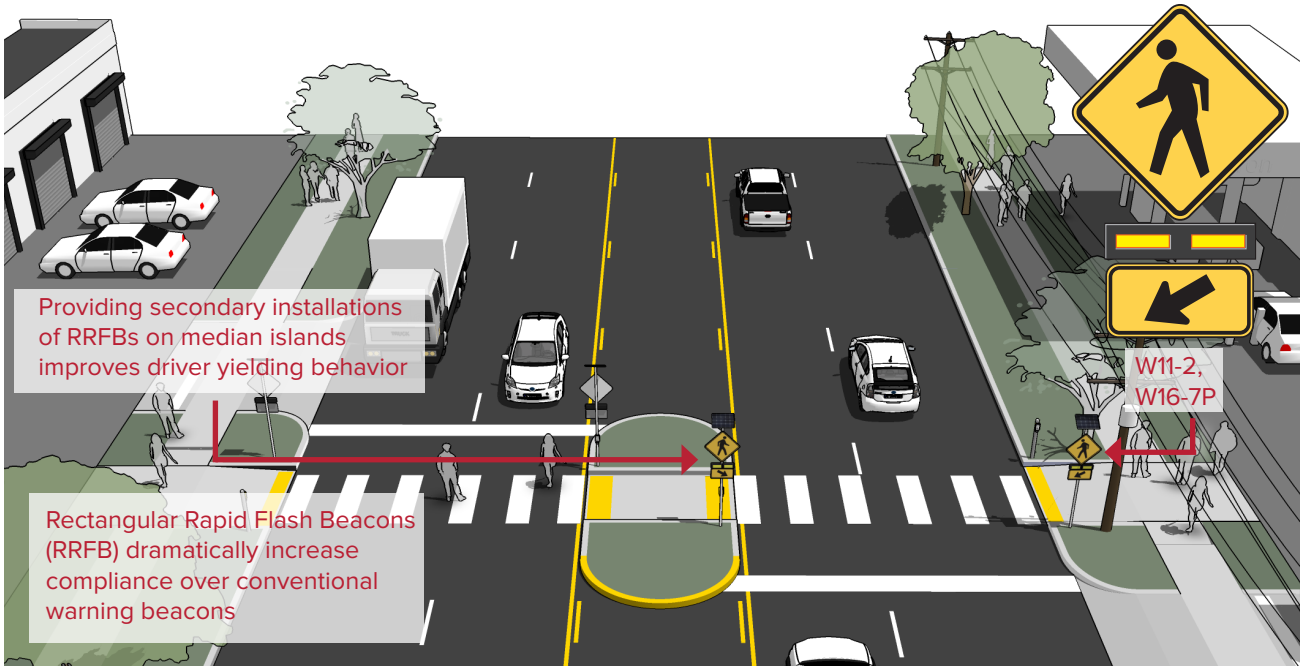
It is important to perform ongoing maintenance of traffic control equipment. Consider semi-annual inspections of controller and signal equipment, intersection hardware, and detectors.

Approximate Cost

Adjusting signal timing is relatively inexpensive, as it requires only a few hours of staff time to accomplish. New signal equipment ranges from $20,000 to $140,000.

Rectangular Rapid Flashing Beacons (RRFB)

Rectangular Rapid Flash Beacons (RRFB) are a type of active warning beacon used at unsignalized crossings. They are designed to increase motor vehicle yielding compliance on multi-lane or high-volume roadways. Guidance for marked/unsignalized crossings applies.



Typical Use

RRFBs are typically activated by pedestrians manually with a push button, or can be actuated automatically with passive detection systems.

RRFBs shall not be used at crosswalks controlled by YIELD signs, STOP signs, or traffic control signals.

RRFBs shall initiate operation based on user actuation and shall cease operation at a predetermined time after the user actuation or, with passive detection, after the user clears the crosswalk.

Design Features

Guidance for marked/unsignalized crossings applies.

- 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. A four-beacon arrangement raised compliance to 88%. Additional studies of long term installations show little to no decrease in yielding behavior over time.
- See FHWA Interim Approval 21 (IA-21) for more information on device application standards.

Materials and Maintenance

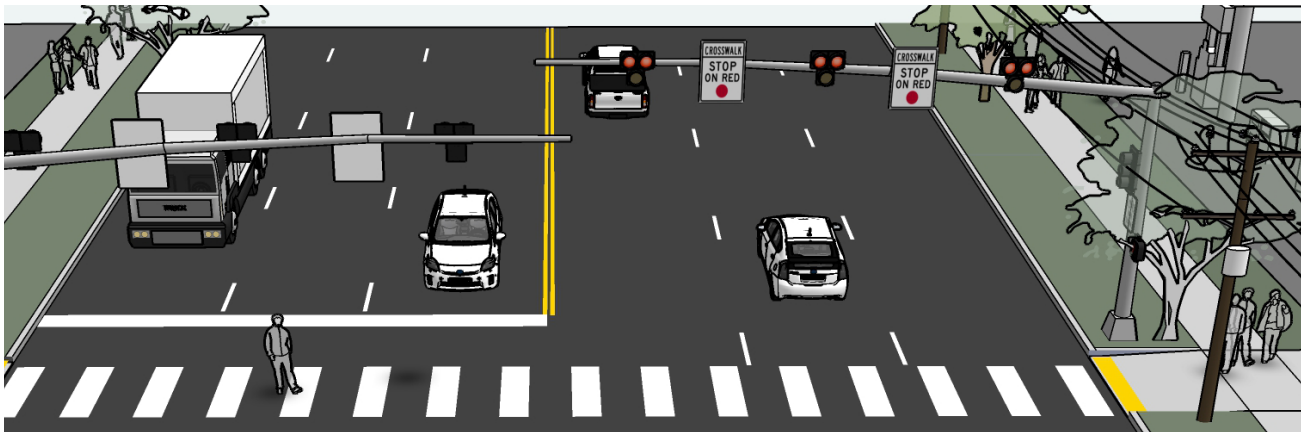
RRFBs should be regularly maintained to ensure that all lights and detection hardware are functional.

Approximate Cost

RRFBs range in price from $5,000 to $20,000 for a solar powered unit depending on the location, width of the road and other factors.

Pedestrian Hybrid Beacon (HAWK)

Hybrid beacons or High-Intensity Activated Crosswalk (HAWK) beacons are used to improve unsignalized intersections or midblock crossings of major streets. It 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. The signal is only activated when a pedestrian and/or bicyclist is present, resulting in minimal delay for motor vehicle traffic.



Typical Use

HAWK beacons are only used at marked mid-block crossings or unsignalized intersections. They are typically activated with a pedestrian pushbutton at each end. If a median refuge island is used at the crossing, another pedestrian pushbutton can be located on the island to create a two-stage crossing.

Design Features

- Hybrid beacons may be installed without meeting traffic signal control warrants if roadway speed and volumes are excessive for comfortable pedestrian crossings.
- If installed within a signal system, signal engineers should evaluate the need for the hybrid signal to be coordinated with other signals.
- 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)**

Further Considerations

- HAWK beacons may also be actuated by infrared, microwave, or video detectors.
- 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.
- The installation of HAWK beacons should also include public education and enforcement campaigns to ensure proper use and compliance.

Materials and Maintenance

Hybrid beacons are subject to the same maintenance needs and requirements as standard traffic signals. Signing and striping need to be maintained to help users understand any unfamiliar traffic control.

Approximate Cost

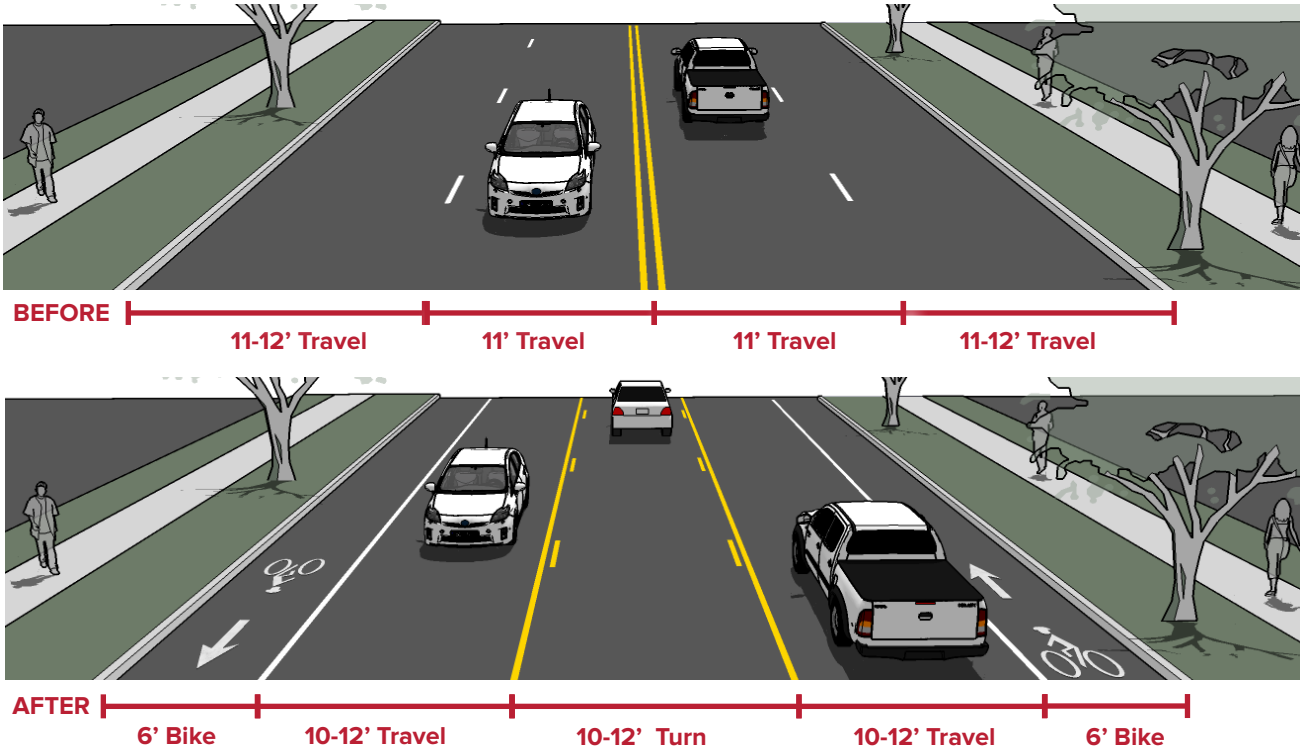
Hybrid beacons are more expensive than other beacons, ranging in costs from $150,000 to $250,000, but are generally less expensive than full signals.

Chapter 3

Bicycle Toolbox

Lane Reconfigurations and Road Diets

Streets with excess roadway capacity or wider lanes often make excellent candidates for lane reconfigurations or road diet projects. The removal of a single travel lane will generally provide sufficient space for bike lanes on both sides of a street. Even if the width of the sidewalk does not increase, pedestrians benefit from the buffer that the new bike lanes create between the sidewalk and travel lanes. Although the actual roadway crossing distance has not been reduced, the addition of bike lanes reduces the number of vehicle travel lanes pedestrians must cross.



Typical Use

- Depending on a street's existing configuration, traffic operations, user needs, and comfort level, various lane reconfigurations may be appropriate.
- For instance, a four-lane street (with two travel lanes in each direction) could be modified to provide one travel lane in each direction, a center turn lane, and bike lanes.
- Prior to implementing this measure, a traffic analysis should identify potential impacts, including diversion to other parallel neighborhood streets. Road diets should also consider school, city bus, emergency service access, and other truck volumes.

Design Features

- Narrower lanes generally encourage slower vehicle speeds, higher comfort for people walking and biking.
- Vehicle lane width: Width depends on project. No narrowing may be needed if a lane is removed. Lanes along transit and freight routes may need a minimum of 11 feet to accommodate larger vehicles.
- Bicycle lane width: Standard bicycle lane width is 5-6 feet. A buffered bike lane requires an additional 2-3 feet.
- Number of Lanes: Generally, 3 lanes with a center turn lane can support 20,000 vehicles per day.

Before-and-after road diet on Sonoma Avenue. The roadway goes from 4 travel lanes to 3 travel lanes, bike lanes, and parking.

Materials and Maintenance

Road configurations are often paired with the road repaving schedule to reduce costs. Repair rough or uneven pavement surface. Use bicycle compatible drainage grates, and ensure they are flush with the pavement.

Approximate Cost

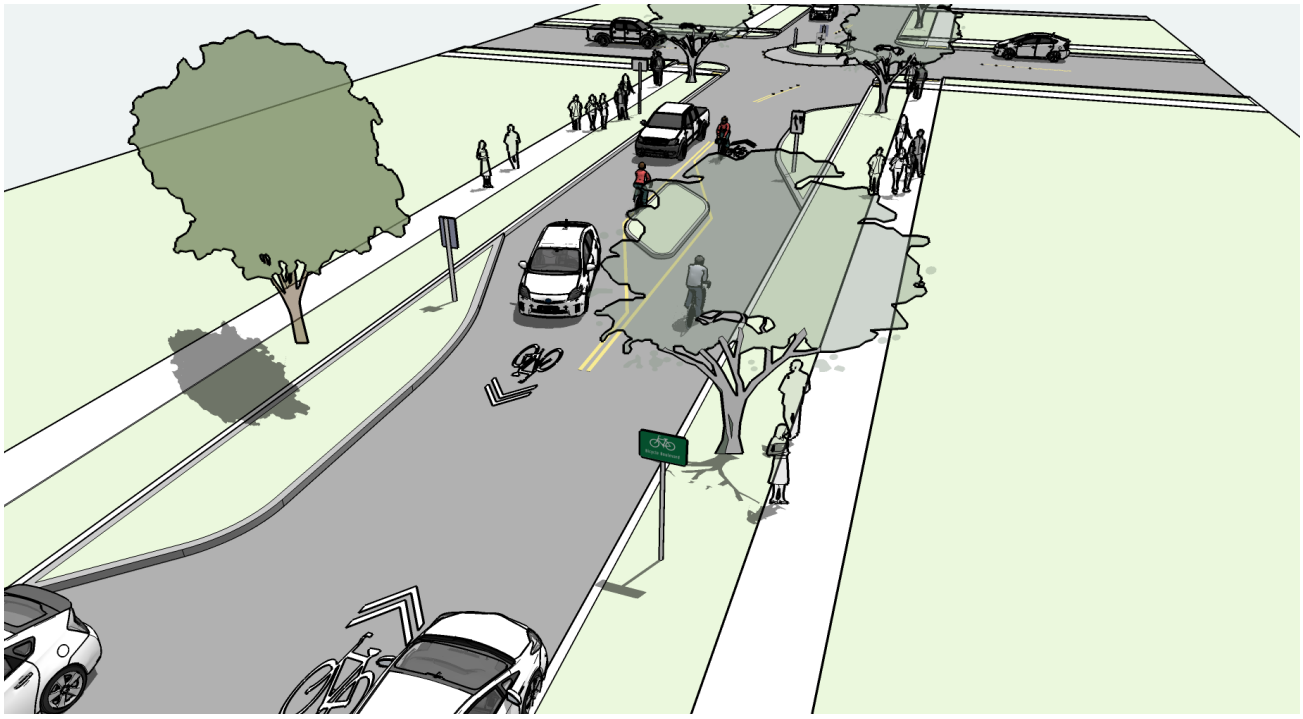
Adding striped shoulders can cost as little as $1,000 per mile if old paint does not need to be removed.

The cost for restriping a street to bike lanes or reducing the number of lanes to add on-street parking is approximately $11 per foot on street, depending on the number of lane lines to be removed.

The approximate cost for restriping a roadway as depicted can range from $10,000-$60,000 per mile.

Bicycle Boulevards

A Bicycle Boulevard is a low-speed, low-volume roadway that has been modified, as needed, to enhance comfort and convenience for people bicycling. It provides better conditions for bicycling while maintaining the neighborhood character and neighborhood and emergency vehicle access. Bicycle Boulevards are intended to serve as the primary low-stress bikeway network, providing direct, and convenient routes across Santa Rosa. Key elements of Bicycle Boulevards are unique signage and pavement markings, traffic calming and diversion features to maintain low vehicle volumes, and convenient major street crossings.



Typical Use

- Parallel with, and in close proximity to major thoroughfares (1/4 mile or less) on low-volume, low-speed streets.
- 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% out of direction travel compared to shortest path of primary corridor.
- Local streets with traffic volumes of fewer than 1,500 vehicles per day. Utilize traffic calming to maintain or establish low volumes and discourage vehicle cut through / speeding.

Design Features

- Signs and pavement markings are the minimum treatments necessary to designate a street as a bicycle boulevard.
- Implement volume control treatments based on the context of the bicycle boulevard, using engineering judgment. Motor vehicle volumes should not exceed 1,500 vehicles per day.
- Intersection crossings should be designed to enhance comfort and minimize delay for bicyclists, following crossing treatment progression to achieve Level of Traffic Stress 1 or 2.

Humboldt Street Bike Boulevard

Further Considerations

- 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.
- Bicycle boulevard retrofits to local streets are typically located on streets without existing signalized accommodation at crossings of collector and arterial roadways. Without treatments for bicyclists, these intersections can become major barriers along the bicycle boulevard.
- Traffic calming can 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.

Materials and Maintenance

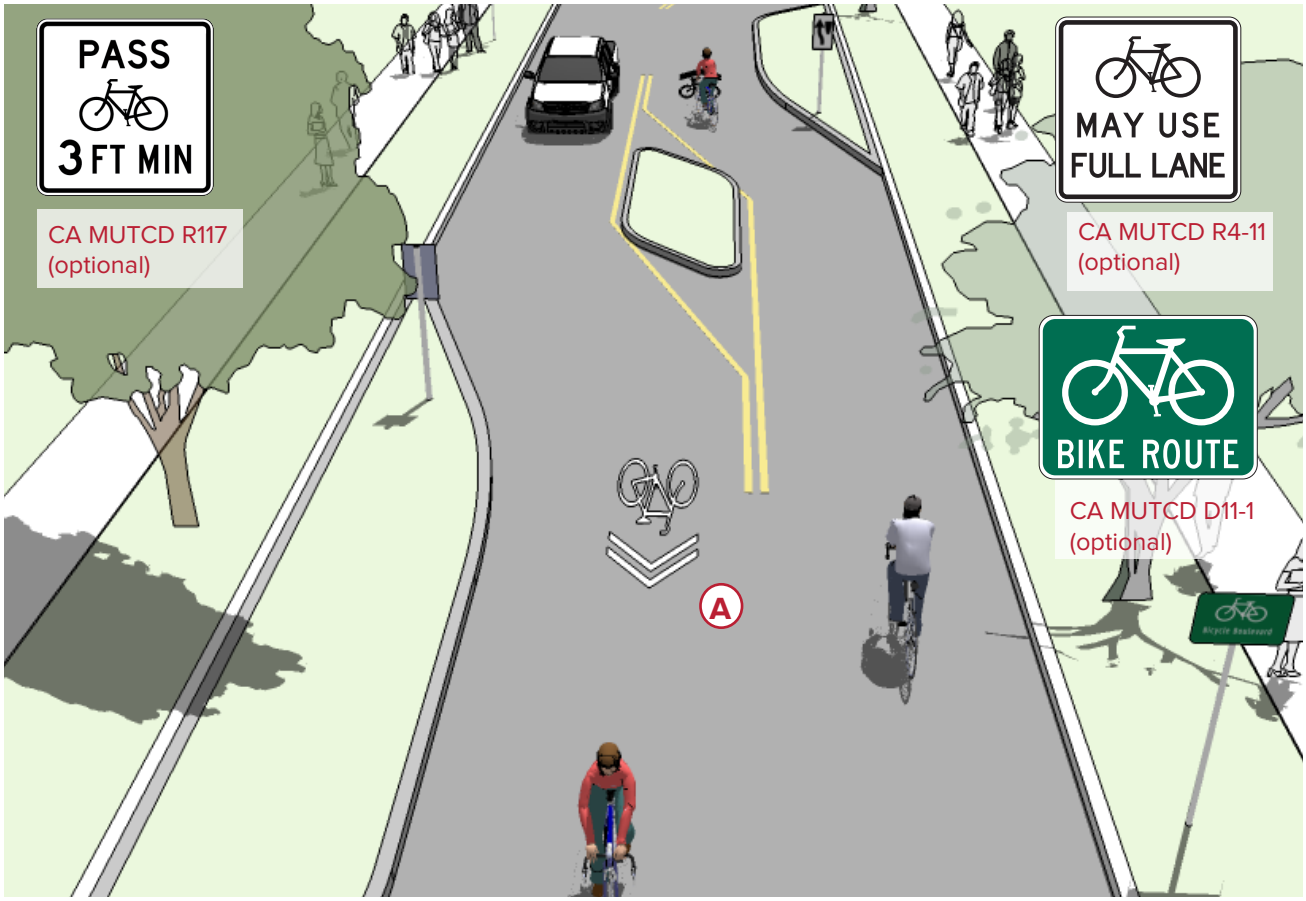
Bicycle boulevards require few additional maintenance requirements to local roadways. Signage, signals, and other traffic calming elements should be inspected and maintained according to local standards.

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 higher cost. Costs can range from $5,000/mile on the simple end to $50,000/mile for significant horizontal deflection and diversion.

Shared Lane Markings

Shared Lane Marking (SLM) or "Sharrow" stencils are used in California as an additional treatment for Bike Route facilities and are currently approved in conjunction with on-street parking. The CA MUTCD approved pavement marking can serve a number of purposes, such as making motorists aware of the need to share the road with bicyclists, showing bicyclists the direction of travel, and, with proper placement, reminding bicyclists to bike further from parked cars to prevent collisions with drivers opening car doors.



Typical Use

- Shared Lane Markings are not appropriate on paved shoulders or in bike lanes, and should not be used on roadways that have a posted speed greater than 35 mph.
- Shared Lane Markings should be implemented in conjunction with BIKES MAY USE FULL LANE signs.

Design Features

A Placement in the center of the travel lane is preferred in constrained conditions.

- Markings should be placed immediately after intersections and spaced at 250 foot intervals thereafter.
- When placed adjacent to parking, markings should be outside of the "door zone". Minimum placement is 11 feet from the curb face.

Sharrows also serve as positional guidance and raise bicycle awareness where there isn't space to accommodate a full-width bike lane. Center lane markings may or may not be necessary depending on travel lane widths. Narrower two way residential streets (less than 22 ft between parked cars) have a natural traffic calming effect without center turn lanes. Pictured above: sharrows on Sonoma Ave.

Further Considerations

- Consider modifications to signal timing to induce a bicycle-friendly travel speed for all users.
- Though not always possible, placing the markings outside of vehicle tire tracks will increase the life of the markings and the long-term cost of the treatment.
- A green thermoplastic background can be applied to further increase the visibility of the shared lane marking.
- A "Pass Bicycle 3 FT MIN" sign (R117(CA)) can be installed to indicate to drivers the required passing distance per California Vehicle Code section 21760.

Approximate Cost

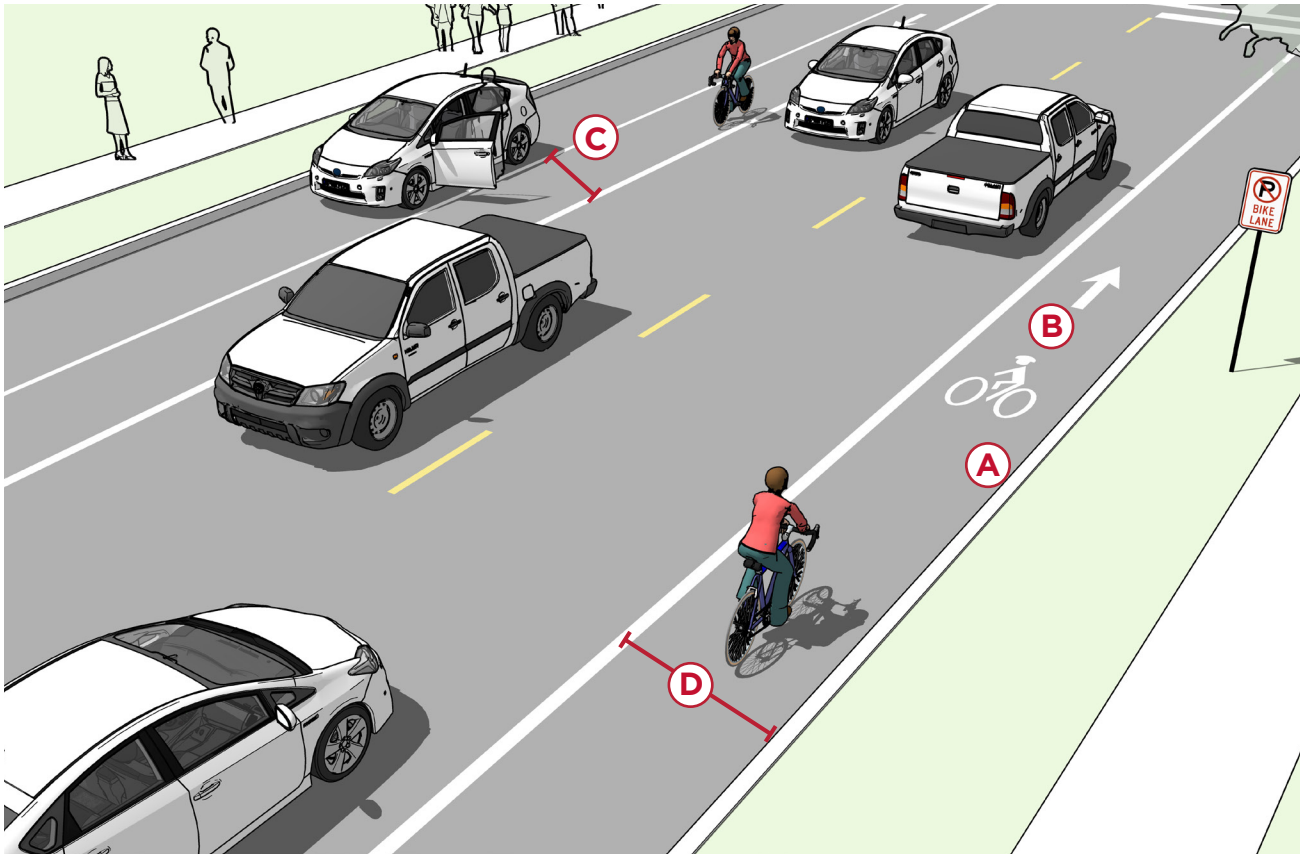
Sharrows typically cost $200 per each marker for a lane-mile cost of $4,200, assuming the CA MUTCD guidance of sharrow placement every 250 feet.

Materials and Maintenance

- Shared lane markings should be inspected annually and maintained accordingly, especially if located on roadways that feature high vehicle turning movements, or bus, or truck traffic. They can be placed in the center of the lane of travel to reduce wear from vehicles.

Bicycle Lanes

On-street bike lanes (Class II Bikeways) 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 Use

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

Design Features

A Mark inside line with 6" stripe. **(CA MUTCD 9C.04)** Mark 4" parking lane line or "Ts".[1]

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

C 6 foot width preferred adjacent to on-street parking, (5 foot min.) **(City of Santa Rosa, HDM)**

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

1 Studies have shown that marking the parking lane encourages people to park closer to the curb. FHWA. Bicycle Countermeasure Selection System. 2006.

Further Considerations

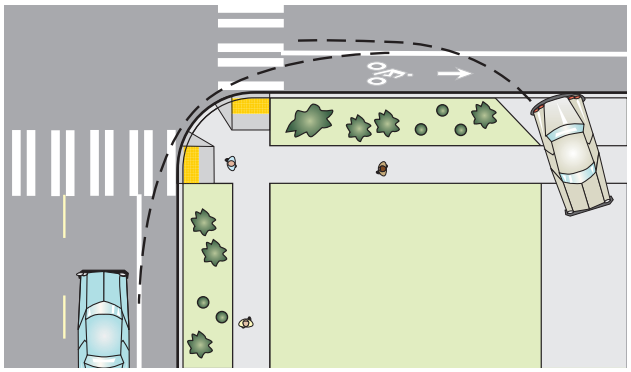
- On high speed streets (≥ 40 mph) the minimum bike lane should be 6 feet. **(HDM 301.2)**
- It may be desirable to reduce the width of general purpose travel lanes in order to add or widen bicycle lanes. **(HDM 301.2 3)**
- On multi-lane streets, the most appropriate bicycle facility to provide for user comfort may be buffered bicycle lanes or physically separated bicycle lanes.

Manhole Covers and Grates:

- 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 ft. of intersections or within 20 ft. of driveways or other bicycle access points, special manufactured permanent nonstick surfaces are 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 should be constructed with no variation in the surface. The maximum allowable tolerance in vertical roadway surface will be 1/4 of an inch.

Standard Class II Bike Lane on Stony Point Road

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)**

Materials and Maintenance

Bike lane 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.

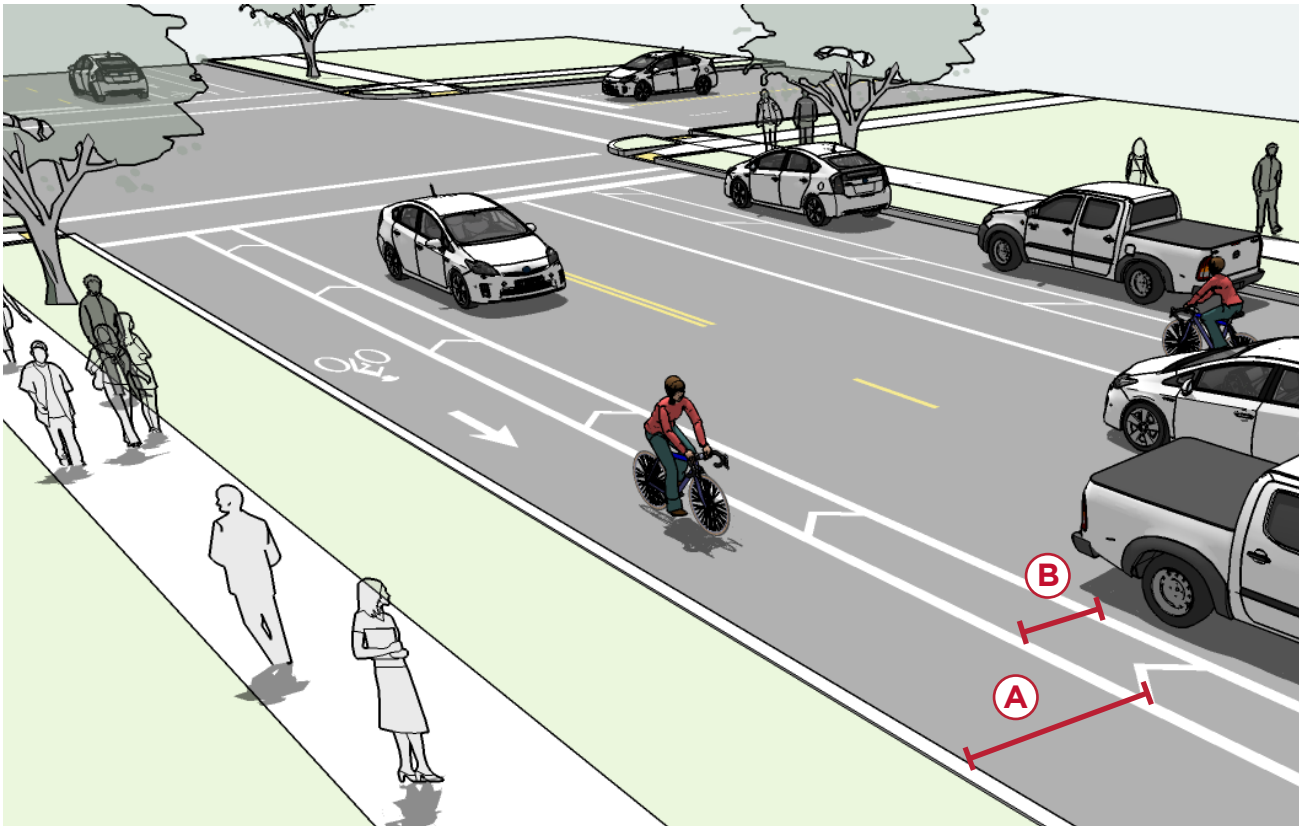
Bike lanes should also be maintained so that there are no pot holes, cracks, uneven surfaces or debris.

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

Buffered bike lanes 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 Use

- Anywhere a conventional bike lane is being considered.
- While conventional bike lanes are most appropriate on streets with lower to moderate speeds (≤ 25 mph), buffered bike lanes are appropriate on streets with higher speeds (+25mph) and high volumes or high truck volumes (up to 6,000 ADT).
- 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 bike lanes transition into conflict markings on W. 3rd Street

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.[1]
- 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 is 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.[2]

Materials and Maintenance

Bike lane 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.

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

Approximate Cost

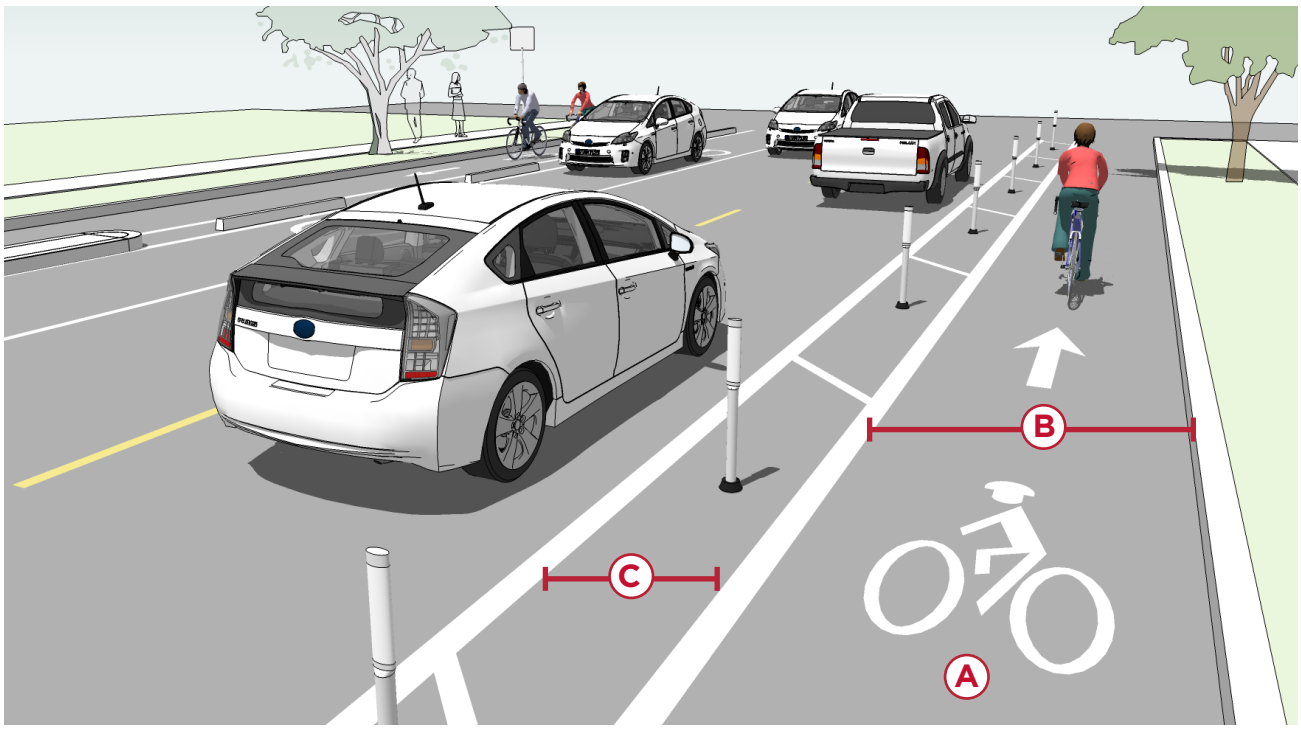
The cost for installing buffered bicycle lanes will depend on the implementation approach. Typical costs are $16,000 per mile for restriping. However, the cost of large-scale bicycle treatments will vary greatly due to differences in project specifications and the scale and length of the treatment.

1 Monsere, C.; McNeil, N.; and Dill, J., "Evaluation of Innovative Bicycle Facilities: SW Broadway Cycle Track and SW Stark/Oak Street Buffered Bike Lanes. Final Report" (2011).Urban Studies and Planning Faculty Publications and Presentations.

2 National Cooperative Highway Research Program. Report #766: Recommended Bicycle Lane Widths for Various Roadway Characteristics.

One-Way Separated Bikeway

One-way separated bikeways, also known as protected bikeways or cycle tracks, are on-street bikeway facilities that are separated from vehicle traffic. Physical separation is provided by a barrier between the bikeway and the vehicular travel lane. These barriers can include flexible posts, bollards, parking, planter strips, extruded curbs, or on-street parking. Separated bikeways using these barrier elements typically share the same elevation as adjacent travel lanes, but the bikeway could also be raised above street level, either below or equivalent to sidewalk level.



Typical Use

- Along streets on which conventional bicycle lanes would cause many bicyclists to feel stress because of factors such as multiple lanes, high bicycle volumes, high motor traffic volumes (9,000-30,000 ADT), higher traffic speeds (25+ mph), high incidence of double parking, higher truck traffic (10% of total ADT) and high parking turnover.
- Along streets for which conflicts at intersections can be effectively mitigated using parking lane setbacks, bicycle markings through the intersection, and other signalized intersection treatments.

Design Features

A Pavement markings, symbols and/or arrow markings must be placed at the beginning of the separated bikeway and at intervals along the facility based on engineering judgment to define the bike direction. **(CA MUTCD 9C.04)**

B 7 foot width preferred in areas with high bicycle volumes or uphill sections to facilitate safe passing behavior (5 foot minimum). **(HDM 1003.1(1))**

C 3 foot minimum buffer width adjacent to parking lines (2 foot minimum when adjacent to travel lanes), marked with 2 solid white **(DIB 89, 2015)**.

Parked cars serve as a barrier between bicyclists and the vehicle lane. Barriers could also include flexible posts, bollards, planters, or other design elements
Source: Bike East Bay.

Further Considerations

- Separated bikeway buffers and barriers are covered in the CAMUTCD as preferential lane markings **(section 3D.01)** and channelizing devices **(section 3H.01).** If the buffer area is 4 feet or wider, white chevron or diagonal markings should be used **(section 9C.04)**. Curbs may be used as a channeling device, see the section on islands **(section 3I.01)**. Grade-separation provides an enhanced level of separation in addition to buffers and other barrier types.
- Where possible, physical barriers such as removable curbs should be oriented towards the inside edge of the buffer to provide as much extra width as possible for bicycle use.
- A retrofit separated bikeway has a relatively low implementation cost compared to road reconstruction by making use of existing pavement and drainage and using a parking lane as a barrier.
- Gutters, drainage outlets and utility covers should be designed and configured as not to impact bicycle travel.
- For clarity at major or minor street crossings, consider a dotted line **(CA MUTCD Detail 39A** - Bike Lane Intersection Line) for the buffer boundary where cars are expected to cross.
- Special consideration should be given at transit stops to manage bicycle and pedestrian interactions.

Materials and Maintenance

Bikeay 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.

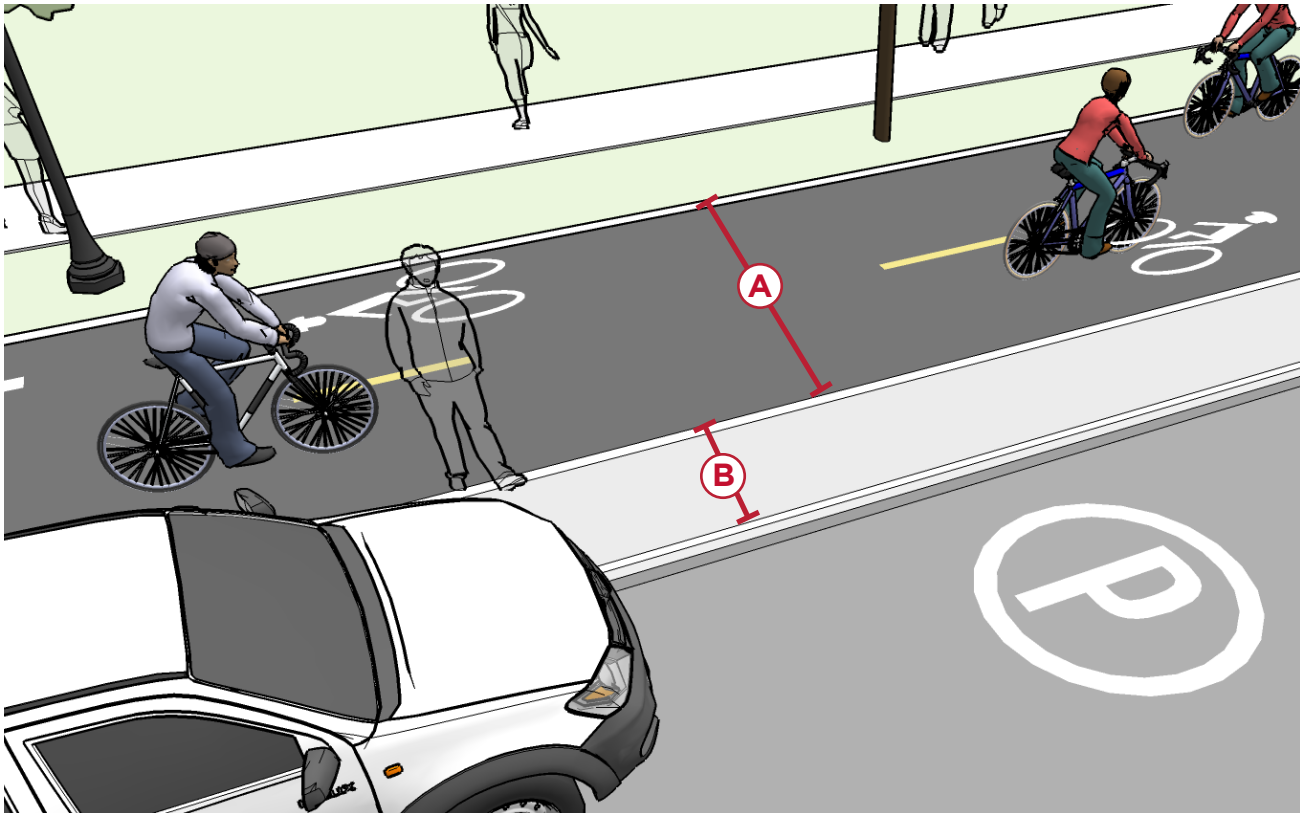
Access points along the facility should be provided for street sweeper vehicles to enter/exit the separated bikeway,

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 without delineators or other vertical elements can cost as little as $8,000-$16,000 per mile.

Two-Way Separated Bikeway

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 Use

- 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.

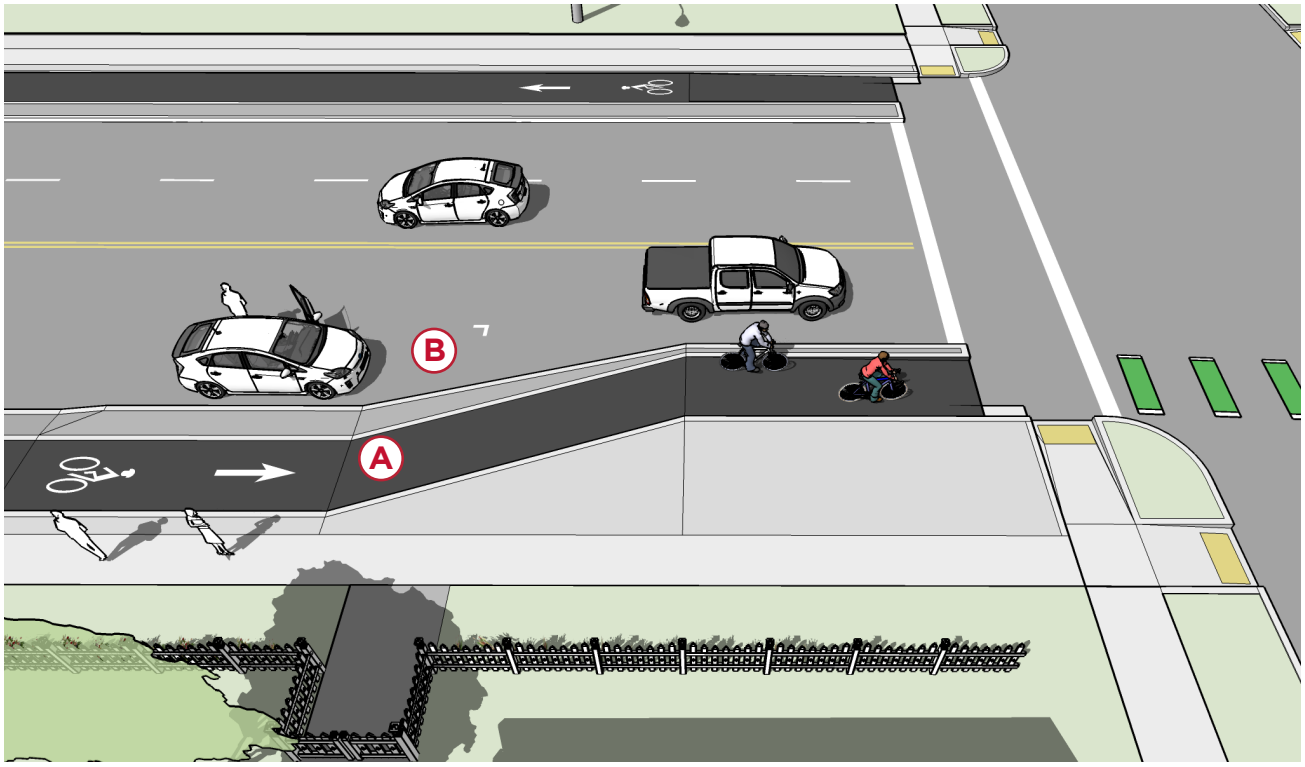
Access points along the facility should be provided for street sweeper vehicles to enter/exit the separated bikeway.

Approximate Cost

Separated bikway 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.

Lateral Shift

To increase the visibility of bicyclists for turning motorists, a lateral shift in or "bend-in" intersection approach laterally shifts the separated bikeway immediately adjacent to the turning lane.



Typical Use

- Bikeways separated by a visually intensive buffer or on-street parking.
- Where it is desirable to create a curb extension at intersections to reduce pedestrian crossing distance.
- Where space is not available to bend-out the bikeway prior to the intersection.

Design Features

A At least 20 ft prior to an intersection, provide between 20 – 40 ft of length to shift the bikeway closer to motor vehicle traffic.

B Where the separated bikeway uses parked cars within the buffer zone, parking must be prohibited at the start of the transition.

- Place a "Turning Vehicles Yield to Bikes" sign (modified MUTCD R10-15) prior to the intersection.
- Optional - Provide a narrow buffer with vertical delineators between the travel and lane and bikeway to increase comfort for bicycle riders and slow driver turning speed.

Clear sight lines at intersections and driveways for people on bikes and people driving are an important aspect of this design.

The approach to an adjacent crossing intersection in Vancouver, BC.

Further Considerations

- The design creates an opportunity for a curb extension, to reduce pedestrian crossing distance. This curb extension can also create public space which can be used bike parking corrals, bikeshare stations, parklets, public art exhibits, and/or stormwater features such as bioswales.
- Can be paired with intersection crossing markings such as green colored pavement to raise awareness of conflict points.

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.

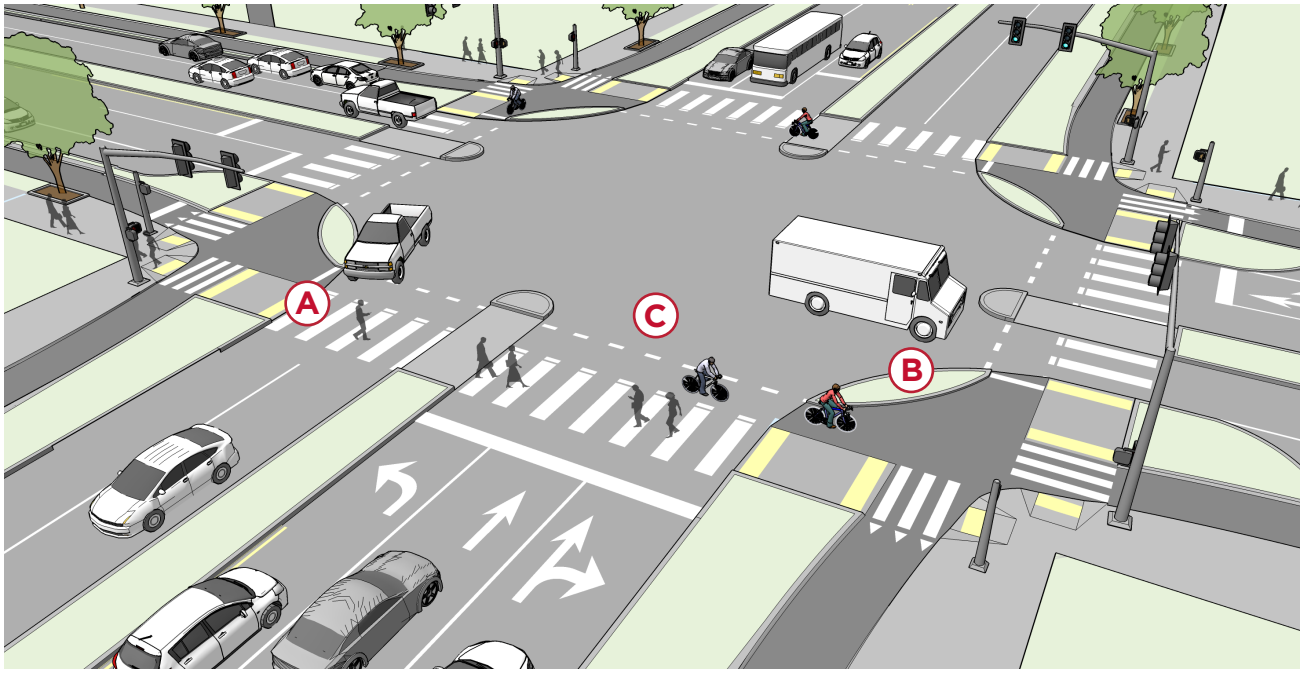
Bikeway should be maintained so that there are no pot holes, cracks, uneven surfaces or debris.

Approximate Cost

The costs of the lateral shift or protected intersection elements vary depending on materials used and degree of implementation desired. Inexpensive materials can used, such as paint, concrete planters, and bollards.

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.

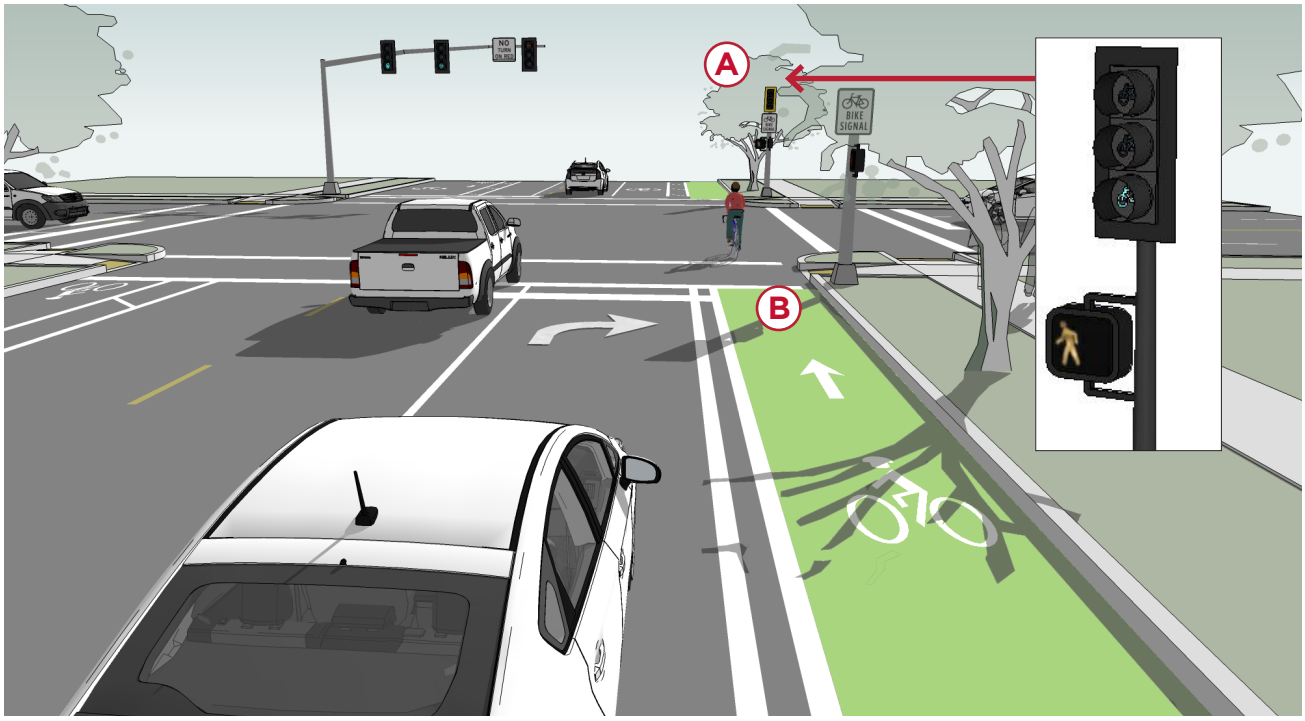
Approximate Cost

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.

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 Use

- 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

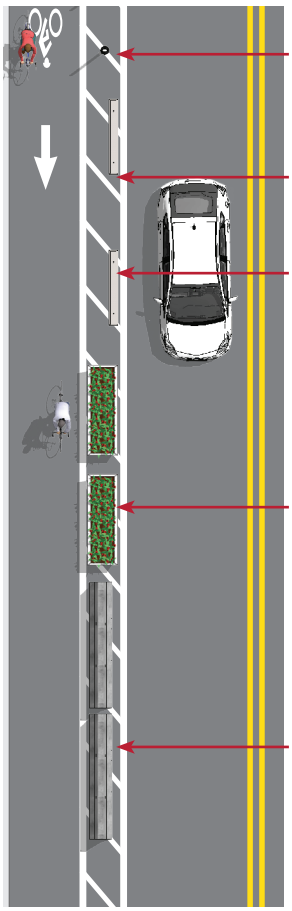
Bicycle signal heads have an average cost of $12,800.

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

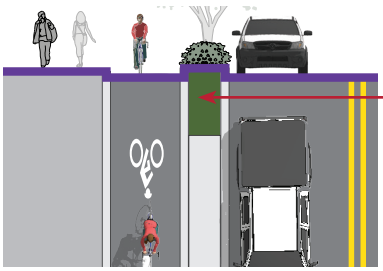
Separated Bikeway Barriers

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.

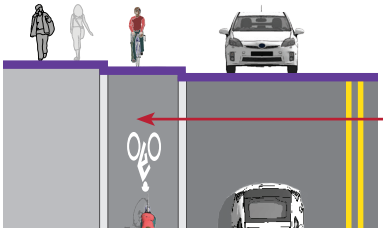
Barrier Separation



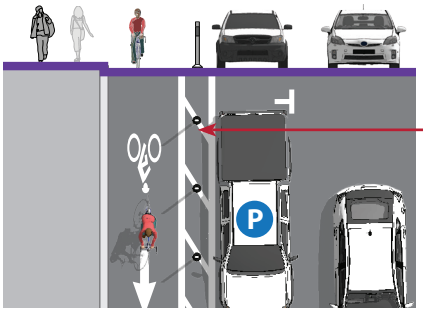
Media Separation



Grade Separation



Parking Separation



Typical Use

Appropriate barriers for retrofit projects:

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

Appropriate barriers for reconstruction projects:

- Curb separation
- Medians
- Landscaped Medians
- Raised protected bike lane with vertical or mountable curb
- Pedestrian Refuge Islands

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 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)**.
- 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.

Materials and Maintenance

Separated bikeways protected by concrete islands or other permanent physical separation, can be swept by smaller street sweeper vehicles.

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

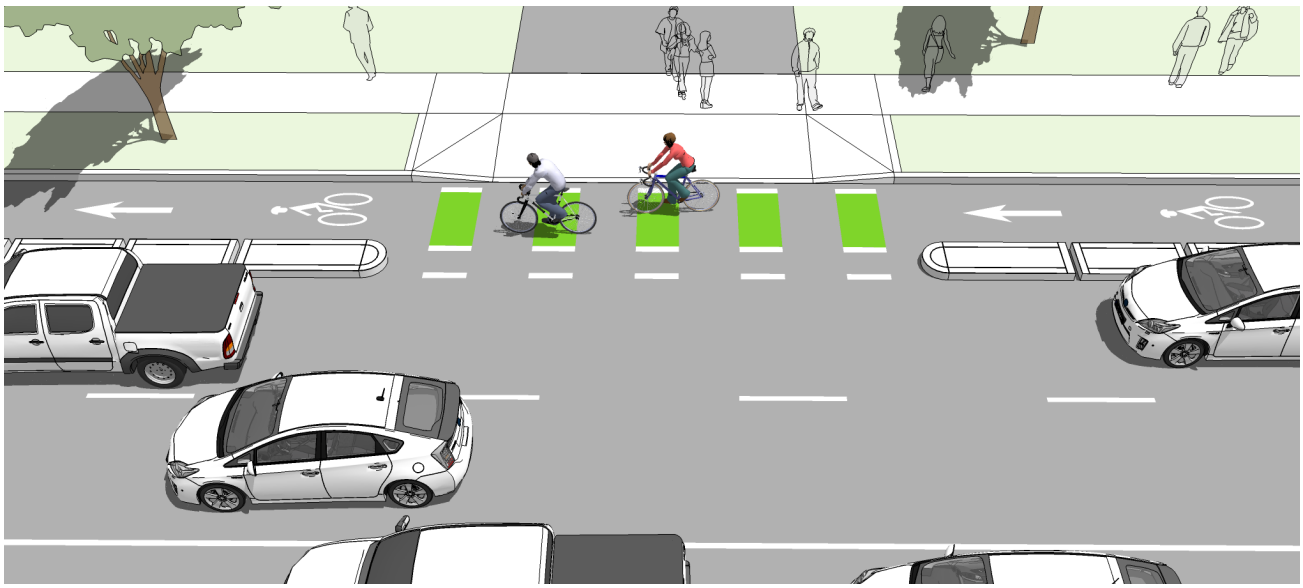
Approximate Cost

Separated bikeway barrier material costs can vary greatly, depending on the type of material, the scale, and whether it is part of a broader construction project.

Separated Bikeways at Driveways (and Minor Streets)

The added separation provided by separated bikeways creates additional considerations at intersections and driveways when compared to conventional bicycle lanes. Special design guidelines are necessary to preserve sightlines and denote potential conflict areas between modes, especially when motorists turning into or out of driveways may not be expecting bicycle travel opposite to the main flow of traffic.

At driveways and crossings of minor streets, bicyclists should not be expected to stop if the major street traffic does not stop.



Typical Use

- Along streets with separated bikeway where there are intersections and driveways.
- Higher frequency driveways or crossings may require additional treatment such as conflict markings and signs.

Design Features

- Remove parking to allow for the appropriate clear sight distance before driveways or intersections to improve visibility. The desirable no-parking area is at least 30 feet from each side of the crossing.
- Use colored pavement markings and/or shared line markings through conflict areas at intersections.
- If a raised bikeway is used, the height of the lane should be maintained through the crossing, requiring automobiles to cross over.

Intersection crossing markings can be used at high volume driveway and minor street crossings, as illustrated above.

- Motor vehicle traffic crossing the bikeway should be constrained or channelized to make turns at sharp angles to reduce travel speed prior to the crossing.
- Driveway crossings may be configured as raised crossings to slow turning cars and assert physical priority of travelling bicyclists.
- Motor vehicle stop bar on cross-streets and driveways is setback from the intersection to ensure that drivers slow down and scan for pedestrians and bicyclists before turning.

Further Considerations

- Removing obstructions and providing clear sight distance at crossings increases visibility of bicyclists.
- Treatments designed to constrain and slow turning motor vehicle traffic will slow drivers to bicycle-compatible travel speeds prior to crossing the separated bikeway.

Materials and Maintenance

Green conflict striping and markings, will require higher maintenance where vehicles frequently traverse over them at driveways and minor intersection. Green conflict striping (if used) will also generally require higher maintenance due to vehicle wear.

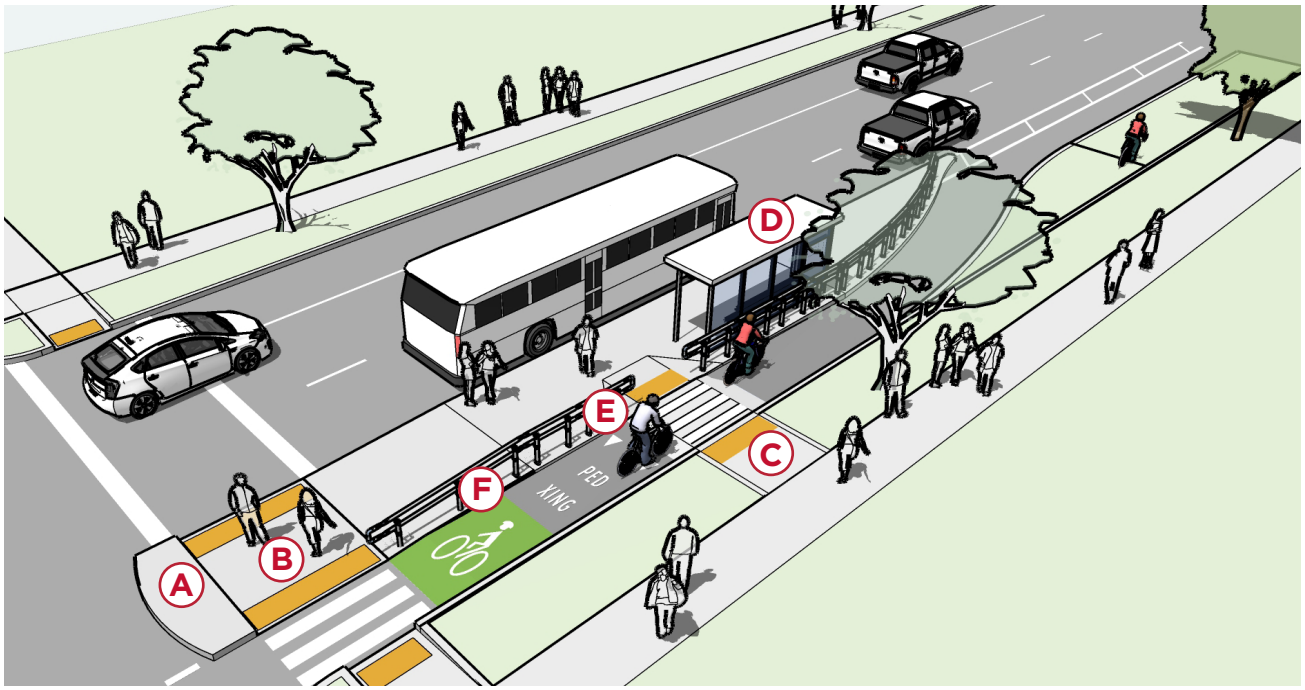
Approximate Cost

The cost for installing high visibility colored crossing 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. Colored pavement is more expensive than standard asphalt installation, costing 30-50% more than non-colored asphalt.

Separated Bikeways at Transit Side Boarding Islands

A transit side boarding island is a channelized lane for bicyclists designed to provide a path for bicyclists to pass stopped transit vehicles, and clarify interactions between pedestrians, bicyclists, and passengers, boarding and alighting.

This is particularly helpful on corridors with high volumes of transit vehicles and bicyclists, where "leapfrogging" may occur, and on separated bikeway corridors where maintaining physical separation is important to maintain user comfort.



Typical Use

- Routes where bike lanes or separated bikeways and transit operations overlap.
- Provides an in-lane stop for buses, reducing delay at stops.
- Median refuge also provides a shorter crossing for pedestrians at intersections

Design Features

- **A** Pedestrian median refuge island (optional) shortens the crossing distance at intersections.
- **B** Pedestrian ramp into crosswalks should be ADA compliant with detectable warning surfaces.
- **C** Direct pedestrians to crossing locations to minimize conflicts between modes.
- **D** High volume stops should have room for appropriately sized shelters and transit amenities.

A transit side boarding island clarifies user spaces and minimizes conflict between bicyclists. pedestrians, transit passengers, buses, and vehicles.

E Pavement markings and signage should clarify expectations among users. The bikeway could also ramp up to sidewalk level at this crossing to reduce bicycle speeds and enhance ADA access to the stop.

F Pavement markings on the bikeway should define the bicycle path of travel to minimize intrusion by pedestrians, except at designated crossings.

Further Considerations

- Transit island should be wide enough to accommodate mobility devices. An 8'x5' accessible clear space is required at the front door per ADA requirements.
- Transit platforms should feature pedestrian scale lighting.
- Side boarding island will require detectable warning surfaces along full length of platform if greater than 6" high.

Materials and Maintenance

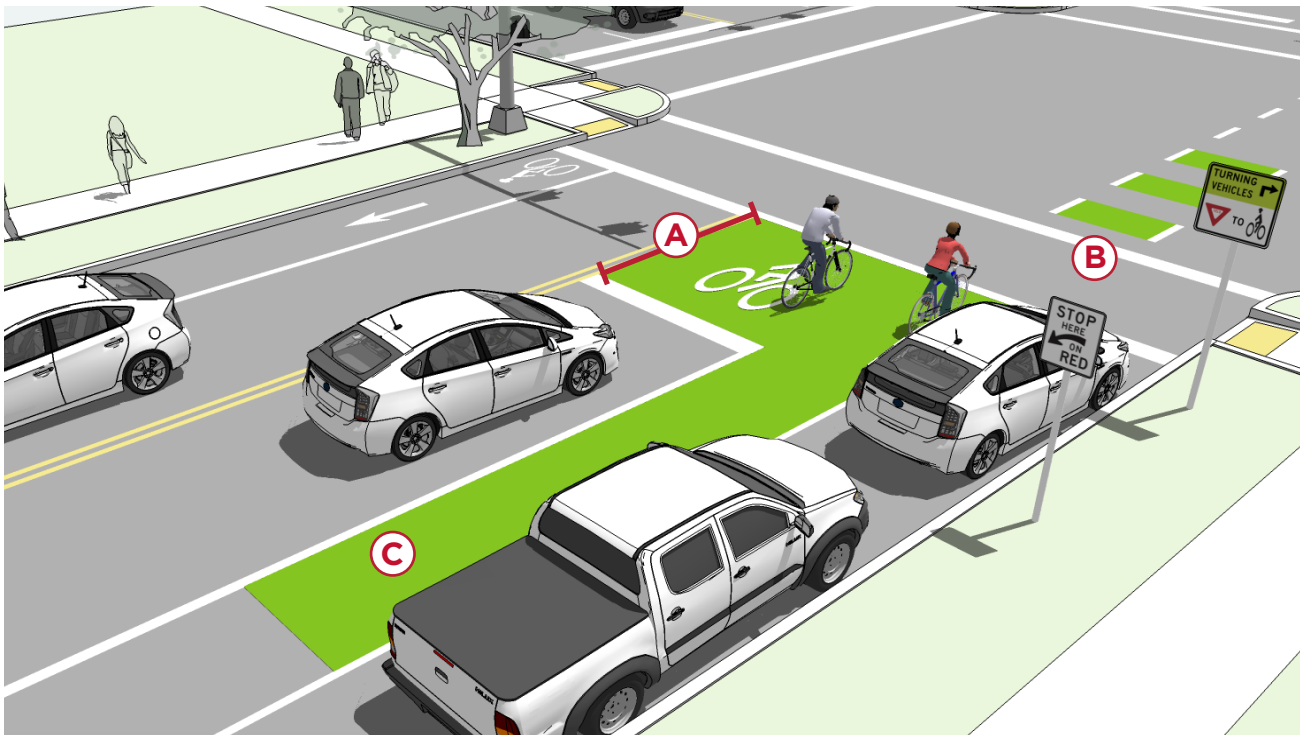
Similar to median refuge islands, side boarding islands may require frequent maintenance of road debris. If at street grade, the bikeway can be swept by street sweeper vehicles with narrow widths.

Approximate Cost

The approximate cost of a side boarding island is similar to median refuge islands ranging from $500 to $1,100 per foot, or about $3,500 to $4,000, depending on the design, and site conditions. This cost is exclusive of transit shelters and amenities, landscaping, and lighting.

Bicycle Box

A bicycle box is an experimental treatment, designed to provide 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. This treatment is currently under experiment, and has not been approved by Caltrans.



Typical Use

- 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.
- Not to be used on downhill approaches to minimize the right hook threat potential during the extended green signal phase.

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)** or "No Right Turn on Red" **(CA MUTCD R13A)** sign shall be installed overhead to prevent vehicles from entering the Bike Box. (Refer to CVC 22101 for the signage) 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.

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

- Use of green colored pavement is recommended.

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.
- Pedestrian also benefit from bike boxes, as they experience reduced vehicle encroachment into the crosswalk.
- Bike boxes are currently under experiment in California. Projects will be required to go through an official Request to Experiment process. This process is outlined in Section 1A.10 in the CAMUTCD, and jurisdictions must receive approval prior to implementation.

Materials and Maintenance

Bike boxes are subject to high vehicle wear, especially turning passenger vehicles, buses, and heavy trucks. As a result, bike boxes with 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.

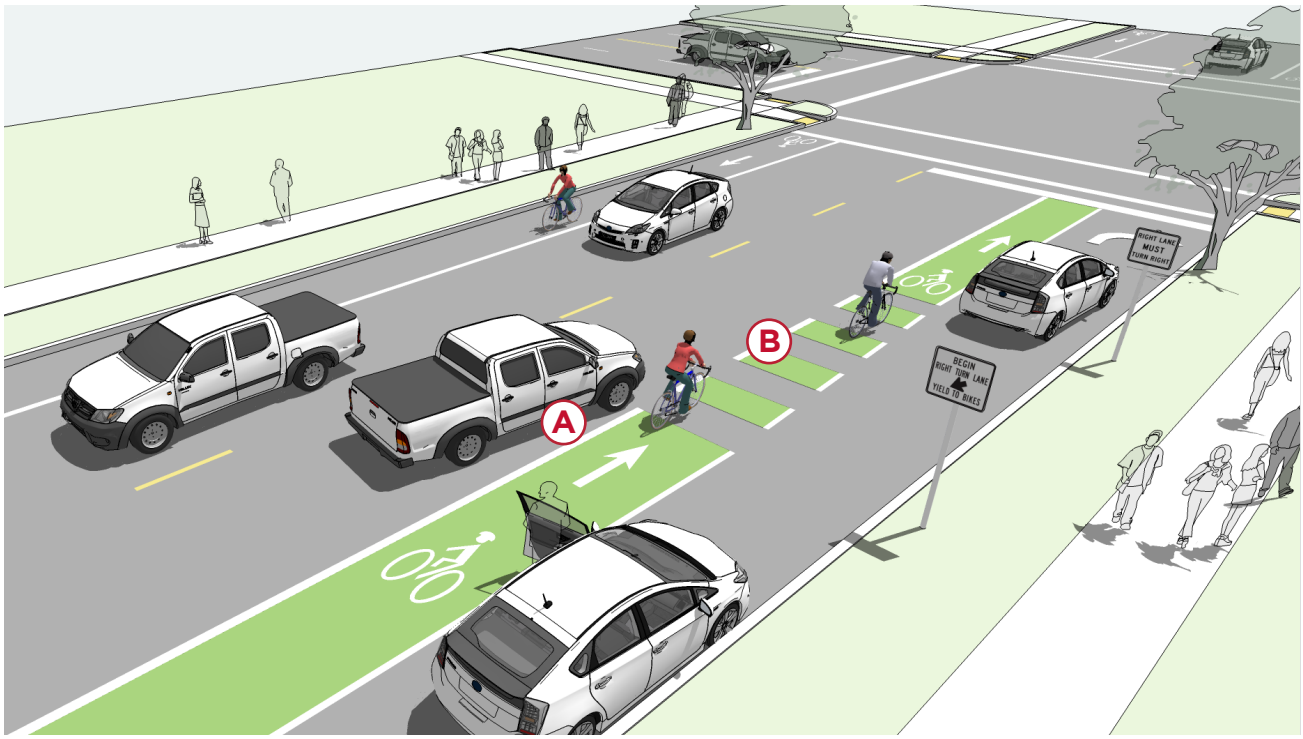
Approximate Cost

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

Typical costs range from $1.20/sq. ft. installed for paint to $14/sq. ft. installed for Thermoplastic.

Colored Pavement Treatment

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 Use

- 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” 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).[1]
- While other colors have been used (red, blue, yellow), green is the recommended color in the US.
- The application of green colored pavement within bicycle lanes is an emerging practice. The guidance recommended here is based on best practices in cities around the county.

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. Colored pavement is more expensive than standard asphalt installation, costing 30-50 percent more than non-colored asphalt.

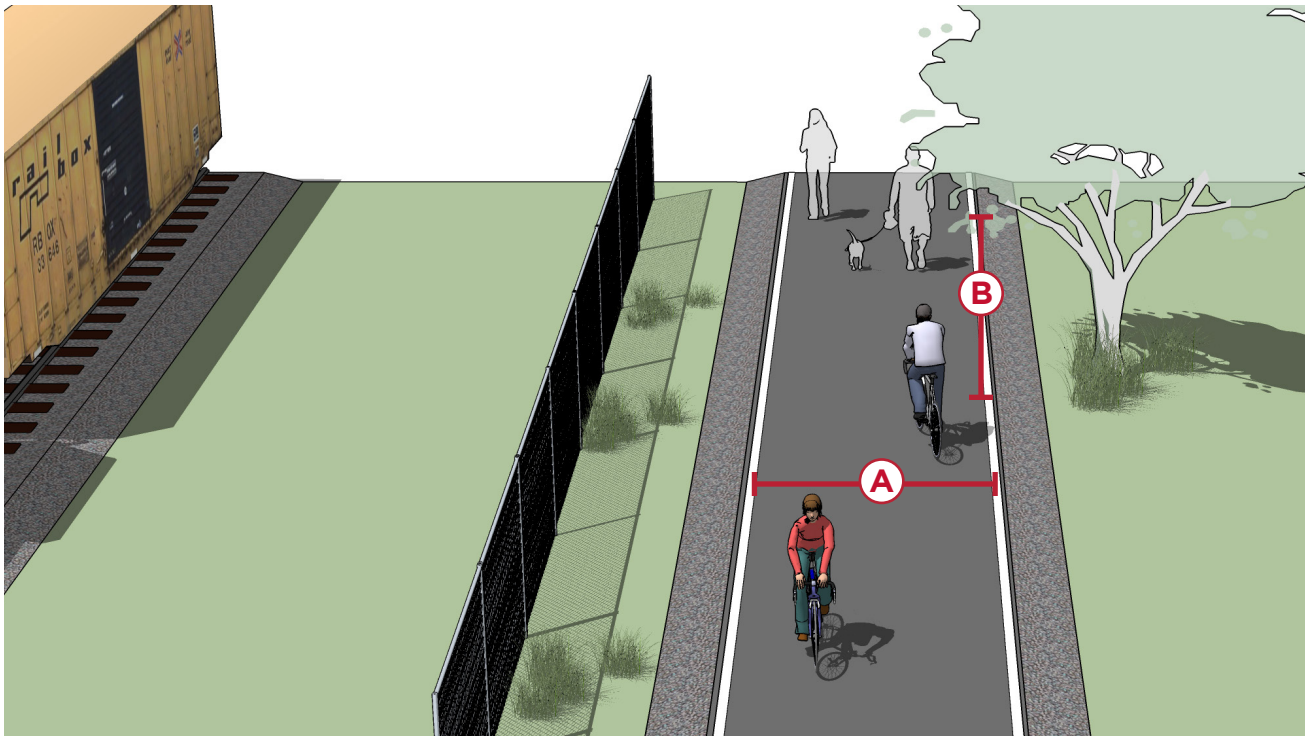
1 FHWA. Interim Approval for Optional Use of Green Colored Pavement for Bike Lanes (IA-14). 2011.

Chapter 4

Mixed Use Toolbox

Shared Use Path

Shared use paths 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 ft is the minimum width (with 2' ft shoulders) allowed for a two-way bicycle path and is only recommended for low traffic situations. **(Caltrans Design Manual)**

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

Lateral Clearance

» A 2 ft or greater shoulder on both sides of the path should be provided. An additional ft of lateral clearance (total of 3') 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

B Clearance to overhead obstructions should be 8 ft minimum, with 10 ft 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.

Further Considerations

» The provision of a shared use path adjacent to a road is not a substitute for the provision of on-road accommodation such as paved shoulders or bike lanes, but may be considered in some locations in addition to on-road bicycle facilities.

» To reduce potential conflicts in some situations, it may be better to place one-way sidepaths on both sides of the street.

» The design of the trail should conform to Crime Prevention Through Environmental Design (CPTED) principles. CPTED is a framework that encourages intuitive visual cues to guide path users, increase the visibility of the corridor and adjacent landmarks and properties, careful design that indicates active use and upkeep, and manages conflicting uses, and regular maintenance to prevent improper or illegal uses.

Prince Memorial Greenway connects users to downtown Santa Rosa
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.

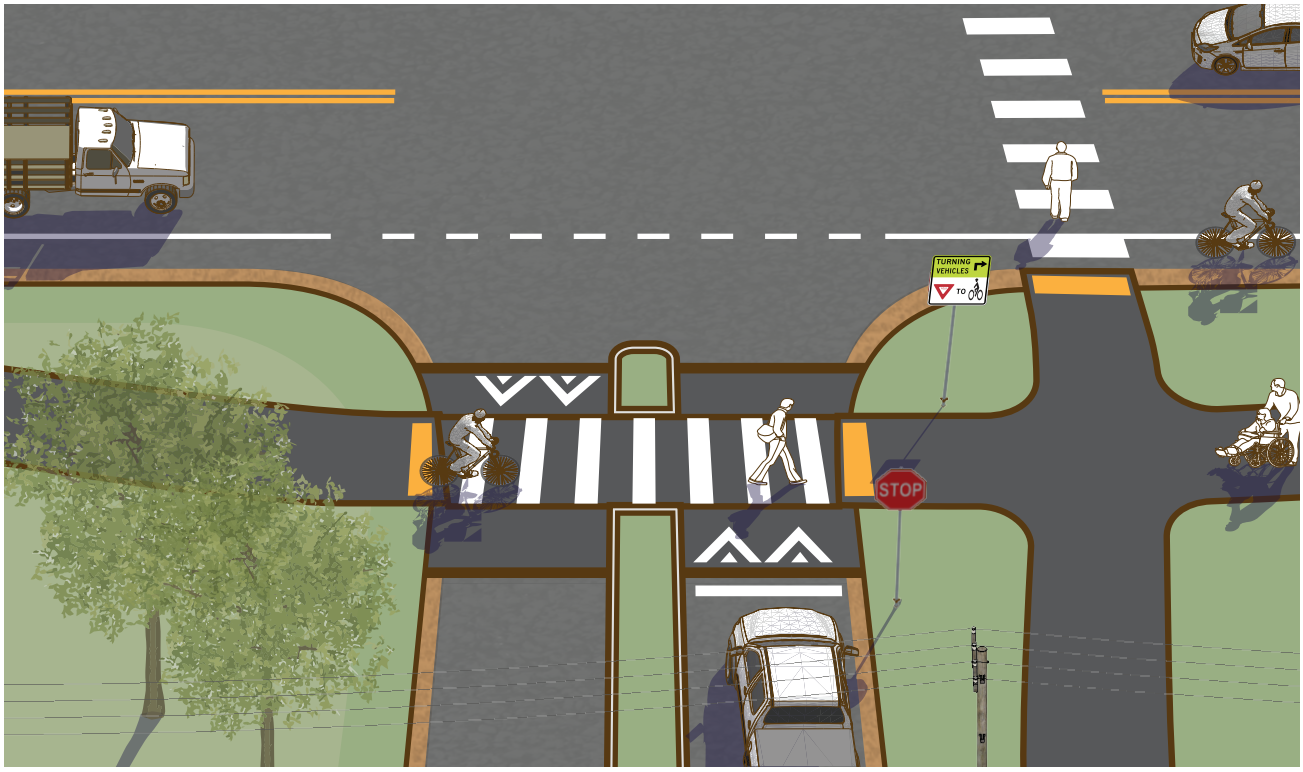
Adjacent landscaping should be regularly pruned, to allow adequate sightlines, daylight, and pedestrian-scale lighting, and so as not to obstruct the path of travel of trail users.

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.

Sidepath Design

A sidepath is a bidirectional shared use path located immediately adjacent and parallel to a roadway. Sidepaths can offer a high-quality experience for users of all ages and abilities.



Typical Use

Sidepaths should be considered where one or more of the following conditions exist:

- The adjacent roadway has relatively high volume and/or high-speed motor vehicle traffic that might discourage many people bicycling from riding on the roadway to achieve the targeted low stress. Sidepaths do not preclude the installation or maintenance of existing bike lanes.
- Along corridors with few intersections with minor streets and driveways.
- To provide continuity between existing segments of shared use paths.
- For use near schools, neighborhoods, and mixed use commercial areas, where increased separation from motor vehicles is desired, and there are few roadway and driveway crossings.

Design Features

- Sidepaths shall be designed to meet transportation standards as defined by AASHTO, PROWAG, and MUTCD.
- Materials: Asphalt is the standard paving material for sidepaths.
- Minimum Width: Minimum width of a sidepath is 10'. Where user volumes are high, additional width, as well as parallel facilities such as bike lanes and sidewalk can provide needed space.
- Roadway Separation: The preferred minimum roadway separation width is 6.5 - 16.5' **(Schepers, 2011).** Absolute minimum separation width of 5' **(AASHTO Bike Guide 2012, p. 5-11).**
- Roadway Separation: Separation from roadway traffic is an essential design feature of sidepaths. Separation should increase as volumes and speed of adjacent roadway increase **(AASHTO Bike Guide 2012, p. 5-11).**

A sidepath provides a continuous path of travel along roadway corridors with few driveways or intersections. Depending on the anticipated volumes and context, the sidepath can be constructed in lieu of sidewalk and/or bike lanes. Oftentimes, anticipated volumes, mix of skills, or other factors such as route continuity will also be considered in the decision to also include bike lanes and sidewalks.

- Horizontal Clearance: A lateral clearance to landscaping, street furnishings and signs is required. MUTCD identifies minimum clearance. Signs and other street furniture should be placed outside of the minimum path width.
- Vertical Clearance: Standard clearance to overhead obstructions is 10'.
- Cross Slope and Running Slope: As sidepaths are typically located within public rights of way, their designs are governed by ADA guidelines.

Further Considerations

- Sight Lines: It is important to keep approaches to intersections and major driveways clear of obstructions due to parked vehicles, shrubs, and signs on public or private property.
- Corner radii at driveways and minor streets should be minimized to facilitate vehicle turning speeds of 10-15 mph.

Materials and Maintenance

Like shared use paths, Sidepaths 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 sidepath users feel comfortable, especially in areas where visibility is limited.

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

Approximate Cost

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