Final Report

FAIRFAX TO SAN RAFAEL CROSS MARIN BIKEWAY FEASIBILITY STUDY

For the:

Town of Fairfax

Prepared by:
Alta Planning + Design

In Partnership with:
Parisi Associates Transportation Consulting and ILS Associates, Inc.

MARCH 2010

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alta
PLANNING + DESIGN

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The development of the Fairfax to San Rafael Cross Marin Bikeway Study was truly a collaborative and community effort. Marin County residents, advocates, and many public agency staff were actively involved at numerous technical advisory committee meetings, stakeholder meetings, and public workshops.

This study was led by the Town of Fairfax but would not have been possible without the cooperation of the Town of San Anselmo and City of San Rafael. All three cities contributed staff time, data and technical resources.

The Technical Advisory Committee (members presented below) made the greatest contribution to the project – giving their personal time, detailed knowledge of the project study area, and generating many of the concepts presented in the recommended improvements chapter of this document.

Funding for this feasibility study was provided by Marin County through the federally funded Nonmotorized Transportation Pilot Program, which was created in 2005 as part of a six-year United States federal government transportation bill called SAFETEA-LU. As stated in the bill, "The purpose of the program shall be to demonstrate the extent to which bicycling and walking can carry a significant part of the transportation load, and represent a major portion of the transportation solution, within selected communities."

Agency Staff

The following public agency staff participated in this study:

- James M. Moore, Town of Fairfax, Planning Director; Lead Staff
- Kathy Wilkie, Town of Fairfax, Public Works Director; Co-Lead Staff
- Steve Myrter, Town of San Anselmo, Public Works Director
- Jack Curley, Town of San Anselmo, Interim Public Works Director
- Leslie Blomquist, City of San Rafael, Associate Engineer

Technical Advisory Committee Members (TAC)

The following TAC and key stakeholders contributed their time and expertise:

- Larry Bragman, Town of Fairfax Council Member
- Stephen Bryne, Fairfax Bicycle & Pedestrian Advisory Committee

- John Reed, Fairfax Bicycle & Pedestrian Advisory Committee
- David Hoffman, Marin County Bicycle Coalition Director of Planning
- Deb Hubsmith, Marin County Bicycle Coalition, Advocacy Director
- Andy Peri, Marin County Bicycle Coalition, Advocacy Outreach Coordinator
- Chris Lang, Co-Founder Marin County Bicycle Coalition
- Tom Boss, San Anselmo Bicycle & Pedestrian Advisory Committee
- Don Magdanz, San Rafael Bicycle & Pedestrian Advisory Committee
- Patrick Seidler, Transportation Alternatives for Marin
- Moe Shakernia, Caltrans Local Assistance, District 4
- Joe Breeze, Breezer Bicycles

Consultant Team

The consultant team managers and key staff included:

- Michael Jones, Alta Planning + Design, Founding Principal
- Ian Moore, Alta Planning + Design, Principal, Project Manager
- Matt Lasky, Alta Planning + Design, Associate
- Lauren Ledbetter, Alta Planning + Design, Associate
- Holly Dabral, Alta Planning + Design, Landscape Designer
- Kristin Maravilla, Alta Planning + Design, Project Assistant
- David Parisi, Parisi Associates
- Irv Schwartz, ILS Associates

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1. Introduction

1.1. Purpose of Document

The primary purpose of this study is to identify a feasible, safe and efficient east-west bikeway alignment from the western limit of the Town of Fairfax to Downtown San Rafael and develop short- and medium-term implementation methods. This alignment will serve bicycle commuters, school children en route to the many schools in the corridor, local utilitarian trips as well as the many recreational cyclists traversing the Ross Valley. Much of the proposed corridor is already served by on-street bicycle facilities; therefore, this feasibility study focuses on closing gaps in those facilities, improving existing facilities, and improving north-south connections to the east-west corridor. This Feasibility Study also sets forth a safe and separate east-west bikeway through this corridor that connects Fairfax, San Anselmo, and San Rafael.

In this study, short-term is defined as occurring within zero to five years. Medium-term is defined as occurring within five to ten years.

The Fairfax to San Rafael Cross Marin bicycle corridor has been planned by Marin County advocates and local and county agencies for many years and is given further detail through this current study. The original vision was established in the Cross Marin Trail, of which this corridor is a part. Furthermore, the 1974 Marin County Bike Plan describes the need for a bicycle corridor through the Ross Valley.

The key implementation strategies to achieve this unified bikeway corridor are identified in the concept level designs included in this document. The study includes recommendations for connecting the Fairfax to San Rafael Cross Marin Bikeway to the proposed Marin North/South Greenway at San Rafael Transit Center and Andersen Drive, and connections to bike lanes on Butterfield Drive and Red Hill Shopping Center**.** Figure 1-1 shows an overview of the study corridor.

This feasibility study is a multi-agency project and includes the Town of Fairfax, the Town of San Anselmo and the City of San Rafael, with the Town of Fairfax acting as the lead agency.

This study did not include identification or analysis of potential environmental impacts associated with the proposed project improvements at the programmatic or site specific level. This study does include identification of traffic and civil engineering issues but not at the level of detailed required for environmental review. Many of the projects recommended in this Fairfax to San Rafael Cross Marin Bikeway Study are consistent with projects adopted in local bicycle plans that have received environmental clearance. Other projects recommended here require further analysis, documentation of potential environmental impacts, and identification of appropriate mitigations.

Bicyclists on Lansdale Avenue, an existing Class III facility.

1.2. Study Background

The Fairfax to San Rafael Cross Marin Bikeway, such as it currently exists, is the central east-west 'spine' of Marin County connecting key destinations, and linking residential neighborhoods to schools and places of work. On any given day bicyclists can be seen throughout the corridor, from experienced club bicyclists to mountain bicyclists headed to trailheads, as well as school children, casual riders, and families. The connection between Fairfax and San Rafael is a key portion of the longer Marin East/West Bikeway that will provide a bikeway connection between eastern and western Marin County.

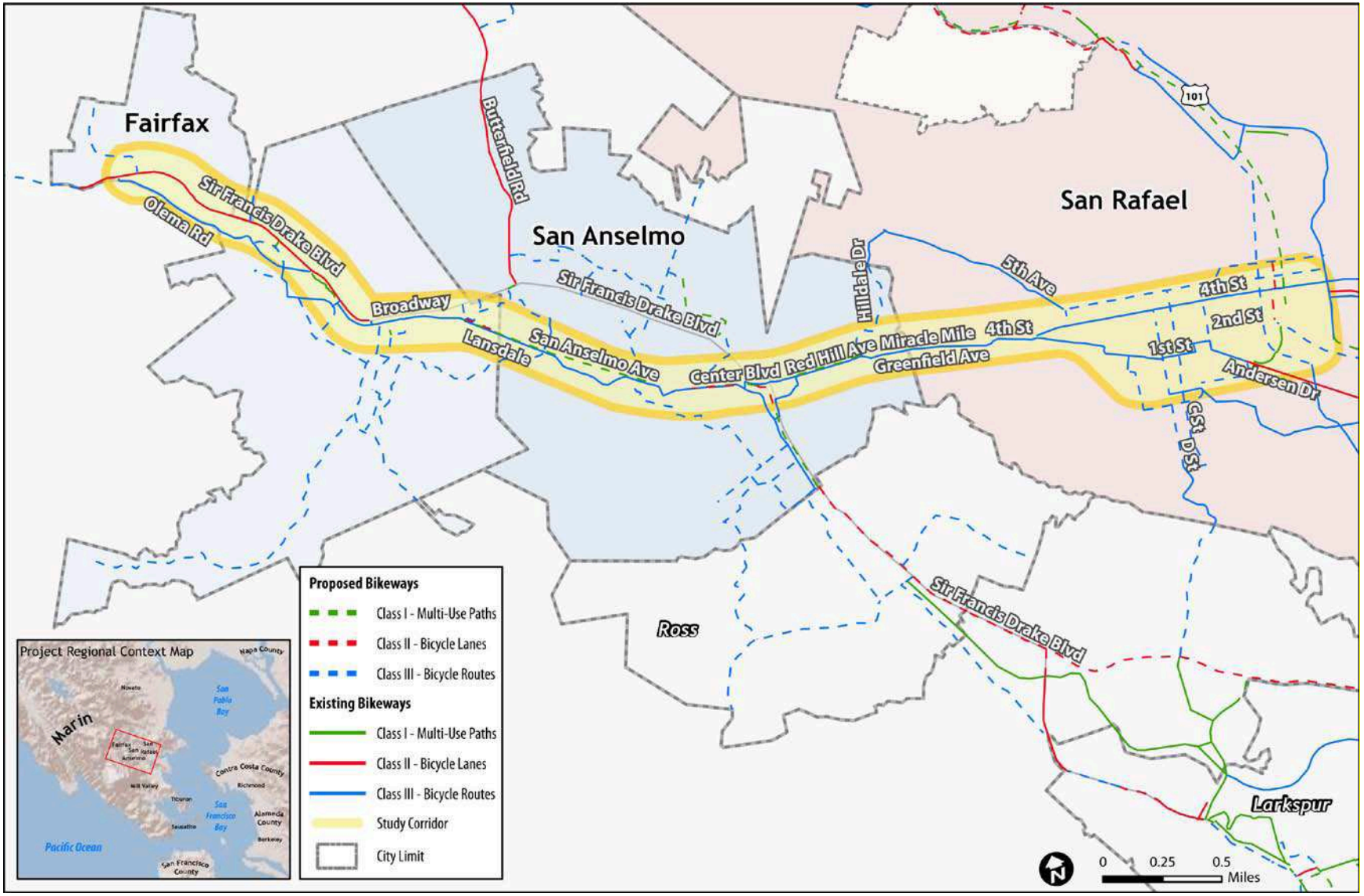


Figure 1-1: Fairfax to San Rafael Cross Marin Bikeway Project Study Area

The Fairfax to San Rafael Cross Marin Bikeway Feasibility Study is funded through the federal Nonmotorized Transportation Pilot Program (NTPP). The 2005 federal transportation funding legislation (SAFETEA-LU) established the NTPP, which provides $25 million to four selected communities—one of which is Marin County—to develop pilot projects to construct a network of nonmotorized transportation infrastructure facilities. The purpose of the pilot projects is to demonstrate the extent to which walking and bicycling can represent a major portion of the transportation solution.

1.3. Goals and Objectives

The goals and objectives for this study are based on the goals established for the NTPP, from Marin County's adopted local bicycle plans, and were further developed in collaboration with the project management team and Technical Advisory Committee (TAC) members.

Children bicycling with a parent on Center Street in Fairfax

The overarching vision of this project is to provide safe and separate bicycle accommodation in the east-west corridor where feasible. Accommodation should be equivalent to the North-South Greenway. To meet this vision, both the east-west corridor and connections to the corridor must be improved. The following goals and objectives have been developed to help guide the identification of a preferred improvement concept and design approach.

Goal 1: Improve bicycle connectivity in the Ross Valley Corridor from the western edge of Fairfax to Downtown San Rafael.

Objective 1.1: Close gaps in existing east-west facilities.

Objective 1.2: Connect to important destinations along the corridor including area schools, Sleepy Hollow, San Rafael Transit Center, and Andersen Drive bike lanes that lead to the Cal Park Tunnel.

Objective 1.3: Improve connections to existing north-south bicycle facilities.

Goal 2: Complete the network of bicycle facilities in coordination with other transportation modes.

Objective 2.1: Provide a transportation benefit to the Ross Valley Corridor by offering an effective alternative to the motor vehicle.

Objective 2.2: Enhance bicycle commuter access to employment, shopping, and transit nodes along the corridor.

Goal 3: Improve bicycle safety in the project corridor.

Objective 3.1: Minimize conflicts with motor vehicles, especially on high volume roadways and intersections.

Objective 3.2: Maximize separation between bicycles and vehicles to the extent feasible.

Objective 3.3: Provide for the broadest range of potential users.

Goal 4: Design the bikeway improvements to enhance the local environment and neighborhoods.

Objective 4.1: Avoid direct impacts to biological, hydrologic, historical and archaeological resources.

Objective 4.2: Minimize impacts to local traffic capacity.

Objective 4.3: Minimize impacts to local management and financial obligations.

Objective 4.4: Minimize impacts to private property and residential neighborhoods, and avoid the need to acquire right-of-way or easements where feasible.

Objective 4.5: Minimize visual impact to local neighborhoods, the urban forest canopy, and other local visual resources.

Goal 5: Develop the project to the highest standards consistent with adopted policies, standards, and goals.

Objective 5.1: Design the project to be consistent with the local, regional, and State adopted design standards.

Objective 5.2: Design the preferred alternative to be consistent with existing and future local and regional improvement projects wherever possible.

Objective 5.3: Pursue opportunities to develop safe and separate facilities specifically where existing adopted standards do not provide for a design solution consistent with the overall project vision.

1.4. Project Management and Public Outreach

The Fairfax to San Rafael Cross Marin Bikeway project management team was led by the Town of Fairfax Planning Department and included representatives from the Town of Fairfax Public Works Department, Town of San Anselmo Public Works Department, and the City of San Rafael Public Works Department. Each of the three cities contributed significant staff time and expertise to this project. The project management team focused on identifying implications of bikeway design scenarios on existing and forecast traffic operations, land use, and infrastructure in order to assist the consultant team in structuring the short-term and medium-term design improvements. The project management team met throughout the course of the project both independently and with the Technical Advisory Committee.

The TAC was comprised of representatives from the Bicycle and Pedestrian Advisory Committees (BPAC) of Town of Fairfax, Town of San Anselmo and City of San Rafael. BPAC members are appointed by their respective town and city council members to serve in an advisory role guiding pedestrian and bicycle planning and project implementation. In addition to the local BPAC representatives, the TAC included representative s from the Marin County Bicycle Coalition and Transportation Alternatives for Marin, both groups with countywide bicycling interests and a long-history of involvement in the Marin County NTPP.

The TAC convened five times over the course of the project to develop project goals and objectives, opportunities and constraints, potential alternatives, and the proposed improvements. The TAC also provided regular review and input on project approach. In addition, members of the TAC provided independent field review of specific project segments, and participated in a site walk of the project area near the San Anselmo Hub to discuss potential alternatives.

The project included two public workshops to gather information about the background, identify opportunities and constraints, discuss design improvement concepts, and assist in refinement of the proposed improvements. The first public workshop was held on March 3, 2009 in the San Anselmo Council Chambers where the consultants introduced the study and presented background information and existing conditions. Workshop attendees marked key safety concerns, facility improvements concepts, and areas in need of further investigation on project area poster boards. The second public meeting was held on June 9, 2009, at the Fairfax Women's Club. The consultants presented specific design recommendations and facilitated a workshop discussion of each proposed improvement. The public provided detailed input on specific design recommendations and emphasized key areas where additional analysis and design development was needed.

There are several key themes and issues that were identified in the first public workshop. These issues include:

- Need for addressing gaps in existing facilities.
- Locations where on-street facilities require improvements.
- Intersections that need improvement and specific ideas for how they can be improved.
- Recommended locations for bicycle route information kiosks.
- Segments of the corridor with bicyclist-motorist conflicts and/or traffic calming needs.
- Barriers to efficient bike travel.
- Desire to protect natural resources such as mature trees and creeks.
- Key North/South connections such as to Red Hill Shopping Center and the Sleepy Hollow Neighborhood.

The second public workshop provided members of the general public, local advocacy groups, and local elected officials the opportunity to comment on specific design recommendations. The key themes that came out of this second workshop include:

- Desire for Class II bike lanes on the south side (eastbound direction) of Sir Francis Drake Boulevard from Olema Road to Claus Drive.
- Need for improvements along Broadway Boulevard between Olema Road and the Fairfax Parkade.
- Desire to consider grade separated facilities at the San Anselmo Hub and the Second/Fourth Street intersections as feasible based on local physical conditions and engineering cost.
- Desire for facilities that divert bicyclists away from the Second/Fourth Street intersection to other nearby intersections that are easier to cross.

1.5. Document Structure

This feasibility study contains the following chapters:

Chapter 1. Introduction: describes the project and provides relevant background information.

Chapter 2. Planning Background: provides brief summaries of the local planning documents that are relevant to the study corridor.

Chapter 3. Existing Conditions: describes existing bicycling conditions and opportunities and constraints within the study corridor.

Chapter 4. User Needs Analysis: summarizes the needs of bicyclists in general and corridor users specifically. This chapter provides estimates of existing and projected bicyclist usage, demonstrating the need for facility improvements to respond to bicycle travel demand.

Chapter 5. Design Standards: provides and explanation and illustrations of design standards that should be followed when constructing bicycle facilities in the study corridor.

Chapter 6. Proposed Improvements: presents detailed descriptions and maps of the proposed facilities along the corridor along with planning level cost estimates.

Chapter 7. Implementation Strategy: presents implementation phasing, summary cost estimates, and implementation funding sources.

2. Planning Background

This chapter summarizes pertinent background planning documents and demonstrates how adopted bicycle plans, circulation elements and other transportation documents support the development of the Fairfax to San Rafael Cross Marin Bikeway in Marin County. Most of the plans listed here specifically support the development of a Fairfax to San Rafael Cross Marin Bikeway, and some include recommendations for bicycle facilities within the study corridor.

2.1. Nonmotorized Transportation Pilot Program (NTPP)

Marin County is one of four communities nationally selected by Congress to participate in a Nonmotorized Transportation Pilot Program (NTPP) and receive $25 million for walking and bicycling programs and infrastructure. The purpose of the pilot program is to demonstrate "the extent to which bicycling and walking can carry a significant part of the transportation load, and represent a major portion of the transportation solution, within selected communities." This Fairfax to San Rafael Cross Marin Bikeway study is one of the projects prioritized for detailed study and implementation through the NTPP.

The NMTPP has responded overall to the following geographic framework for bicycle connectivity in Marin County. The County's and numerous City's Pedestrian and Bicycle plans refer to three primary pedestrian and bicycle networks in Marin County:

- The North-South Bikeway defined as passage on the west side of 101 from Novato to the top of Puerto Suello Hill in San Rafael for bicycles.
- The North-South Greenway from Novato to Sausalito primarily along the North Western Pacific railroad right-of-way. From Sausalito north to Larkspur Landing there is only the proposed bikeway, and no current or planned rail service is existing. From Larkspur Landing north to the northern Novato/County border the Greenway runs parallel to the SMART railroad tracks.
- The Cross Marin Trail extends from San Rafael to Fairfax through San Anselmo and then to West Marin, primarily along the railroad right-of-way. There are two primary segments of railroad right-of-way in the Cross Marin trail region:
    - One is on the northern leg of the railroad right-of-way, which runs primarily from the San Anselmo Miracle Mile on Fourth Street to the North-South Greenway in Central San Rafael; and
    - The southern leg starts at the Hub in San Anselmo along Sir Francis Drake parallel to SFD along the old railroad right-of-way across College of Marin, Larkspur, and then connecting to the North-South Greenway at Larkspur, at the Baltimore Park Train Station.

The purpose of this plan is to identify short term and long term design and infrastructure improvements for non-motorized transportation (bicycling and walking) for the Cross Marin Trail from Fairfax to San Rafael through San Anselmo which will provide continuous and safe routes for non-motorized travelers.

Ideally, most sections of the Cross Marin Trail would provide pedestrians and cyclists separate accommodations from automobiles. A continuous and safe integrated Cross Marin Trail is the top priority in building the Cross Marin Trail to completion.

2.2. Regional Bicycle Plan for San Francisco Bay Area (2009)

The Metropolitan Transportation Commission (MTC) *Regional Bicycle Plan* is the 2009 update to the MTC's 2001 plan, a component of the 2001 Regional Transportation Plan for the San Francisco Bay Area that establishes the region's 25-year transportation investment plan. A primary focus of the document is the Regional Bikeway Network, which defines the San Francisco Bay Area's continuous and connected bicycling corridors of regional significance. Almost 50 percent of the network's 2,140 miles have been constructed.

Portions of the proposed Fairfax to San Rafael Cross Marin Bikeway are identified in the plan as unbuilt segments of the Regional Bikeway Network. Project MRN-17 Marin East/West Bikeway is identified as Fourth Street/Second Street/West End Avenue to Francisco Boulevard/Main Street/Richmond Bridge. The project length is 4.5 miles at a cost of $422,720. MRN-16 San Rafael's Miracle Mile is also identified as a 2.1 mile project from Fourth Street/Brooks Street to Sir Francis Drake Boulevard/Center Boulevard/Greenfield Avenue. MRN-16 is identified as 2.1 miles with a cost of $200,586.

While projects identified in the Regional Plan do not call out specific improvements, it is clear from the relatively low cost estimates that limited improvements are assumed. Nonetheless, the fact that significant segments of the Fairfax to San Rafael Cross Marin Bikeway are identified as a part of the regional bicycle network is important and it is the function of this Fairfax to San Rafael Cross Marin Bikeway Study to add additional detail and specificity to justify additional infrastructure improvement expenditures.

Table 2-1: MTC Regional Bicycle Plan, Unbuilt Regional Projects along the Fairfax to San Rafael Cross Marin Bikeway

Segment Name	Begin	End	Class	Length
MRN-16 Miracle Mile	Fourth Street/Brooks Street	Sir Francis Drake Boulevard/Center Boulevard/Greenfield Avenue	II	2.1
MRN-17 Fairfax to San Rafael Cross Marin Bikeway	Fourth Street/Second Street/West End	Francisco Boulevard/Main Street/Richmond Bridge	III	4.5

2.3. Marin County Bicycle and Pedestrian Master Plan (2008)

The *Marin County Unincorporated Areas Bicycle and Pedestrian Master Plan* was completed for the Marin County Department of Public Works in 2001 and updated in 2008. One of the primary goals of the *Bicycle and Pedestrian Master Plan* is to make bicycling an integral part of daily transportation in Marin County, particularly for trips of less than five miles, by implementing and maintaining a bikeway network, providing end-of-trip facilities, improving bicycle/transit integration, encouraging bicycle use, and making bicycling safer and more convenient. Though none of the study corridor for the Fairfax-San Rafael Bicycle Connector is located in unincorporated Marin County, there is a strong community desire that the Fairfax to San Rafael Cross Marin Bikeway include connections to unincorporated areas such as the Class II facility on Butterfield Road that connects to the Sleepy Hollow Neighborhood.

2.4. Marin Countywide Plan (2007)

The *Marin Countywide Plan* was adopted in 2007, and provides planning guidance and goals for Marin County and the individual jurisdictions. The plan's goals support the creation of a Fairfax to San Rafael Cross Marin Bikeway. Specifically, the transportation element calls for "An integrated, multimodal system that relies on travel by bus, rail, ferry, bicycle, and foot to supplement and supplant automobile use." The goals laid out in this section provide guidance for the development of the proposed Fairfax to San Rafael Cross Marin Bikeway. Goals and policies related to the proposed project include providing a range of transportation options, including bicycle access to adequate and affordable public transportation.

Another relevant goal is the expansion of bicycle and pedestrian facilities and access in and between neighborhoods, employment centers, shopping areas, schools, and recreational sites, with a focus on identifying gaps in the Fairfax to San Rafael Cross Marin Bikeway and obtaining funding for the completion of these gaps. Cumulatively these goals are intended to move Marin County to a 20 percent bicycle mode share by 2020. The project area of this study is one of the gaps in the Fairfax to San Rafael Cross Marin Bikeway.

2.5. Town of Fairfax Bicycle and Pedestrian Master Plan (2008)

The *Town of Fairfax Bicycle and Pedestrian Master Plan* was updated in 2008. The plan contains both general goals that support bicycling, as well as specific bicycle facilities along the Fairfax to San Rafael Cross Marin Bikeway. The plan prioritizes closing gaps in the Fairfax to San Rafael Cross Marin Bikeway and notes that many residents of Fairfax are employed in San Rafael, and would benefit from the Fairfax to San Rafael Cross Marin Bikeway. Table 2-2 presents the proposed bikeways that are located within or connect to the Fairfax to San Rafael Cross Marin Bikeway study corridor.

Table 2-2: Fairfax Proposed Bikeways Within/Connecting to the Fairfax to San Rafael Cross Marin Bikeway

Segment Name	Begin	End	Class	Length	Priority
Center Blvd. Sidepath	Pastori Ave.	Fairfax Town Limit	I	0.16	3
Center Blvd.	Fairfax Town Limit	Pastori Ave.	II	0.17	3
Center Blvd.	Pastori Ave.	Pacheco Ave.	II	0.26	1
Forrest Ave.	Meernaa Ave.	Fairfax Town Limit	III	0.80	1
Bolinas Rd.	Broadway Blvd.	Porteous Ave.	III - Sharrows	0.48	1
Lansdale Ave.	Center Blvd.	Fairfax Town Limit	III - Shar/TrafCalm	0.16	1
Pacheco Ave.	Napa Ave.	Center Blvd.	III - Shar/TrafCalm	0.05	1
Pastori Ave.	Sir Francis Drake Blvd.	Center Blvd.	III	0.05	1
Manor Rd.*	Olema Rd.	Scenic Rd.	III - Shar/TrafCalm	0.13	1
Oak Manor Dr.	Sir Francis Drake Blvd.	Manor Elem. Sch.	III	0.19	1
Glen Dr.	Sir Francis Drake Blvd.	Fairfax Town Limit	III	0.46	1

* Existing Class III signed bicycle route

2.6. Town of Fairfax General Plan: Circulation Element (2008)

The Town *of Fairfax General Plan Draft Circulation Element,* which includes the *Pedestrian and Bicycle Master Plan* as an appendix, was in the process of being updated in 2009. Two issues identified in the *Draft Circulation Element* are pertinent to the Fairfax to San Rafael Cross Marin Bikeway. First, the existing

conditions section notes that the Pacheco Avenue/Center Street/Broadway intersection is operating at level of service (LOS) E during the evening peak hour, while LOS D is considered the poorest acceptable operation. Second, the plan notes that pedestrian and bicycle circulation is currently subordinate to vehicle flow in the Town Center. Goals and policies related to the proposed project include maintaining Sir Francis Drake Boulevard as a functional regional arterial.

Other relevant goals in the plan include the preservation of Center Boulevard and the Parkade for potential future use as a light rail corridor with bicycle and pedestrian paths, the inclusion of Class II bike lanes on collector streets, and shared lane markings on proposed bicycle corridors where no right-of-way is available for bike lanes.

2.7. Fairfax Parkade Study

The *Fairfax Parkade Study* is also a Nonmotorized Transportation Pilot Program-funded project that identified bicycle, pedestrian and vehicular circulation and safety in and around Parkade area of Downtown Fairfax. The Parkade is bounded by Broadway Avenue, Sir Francis Drake Boulevard, Claus Drive and Pacheco Avenue. The Parkade Study is currently being prepared under the Town of Fairfax's direction and is referenced in this Fairfax to San Rafael Cross Marin Bikeway Feasibility Study. Chapter 3 of this plan presents existing conditions and opportunities and constraints findings from that study and Chapter 6 presents the recommended improvements developed through that study.

2.8. Town of San Anselmo Bicycle Master Plan (2008)

The 2008 *Town of San Anselmo Bicycle Master Plan* is an update of the previously adopted 2001 Plan. The plan specifically supports developing a link in the Fairfax to San Rafael Cross Marin Bikeway between Fairfax, San Anselmo and San Rafael. Proposed improvements to the bikeway network supporting the Fairfax to San Rafael Cross Marin Bikeway include crossings at the Hub and Sir Francis Drake Boulevard and single directional Class I multi-use paths along Center Boulevard and Lincoln Park Avenue. Table 2-3 presents the proposed projects from the San Anselmo plan that directly overlap with the proposed Fairfax to San Rafael Cross Marin Bikeway or that would provide key connections to the corridor.

Table 2-3: San Anselmo Proposed Bikeways Within/Connecting to the Fairfax to San Rafael Cross Marin Bikeway

Segment Name	Begin	End	Class	Length	Priority
Fairfax-San Anselmo Path	Hooper Ln.	Laurel Ave.	I	0.68	2/3
San Anselmo-San Rafael Path	Sequoia Dr.	Lincoln Park Ave.	I	0.39	2/3
Creek Park Parking Lot	Bikeway Center Blvd.	Sir Francis Drake Blvd.	II	0.68	2
Fairfax-San Anselmo Bikeway	Madrone Ave.	Sycamore Ave.	II	0.18	2
Hilldale Ave.	Jordan Ave.	Greenfield Ave.	III	0.13	1
Bolinas Ave.	Richmond Rd.	San Anselmo Ave.	III	0.15	1
Madrone Ave.	Center Blvd.	Sir Francis Drake Blvd.	III	0.19	1
Saunders Ave.	Center Blvd.	Drake High School	III	0.25	1/2
Medway Rd.	Oak Knoll Ave.	San Anselmo Ave.	III	0.20	1/2
Oak Knoll Ave.	Medway Rd.	Sir Francis Drake Blvd.	III	0.05	1/2
Mountain View Ave.	Sir Francis Drake Blvd.	Brookside Dr.	III	0.14	1
Laurel Ave.	Myrtle Ln.	Center Blvd.	III	0.31	1

Segment Name	Begin	End	Class	Length	Priority
Forrest Ave.	San Anselmo Ave.	San Anselmo City Limits	III	0.19	1
Redhill Bikeway	Shaw Dr.	Sir Francis Drake Blvd.	III	0.11	1
Ross Ave.	San Anselmo Ave.	Sunnyside Ave.	III	0.38	1/2/3

2.9. Draft City of San Rafael Bicycle/Pedestrian Master Plan (2008)

The City of San Rafael is currently in the process of updating the City's existing Bicycle/Pedestrian Master Plan. The *Draft City of San Rafael Bicycle/Pedestrian Master Plan 2008 Update* was prepared through the collaborative work of City of San Rafael staff, San Rafael Bicycle and Pedestrian Advisory Committee and members of the public. The draft plan contains general goals as well as specific proposed facilities that are relevant to the Fairfax to San Rafael Cross Marin Bikeway.

One of the primary goals of the draft plan is making the bicycle an integral part of daily life in San Rafael, particularly for trips of less than five miles, by implementing and maintaining a bikeway network, providing end-of-trip facilities, improving bicycle-transit integration, encouraging bicycle use, and making bicycling safer. A main objective is the completion of a network of bikeways that provide bicycle-friendly connections through travel corridors and to important destinations, especially for travel to employment centers, schools, commercial districts, transit stations, parks, and institutions. The draft plan identifies demand for a high quality Fairfax to San Rafael Cross Marin Bikeway from San Quentin through San Rafael to San Anselmo and Fairfax. Table 2-4 presents the proposed projects from the draft San Rafael plan that directly overlap with the proposed Fairfax to San Rafael Cross Marin Bikeway or that would provide key connections to the corridor.

Table 2-4: San Rafael Proposed Bikeways Within/Connecting to the Fairfax to San Rafael Cross Marin Bikeway

Segment Name	Begin	End	Class	Length	Priority
First St.*	D St.	E St.	III-Sharrows	0.08	1
Fifth Ave.	H St.	Grand Ave.	III-Sharrows	1.11	2
A St.	Fifth Ave.	First St.	III-Sharrows	0.24	2
C St.	Antonette Ave.	Fifth Ave.	III	0.75	2
D St.**	Fourth St.	Antonette Ave.	III-Sharrows	0.68	2

*This segment is a one-way street.

**A portion of this segment is a one-way street.

2.10. City of San Rafael General Plan: Circulation Element

The *San Rafael 2020 Plan* Circulation Element provides guidance for development of transportation infrastructure, including bikeways and supporting facilities. The plan's goals and objectives support the creation of a Fairfax to San Rafael Cross Marin Bikeway. The Circulation Element identifies congestion as a major concern of San Rafael residents, and expanded bicycle and pedestrian networks are considered one part of the solution to this problem. This element also prioritizes the identification of opportunities to improve pedestrian, bicycle and transit connections between San Rafael neighborhoods and between San Rafael and adjacent communities.

A main goal of the plan is to provide "A range of travel options that include improved highway and roadway connections, expanded bus service, new commuter rail, smaller scale transit options responsive

to special populations, and an excellent network of bikeways and pedestrian paths." Objectives within this goal include the safe and convenient design of roadways for motor vehicles, transit, bicyclists and pedestrians, with the highest priority on safety.

2.11. Marin County Safe Routes to Schools Projects

Several proposed Safe Routes to Schools (SR2S) projects fall within the proposed Fairfax to San Rafael Cross Marin Bikeway corridor. The purpose of SR2S is to increase the number of children who walk or bicycle to school by funding projects that remove the barriers that currently prevent them from doing so. Safe routes barriers include lack of infrastructure and unsafe infrastructure. These SR2S projects identify a variety of needs for connections between the Fairfax to San Rafael Cross Marin Bikeway and adjacent communities. Table 2-5 presents identified SR2S projects for school sites along the Fairfax to San Rafael Cross Marin Bikeway corridor.

Table 2-5: Marin Safe Routes to School Projects Connecting to the Fairfax to San Rafael Cross Marin Bikeway

School	Location	Proposed Improvements
Wade Thomas School	Sir Francis Drake & Ross Ave	Install high visibility crosswalks; install pedestrian countdown signals; install signage; extend curbs at Sir Francis Drake and Barber Avenue
Wade Thomas School	Red Hill Avenue & Sequoia Drive	Install high visibility crosswalks; install pedestrian countdown signals; signalize right turn from Greenfield Ave./Greenfield Ct. to Red Hill Ave.; extend curbs at Greenfield Ave./Greenfield Ct. and Red Hill Ave.
White Hill School	Sir Francis Drake & Glen Drive	Install high visibility crosswalk across Glen Drive; construct curb ramps; install warning signage; install flashing beacon on Sir Francis Drake.
Manor Elementary School	Sir Francis Drake & Oak Manor Drive	Improve existing sidewalk and provide missing segment on Oak Manor Drive; widen sidewalk between Oak Manor and Manor.
Manor Elementary School	Sir Francis Drake & Marin	Install new crosswalks across Sir Francis Drake and Marin; reduce intersection; construct new pedestrian bridge; relocate bus stop and shelter and provide bus lane; provide sidewalk to Olema.
Manor Elementary School	Sir Francis Drake & Olema	Install new crosswalk across Olema; extend pathway; reduce intersection; install bicycle signage.
Manor Elementary School	Sir Francis Drake & Broadway	Install crosswalk across Sir Francis Drake and extend curb; signalize intersection at Marinda if warranted; relocate and reconfigure paths; remove existing crosswalk; consider modifying school's traffic circulation.
Manor Elementary School	Sir Francis Drake & Claus & Broadway	Relocate crosswalk; install curb extensions.
Manor Elementary School	Sir Francis Drake & Willow & Pastori	Provide bicycle loop detectors; improve/provide wheelchair ramps; improve and widen sidewalk; underground utilities.
Manor Elementary School	Center & Pastori & Belmont	Extend sidewalks and provide wheelchair ramps; underground utilities; improve and widen sidewalks; install new crosswalks; provide multi-modal improvements; consider converting entry to Belmont one-way eastbound only.

3. Existing Conditions, Opportunities and Constraints

3.1. Introduction

This chapter describes the existing conditions, opportunities and constraints along the Fairfax to San Rafael Cross Marin Bikeway study corridor. The chapter is organized according to the major roadways along the corridor, and describes right-of-way conditions, existing bicycle facilities, traffic operations and safety, and pedestrian and transit access. The purpose of this presentation is to document the basic dimensional and operational characteristics of each of the key roadways in the project study area that influence future bikeway improvements.

The five-mile long study corridor provides primary East-West transportation for bicyclists, transit, and cars. The topography of the Ross Valley provides few alternative travel options between Fairfax and San Rafael. Since the late 19th Century, when resource extraction and land development began in earnest, the Ross Valley has served as one of Marin County's primary transportation arteries. The North Coast Pacific timber railroad opened in 1875 and this same right-of-way was used for passenger service through the mid-20th Century. Today, this and other former railroad corridors are Sir Francis Drake Boulevard, Red Hill Avenue, Center Boulevard, Broadway Boulevard, and Second/Third Street.

Electric Train in Fairfax

The fact that so many of Central Marin's primary street rights-of-way were established via railroad development creates both opportunity and constraint. The greatest opportunity is that the downtowns, shopping areas, schools, and residential neighborhoods that were developed adjacent to the railroad years ago have continued to build-out until this day. The majority of Central Marin's population is centered along the Fairfax to San Rafael Cross Marin Bikeway corridor.

The greatest constraint is that the streets today carrying tens of thousands of cars per day were once narrow railroad corridors accommodating just one or two railroad tracks. The adjacent commercial businesses, private homes, and related infrastructure have not moved, making for generally tight operating space for pedestrians, bicycles, transit buses, and private cars. Available right-of-way is limited, intersection geometries are less than ideal by today's traffic engineering and safety standards, and accommodation of multiple transportation modes on a given segment generally requires trade-offs.

The primary streets that provide east-west connectivity through the study corridor include:

- Sir Francis Drake Boulevard
- Olema Road
- Broadway Boulevard
- Center Boulevard
- Lansdale Avenue
- San Anselmo Avenue
- Greenfield Avenue
- Red Hill Avenue/Miracle Mile
- Fourth Street
- Second Street
- First Street
- Andersen Drive

The location of each of these primary roadways and secondary roadways is illustrated in Figure 3-1.

Each of the primary streets along the corridor is discussed in greater detail below including a discussion of existing conditions, opportunities and constraints including:

- Right-of-way conditions
- Existing bicycle facilities
- Traffic operations and safety
- Pedestrian and transit access

This summary information is presented as existing conditions, opportunities and constraints in order to provide the context and justification for the corridor improvements presented in Chapter 6, Proposed Improvements. Figure 3-2 and Figure 3-3 present the bicycle collision history for the study area including data for the years 2002 through 2008.

Table 3-1 presents the existing bikeway facilities in the Fairfax to San Rafael Cross Marin Bikeway project study area.

Table 3-1: Existing Bikeway Facilities along Fairfax to San Rafael Cross Marin Corridor

Segment Name	Facility Type	Begin	End	Miles	Jurisdiction
Sir Francis Drake Blvd.	Class II Bike Lane	Shadow Creek Ct.	Claus Dr.	1.38	Fairfax
Olema Rd.	Class III Bike Route	Sir Francis Drake Blvd.	Sir Francis Drake Blvd.	0.72	Fairfax
Fairfax Library Pathway	Class I Path	Olema Rd.	Broadway Blvd.	0.13	Fairfax
Broadway Blvd.	Class III Bike Route	Sir Francis Drake Blvd.	Pacheco Ave.	0.4	Fairfax
Center Blvd.	Class II Bike Lane	Pacheco Ave.	Pastori Ave.	0.24	Fairfax
Center Blvd.	Class III Bike Route	Pastori Ave.	San Anselmo Ave.	1.04	Fairfax/San Anselmo
Lansdale Ave.	Class III Bike Route	Center Blvd.	San Anselmo Ave.	0.34	Fairfax
Greenfield Ave.	Class III Bike Route	Sir Francis Drake Blvd.	West End Ave.	1.04	San Anselmo/ San Rafael
San Anselmo Ave.	Class III Bike Route	Medway Rd.	Bolinas Ave.	1.79	San Anselmo
Bank St.	Class III Bike Route	Sir Francis Drake Blvd.	Lincoln Park Ave.	0.07	San Anselmo
Sir Francis Drake Blvd.	Class III Bike Route	Bank St.	Tunstead Ave.	0.08	San Anselmo
Lincoln Park Ave.	Class III Bike Route	Bank St.	Greenfield Ave.	0.08	San Anselmo
Second St.	Class III Bike Route	Fourth St.	Miramar Ave.	0.29	San Rafael

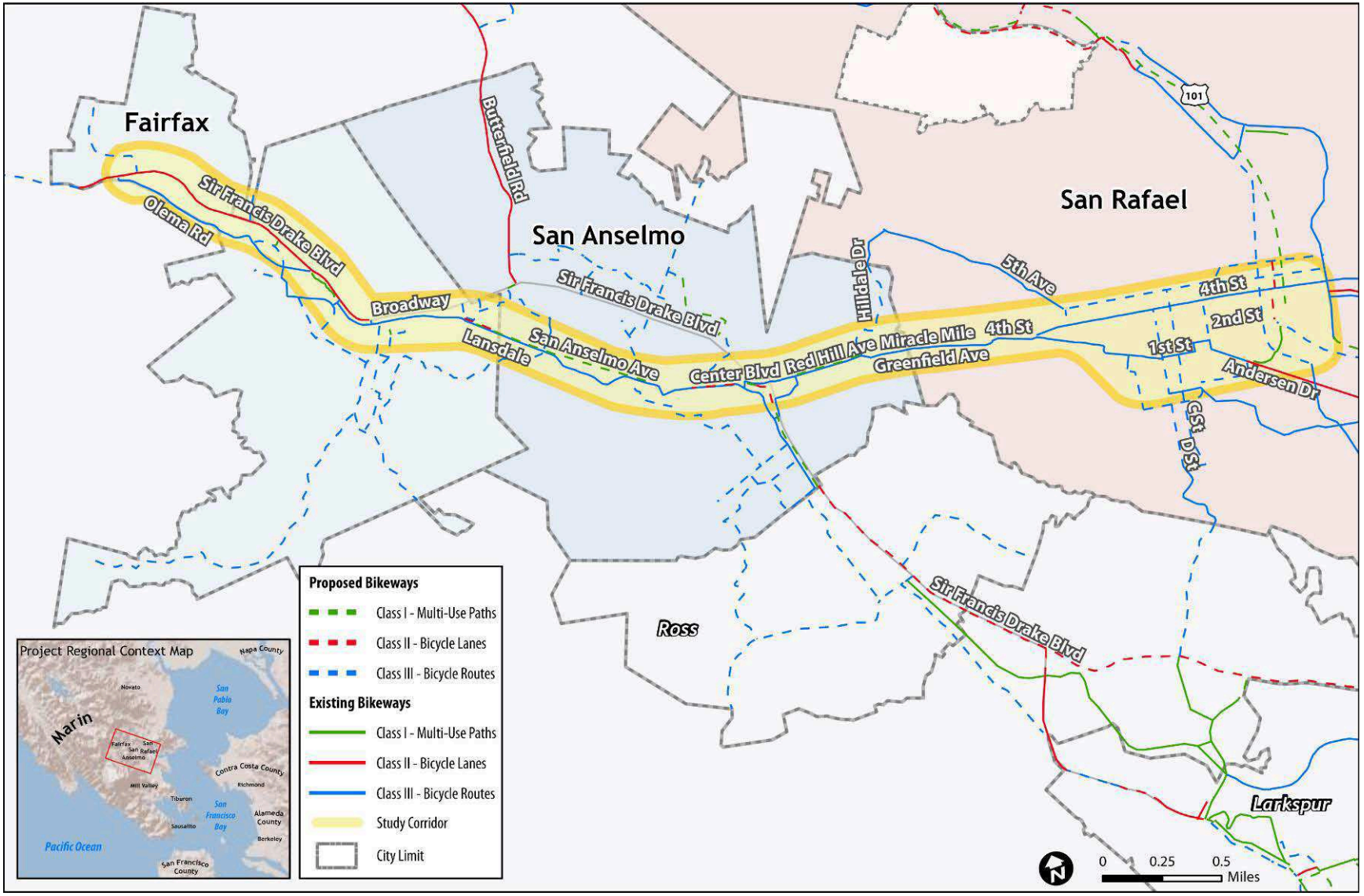


Figure 3-1: Fairfax to San Rafael Cross Marin Bikeway Streets

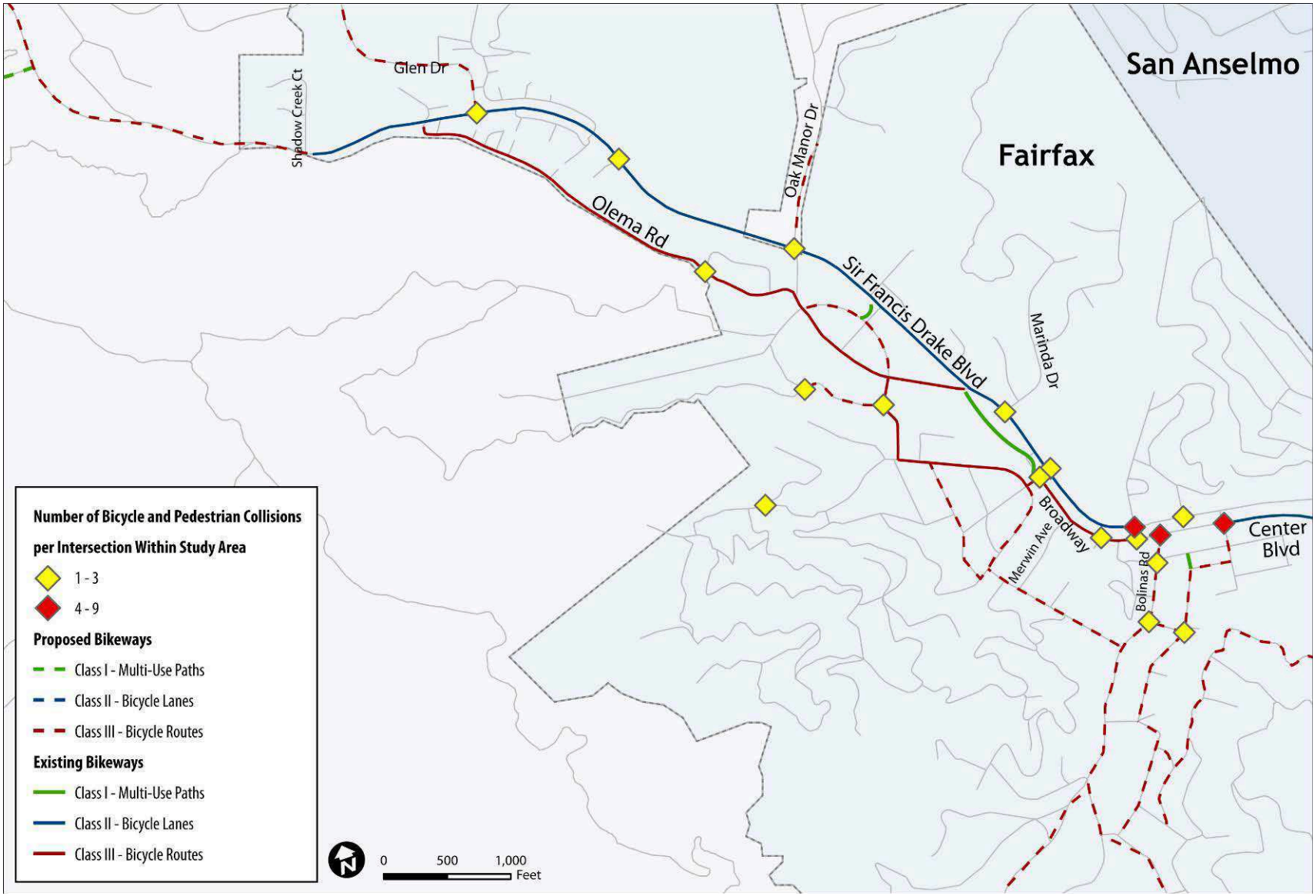


Figure 3-2: Fairfax to San Rafael Cross Marin Bikeway Collision History (Fairfax), 2002-2008

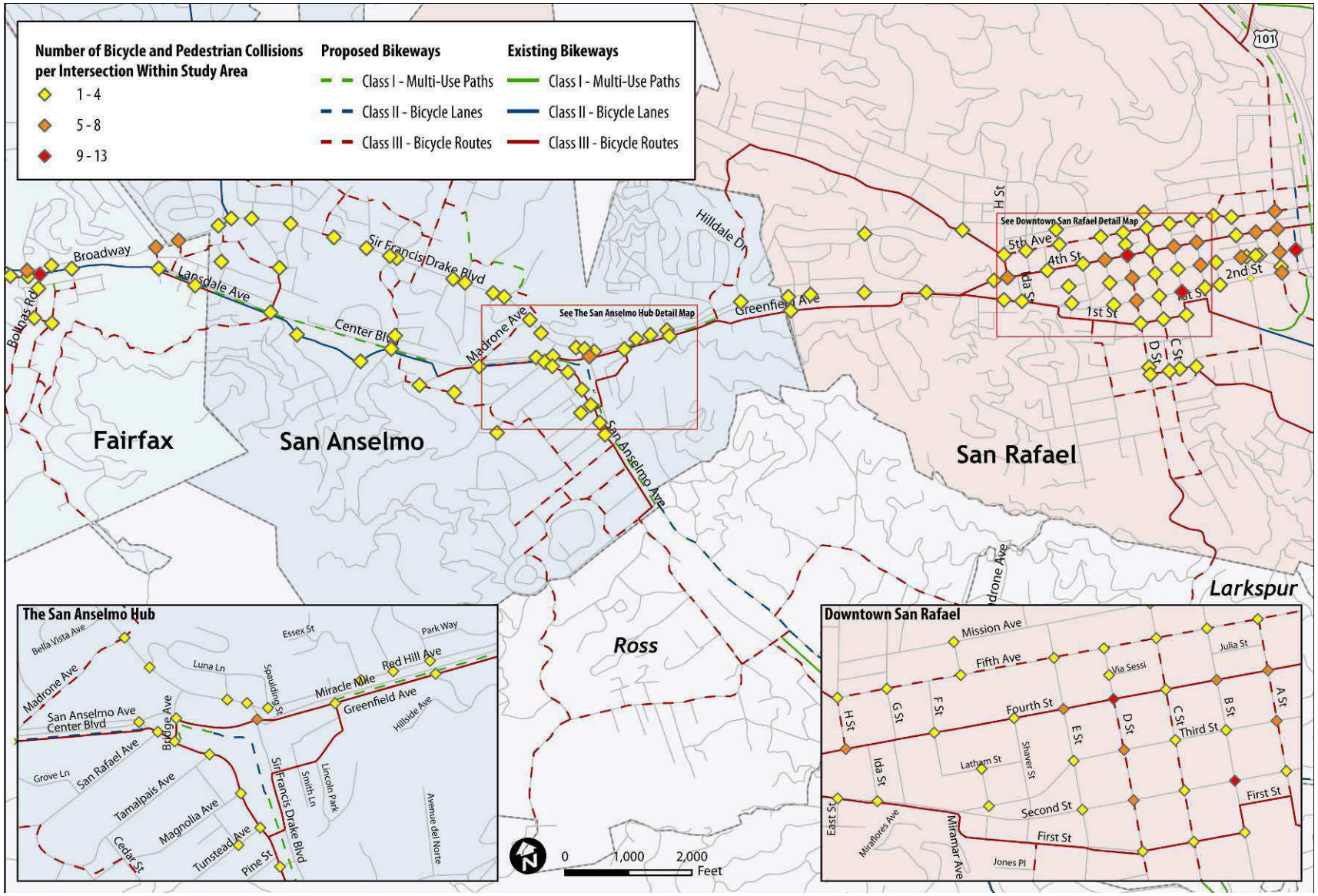


Figure 3-3: Fairfax to San Rafael Cross Marin Bikeway Collision History (San Anselmo/San Rafael), 2002-2008

3.2. Sir Francis Drake Boulevard

Right-of-Way Conditions

Sir Francis Drake Boulevard is a regionally significant arterial that provides primary east-west circulation for Marin County. The segment of Sir Francis Drake Boulevard that falls within the Fairfax to San Rafael Cross Marin Bikeway study corridor is from the San Anselmo Hub in the east to the Fairfax western town limit in the west.

Western boundary of the study area: Sir Francis Drake Blvd near eastern Olema Road intersection looking west.

The Sir Francis Drake Boulevard cross section varies significantly through the San Anselmo segment of the project study area from east to west. At the San Anselmo Hub Sir Francis Drake Boulevard there are three travel lanes with varying turn lane configurations, depending on direction of travel. Beginning immediately east of the Hub, Sir Francis Drake Boulevard is two lanes in each direction with varying median and center turn lane configurations. This pattern continues to the west with increasingly narrow right-of-way. At approximately the Town of San Anselmo and the Town of Fairfax boundary, Sir Francis Drake Boulevard is reduced to one lane in each direction.

There is limited on-street parking along Sir Francis Drake Boulevard, due to the constrained right-of-way and high traffic volumes. On-street parking does exist along isolated segments, including Downtown Fairfax where it directly serves adjacent local businesses.

Existing Bicycle Facilities

Existing bicycle facilities on Sir Francis Drake Boulevard include Class II bicycle lanes from west of the intersection with Claus Drive to the western Town of Fairfax limit. There are no bicycle lanes on Sir Francis Drake Boulevard between the San Anselmo Hub and Claus Drive.

Traffic Operations and Safety

Traffic volumes and traffic characteristics vary considerably from downtown Fairfax in the west to the San Anselmo Hub in the east. The posted speed limit for the majority of the corridor is 30 miles per hour, though the design speed is higher on some segments, and speed has been documented as a safety concern in the corridor in several traffic circulation studies in recent years. Generally, Sir Francis Drake Boulevard is highly congested at peak period throughout the corridor, operating and Level of Service C or less, carries significant daily traffic volumes, and provides narrow travels lanes between 10 and 11 feet wide. Collectively, this means that Sir Francis Drake Boulevard has little to no available right-of-way nor is there flexibility in the existing travel lane configuration. Relatively, recent and current Sir Francis Drake Boulevard traffic studies being led by the Town of San Anselmo are focused on identifying strategies for improving automobile traffic flow between the Hub and Butterfield Road.

Pedestrian and Transit Access

Golden Gate Transit bus lines 23 and 24 run on Sir Francis Drake Boulevard. Pedestrian infrastructure on Sir Francis Drake Boulevard varies considerably. Depending on the segment, there are sidewalks on one or both sides of the street. Pedestrian crossings are located only at existing traffic signal controlled intersections, either full stop signals at roadway intersections or pedestrian-actuated yellow beacons and midblock pedestrian crossing locations. Given the limited opportunity for bicycle facilities, there is no potential conflict between existing pedestrian and transit facilities and proposed bicycle improvements.

The following existing conditions cross sections illustrate the conditions along Sir Francis Drake Boulevard in Fairfax, where this roadway is frequently used by bicyclists and future accommodations are an important consideration for the Fairfax to San Rafael Cross Marin Bikeway.

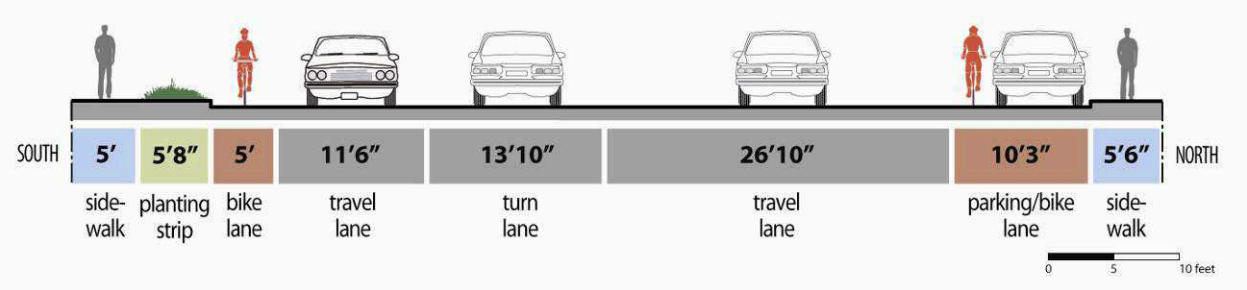


Figure 3-4: Sir Francis Drake Boulevard at Olema Road (West) (Fairfax)

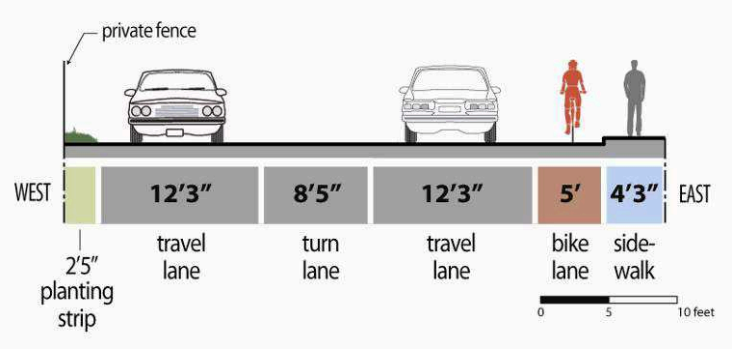


Figure 3-5: Sir Francis Drake Boulevard East of the Olema Road (East) Intersection (Fairfax)

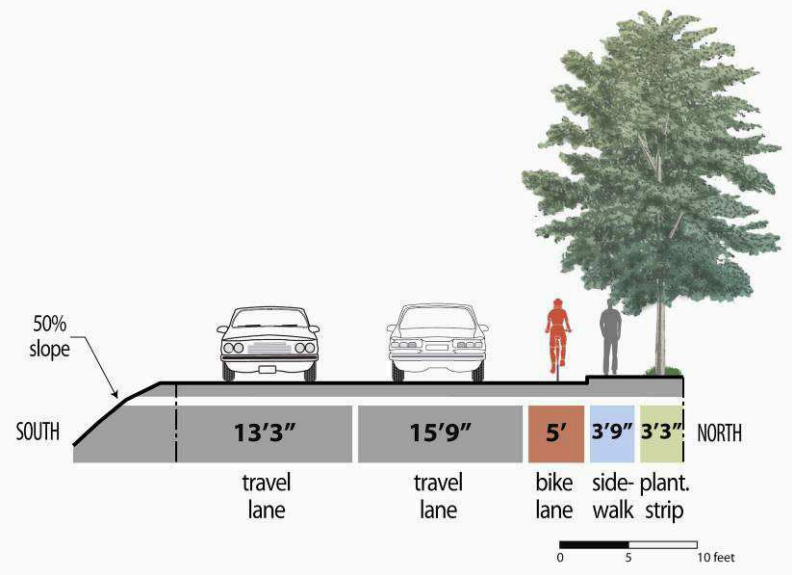


Figure 3-6: Sir Francis Drake Boulevard at Azalea Avenue (Fairfax)

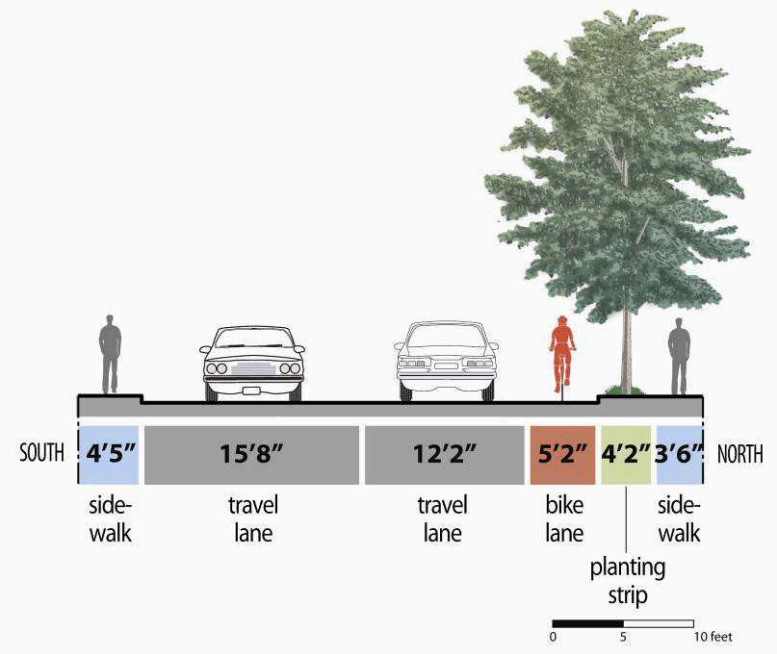


Figure 3-7: Sir Francis Drake Boulevard at Merwin Avenue (Fairfax)

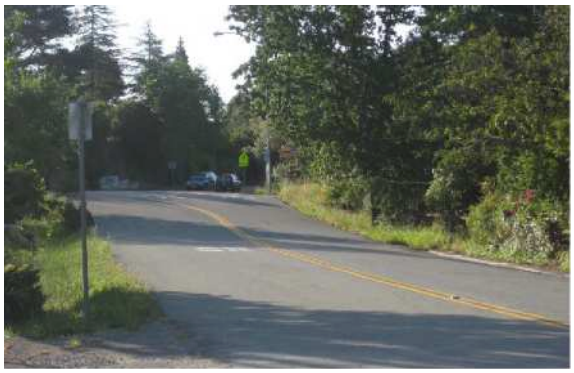
3.3. Olema Road

Right-of-Way Conditions

Olema Road is a local residential street that parallels Sir Francis Drake Boulevard through western Fairfax. Olema Road has a posted speed limit of 25 miles per hour and one travel lane in each direction with no centerline stripe. Intersection controls include stop signs at most intersections. There is on-street parking allowed on the gravel shoulders with low utilization.

Existing Bicycle Facilities

Olema Road is a designated Class III bicycle route, is well-used by students who bike to nearby schools, and is also used by high volumes of recreational bicyclists.



Olema Road facing east toward Sir Francis Drake Blvd.

Traffic Operations and Safety

Car travel on this street is generally limited to residents, local visitors and low-volumes of commercial vehicles. Traffic volumes on Olema Road are low given that Sir Francis Drake Boulevard runs parallel and is generally not congested west of downtown Fairfax.

While there are no documented traffic safety concerns along Olema Road, its two intersections with Sir Francis Drake Boulevard were identified as sites for potential improvements through the Fairfax to San Rafael Cross Marin Bikeway study. The western intersection of Olema Road and Sir Francis Drake Boulevard presents challenging sight lines for westbound bicyclists entering the flow of westbound auto traffic. Eastbound cars are not visible and bicyclists and motorists alike must encroach north on the travel lanes in order to gain adequate sight distance to enter the traffic stream. Likewise, at the eastern intersection of Olema Road and Sir Francis Drake Boulevard, motorists and bicyclists alike must navigate a complex oblique intersection with short sight distance from Olema Road west onto the oncoming eastbound travel lane and bicycle lane on Sir Francis Drake. The Class I multi-use pathway extending southeast from this intersection adds additional complexity. For bicyclists there is not a clearly defined path from the terminus of the Class I multi-use path west on Olema Road or west on Sir Francis Drake Boulevard.

Pedestrian and Transit Access

Pedestrian facilities include a discontinuous four-foot wide sidewalk, curb and gutter along the north side of the street. Sidewalks exist between the western intersection with Sir Francis Drake Boulevard and Charro Way, and between Westbrae Drive and Hawthorne Court.

Marin County Transit and Golden Gate Transit do not operate fixed-route bus service on Olema Road, however the western intersection with Sir Francis Drake Boulevard is used as a bus-turnaround.

3.4. Broadway Boulevard

Right-of-Way Conditions

Broadway Boulevard parallels Sir Francis Drake Boulevard through downtown Fairfax and provides local access to residential areas and downtown businesses. Broadway is a local street with a posted speed limit of 25 miles per hour, and has one travel lane in each direction with left and right turn lanes at key downtown intersections including Claus Way, Bolinas-Fairfax Road, and Pastori Lane. On-street parking on south side of the street includes some angled and some parallel.

The Parkade Area, located between Broadway Boulevard and Sir Francis Drake Boulevard provides two central parking lots located along the north side of Broadway. There is also on-street parallel parking on the north side of Broadway Boulevard at Claus Drive.

Broadway Boulevard at Claus Drive facing east.

Broadway is a narrow roadway, with lane widths of 11 to 12 feet, precluding construction of bike lanes or off-street bicycle facilities.

Existing Bicycle Facilities

West of Bank Street and east of Pastori Avenue Broadway is a designated Class III bicycle route. The roadway is well-used by a wide variety of bicyclists.

Traffic Operations and Safety

All intersections along Broadway are stop-controlled, with through traffic on Broadway stop-controlled at Azalea Avenue, Bank Street, Claus Drive, Bolinas Road, and Pacheco Avenue

Average daily traffic on Broadway varies, with volumes higher on the east end of the roadway and lower on the west end of the roadway. Estimates of ADT range from 13,300 vehicles per day at Broadway and Bolinas to 5,400 vehicles per day at Broadway and Bank Street.

Weekday and weekend peak period bicycle counts were conducted at Broadway Boulevard and Bolinas Road in 2007 and 2008. The counts recorded between 50 and 60 bicyclists per hour during the weekday afternoon peak period and an average of 102 bicyclists per hour during the weekend mid-day count. Bicyclist counts at this location are further discussed in Chapter Four: User Needs Analysis.

Between 2002 and 2008, there have been eleven pedestrian crashes and four bicycle crashes recorded along Broadway Boulevard. Crashes have occurred at the intersections of Bank Street, School Street, Pacheco Avenue and Bolinas Road. The majority of pedestrian collisions occurred at Broadway Boulevard and Bolinas Road.

Bicyclists traveling west on Broadway past Bank Street travel slowly uphill, and the lanes are not wide enough for motorists to pass easily. The intersection of Broadway Boulevard and Bank Street was noted as problematic, with westbound bicyclists having limited visibility.

Pedestrian and Transit Access

There is westbound Golden Gate Transit and Marin County Transit bus service on Broadway Boulevard, with a bus stop at Bolinas Road. Pedestrian facilities include a continuous sidewalk along the south side of the street and occasional sidewalk segments on the north side of the street in the downtown area

3.5. Center Boulevard

Right-of-way Conditions

Broadway Boulevard continues as Center Boulevard east of Pacheco Avenue. Center Boulevard runs from Pacheco Avenue in Fairfax to the Sir Francis Drake/Red Hill Avenue intersection in San Anselmo (the Hub). The roadway occupies the former railroad berm and is raised above the adjacent parallel neighborhood streets including Lansdale Street, Belmont Street, San Anselmo Avenue and Sycamore Street.

Center Boulevard is a two-lane collector with posted speeds of 25 mph to 35 mph. Because Center is elevated from the surrounding topography and has relatively limited controlled intersections it functions as a parallel commute route to Sir Francis Drake, indicated by the traffic volumes presented below. The street right-of-way is physically constrained by adjacent private improvements, drainage ways, and mature vegetation encroachment.

Center Blvd between Saunders Ave. and Madrone Ave.

Existing Bicycle Facilities

Class II bicycle lanes are striped on Center Boulevard from Pacheco Avenue to Pastori Avenue. There are no existing designated bicycle facilities on Center Boulevard east of Pastori Avenue.

Center Boulevard from Pastori Avenue to Downtown San Anselmo is identified as a proposed Class I Multi-Use Path in the San Anselmo Bicycle and Pedestrian Master Plan, 2008.

Traffic Operations and Safety

Average daily traffic volumes at the intersection of Broadway Boulevard/Center Boulevard/Pacheco Avenue just east of downtown Fairfax are estimated to be between 9,000 and 12,000 vehicles. No other traffic data was available for this roadway segment at the time this study was prepared.

Bicycle counts taken during the weekday morning peak hour in May 2009 recorded eight bicyclists at the intersection of Center Boulevard and Sir Francis Drake Boulevard.

Between 2002 and 2008, there were 6 reported pedestrian collisions and 8 reported bicyclist collisions along the approximately 1.25-mile Center Boulevard. Collisions were not concentrated at any one intersection.

Pedestrian and Transit Access

There is no bus service along Center Boulevard. Sidewalks exist on the north side of Center Boulevard between Pacheco Avenue and Pastori Avenue. East of Pastori Avenue, pedestrian facilities are limited to discontinuous concrete sidewalks dating from the historic railroad and trolley car boarding platforms.

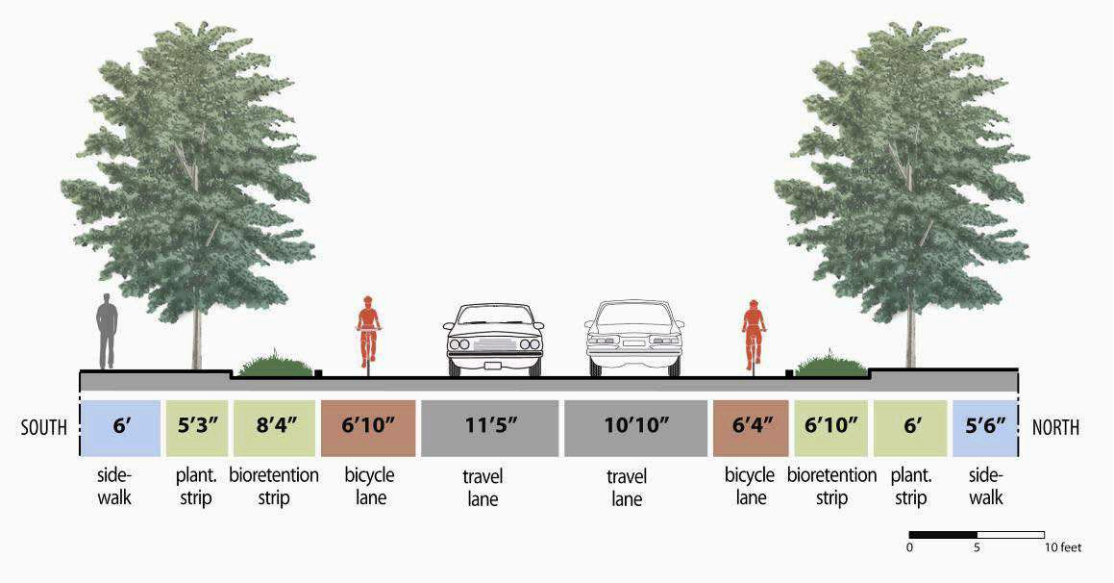


Figure 3-8: Center Boulevard (Pacheco Avenue to Pastori Avenue) (Fairfax)

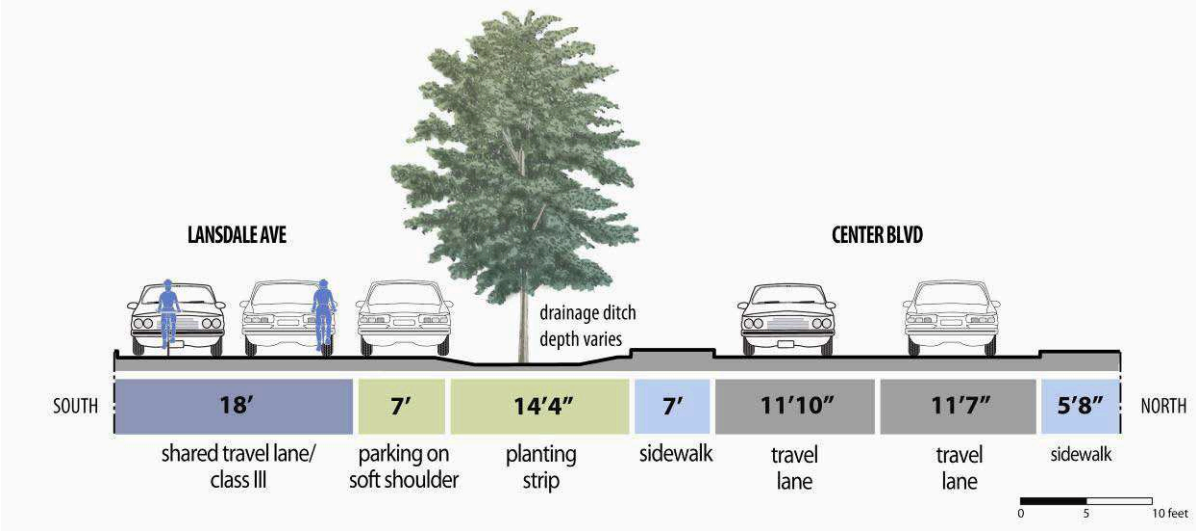


Figure 3-9: Center Boulevard (Pastori Avenue – Forrest Avenue)

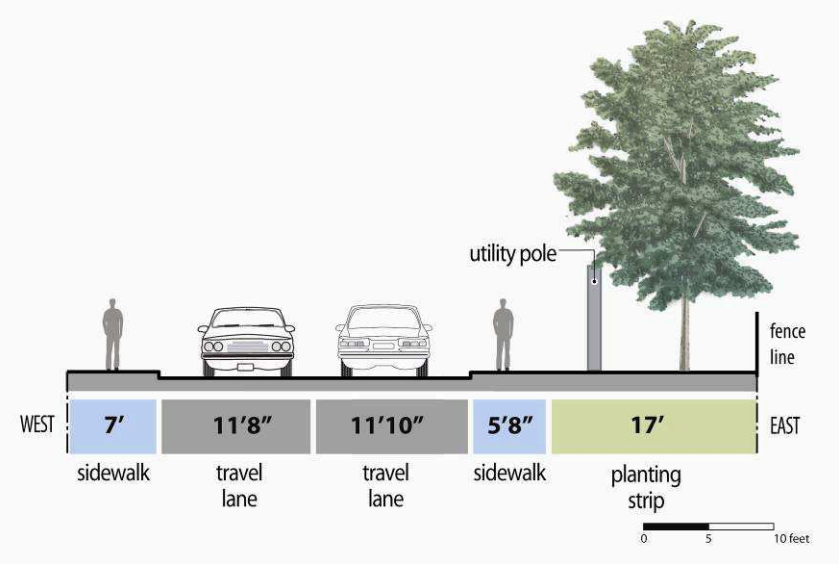


Figure 3-10: Center Boulevard (Forrest Avenue - Madrone Avenue)

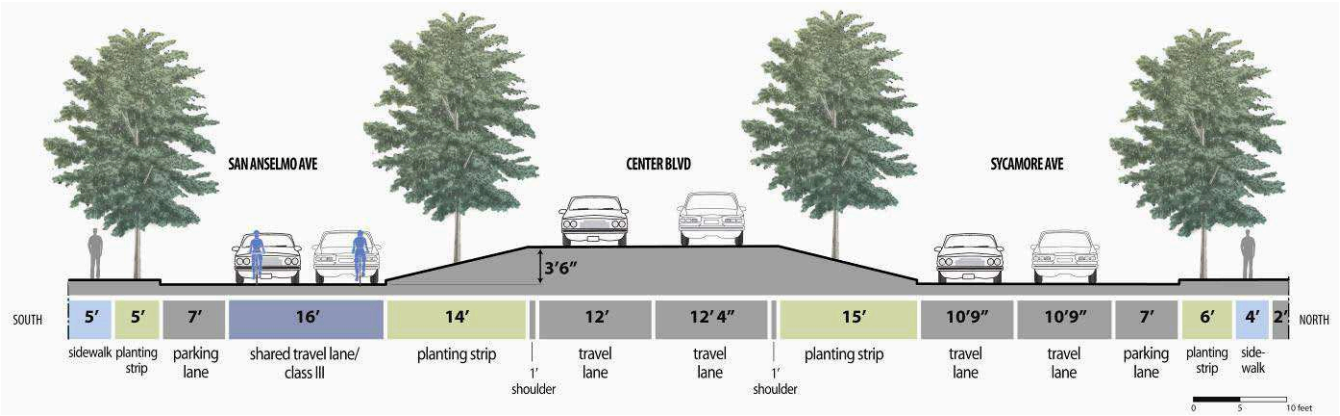


Figure 3-11: Typical Cross Section of Center Boulevard (Madrone Avenue – San Anselmo Avenue)

3.6. Lansdale Avenue

Right-of-Way Conditions

Lansdale Avenue is a narrow two-lane local street that runs just south of and parallel to Center Boulevard from Pastori Avenue to Forest Avenue and San Anselmo Avenue. There is no striped centerline, and there is no on-street parking, but vehicles park on the north shoulder. The south shoulder is fronted by single-family homes.

Lansdale Avenue Class III bike route facing east.

Existing Bicycle Facilities

Lansdale Avenue provides a low-speed alternative to Center Boulevard. This route is a designated Class III bicycle route and is signed as a part of the Marin County bicycle network. Pavement stencils stating "Bike Route" are painted on Lansdale Avenue for approximately 940 feet west of the Forrest Avenue/San Anselmo Avenue intersection.

Traffic Operations and Safety

There are no available motor vehicle counts or bicycle counts for Lansdale Avenue, however, field observation provides clear evidence that Lansdale Avenue carries high volumes of local commuter bicyclists and high volumes of weekday and weekend recreational road and mountain bicyclists.

Between 2002 and 2008, no recorded bicyclist or pedestrian collisions occurred on Lansdale Avenue. However, neighborhood residents have expressed concern about bicyclists failing to stop at stop signs and anecdotal evidence suggests that there are conflicts between group bicyclists and pedestrians.

All intersections along Lansdale Avenue are stop-controlled, which is intended to deter cut-through traffic from Center Boulevard during peak congestion periods.

Pedestrian and Transit Access

There is no transit service or sidewalks along Lansdale Avenue. Many local residents walk in the roadway creating peak period conflicts between regional bicyclists and pedestrians, as identified through public outreach.

3.7. San Anselmo Avenue

Right-of-Way Conditions

Lansdale Avenue continues as San Anselmo Avenue east of the Forest Avenue/San Anselmo Avenue intersection. The segment of San Anselmo Avenue that falls within the Fairfax to San Rafael Cross Marin Bikeway corridor lies between Lansdale Avenue and the Hub in downtown San Anselmo. San Anselmo Avenue roughly parallels Center Boulevard.

Just east of Forest Avenue, the street is constrained by retaining walls to the south.

San Anselmo Avenue is fronted by a mix of single-family and multi-family homes. Where the street is directly adjacent to Center Boulevard, it is separated from Center by a landscaped median, and is slightly lower than Center Boulevard. Parallel parking is provided on the south side of the street when it runs adjacent to Center Boulevard, and provided on both sides of the street when does not directly parallel Center Boulevard.

Figure 3-3 illustrates the sections of San Anselmo Avenue that run parallel to Center Boulevard.

Existing Bicycle Facilities

San Anselmo Avenue is a designated Class III bicycle route and is signed. Bike route stencils are marked on the road east of Madrone Avenue and west of Center Boulevard.

Traffic Operations and Safety

Traffic on San Anselmo Avenue is stop-controlled at Forest Avenue, Scenic Avenue, Hazel Avenue, Redwood Road, Madrone Avenue and Center Boulevard. Scenic Avenue and Hazel Avenue are right-angle four-way intersections, but at the other intersections, San Anselmo Avenue is configured as a frontage road to Center Boulevard and the two roads are immediately adjacent.

The Town of San Anselmo does not possess readily available traffic data for San Anselmo Avenue.

Bicycle counts were taken in 2007 and 2008 at the intersection of San Anselmo Avenue and Tunstead Avenue, just south of the Hub. Weekend mid-day peak counts recorded an average of 58 bicyclists per hour and weekday afternoon peak counts recorded an average of 35 bicyclists per hour.

Between 2002 and 2008, there were four recorded pedestrian collisions along San Anselmo Avenue and thirteen recorded bicycle collisions. All of the pedestrian collisions and the majority of bicycle collisions occurred in the approximately 1,250-foot section of San Anselmo Avenue between Center Boulevard and Woodland Avenue, just south of the Hub.

Pedestrian and Transit Access

Where San Anselmo Avenue parallels Center Boulevard, concrete sidewalks, curb and gutter are provided only on the south side of the road. Where San Anselmo Avenue does not parallel Center Boulevard, narrow concrete sidewalks, curb and gutter are provided along both sides of San Anselmo Avenue. In most locations, sidewalks are buffered from the roadway with planter strips and parallel parking.

3.8. The Hub

Right-of-Way Conditions

The San Anselmo Hub consists is the intersection of Sir Francis Drake Boulevard, Center Boulevard, and Red Hill Avenue, and the associated minor streets. Bicycle access through this complicated intersection is difficult, and a Class III bicycle route has been established that bypasses the major intersection to the south. The bicycle route includes San Anselmo Avenue, Bank Street, Sir Francis Drake Boulevard and Lincoln Park. Right-of-way conditions are described below for each roadway, listed as a bicyclist would travel from west to east, presented in Figure 3-9. The basic characteristics of each of the major streets is presented below.

Center Blvd/Sir Francis Drake Blvd intersection facing east.

San Anselmo Avenue is a two-lane road with a posted speed limit of 25 miles per hour that runs through downtown San Anselmo. The road is fronted by businesses, and parallel and diagonal parking are provided on both sides of the street.

Tunstead Avenue is a one-block five-lane connector street that provides access from Sir Francis Drake Boulevard to San Anselmo Avenue. It is fronted by businesses, and does not have parallel parking.

Sir Francis Drake Boulevard is a four-lane arterial with a center median. Accessory turn lanes are provided at the north and south Bank Street intersections. Parallel parking is provided along this segment of the roadway. The roadway is fronted by businesses.

Bank Street intersects with Sir Francis Drake Boulevard one block north of the Tunstead Avenue intersection. The first block of this roadway is commercial, with parallel and diagonal on-street parking provided.

Bank Street continues as Lincoln Park, a two-lane residential roadway with posted speeds of 25 miles per hour (mph) and on-street parallel parking.

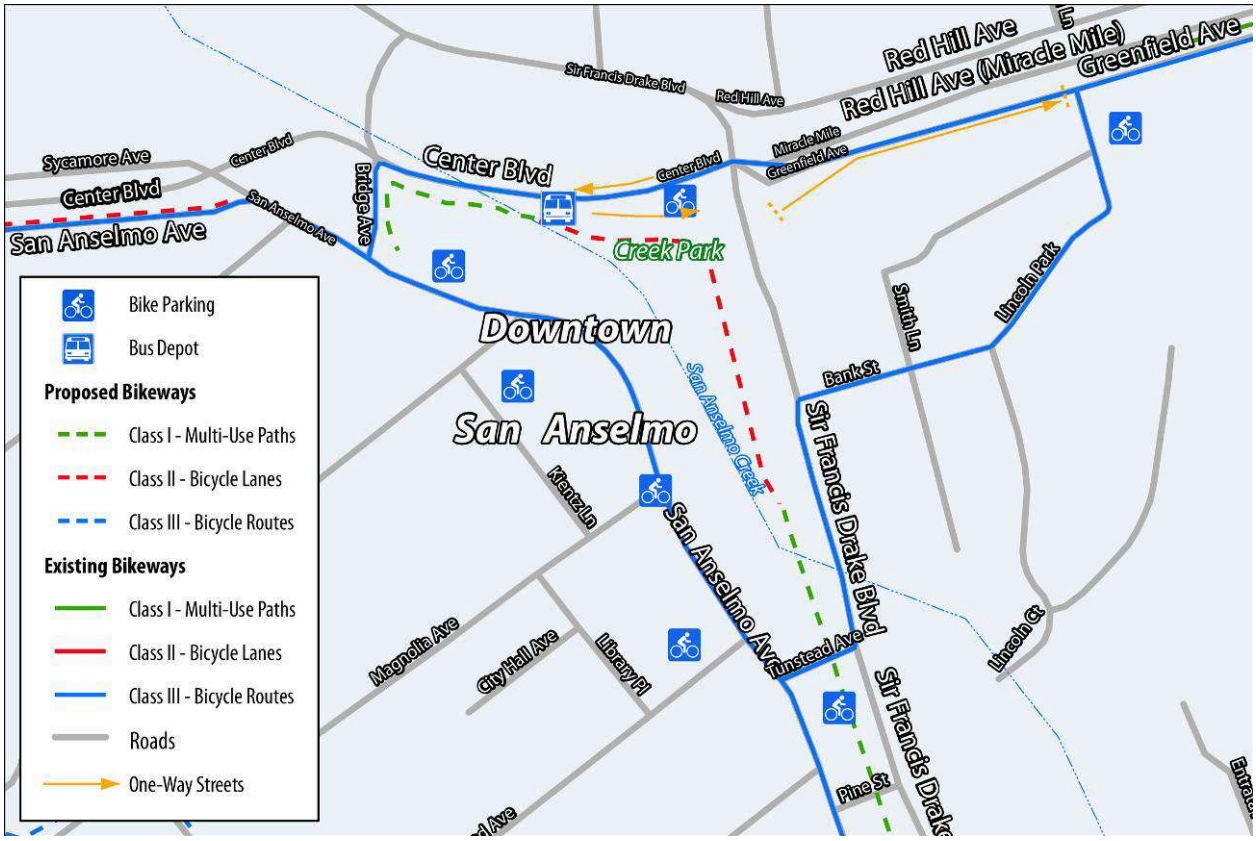


Figure 3-12: The Hub Street Layout

Existing Bicycle Facilities

This route is a designated Class III bicycle route, and is well-used by commuter and recreational bicyclists. The signed route provides a clear bikeway connection between San Anselmo Avenue to the

west and Greenfield Avenue to the east. Signals with Sir Francis Drake Boulevard have in-pavement loop detectors that can be actuated by bicyclists.

Traffic Operations and Safety

Based on turning movement counts taken during the peak period at the Hub, it is estimated that approximately 4,000 vehicles per day turn right from northbound Sir Francis Drake Boulevard to eastbound Red Hill Avenue and approximately 2,100 eastbound vehicles per day turn from Center Boulevard onto southbound Sir Francis Drake Boulevard.

In 2009, during the weekday morning between 9 AM and 11 AM, an average of 28 bicyclists per hour were counted on Greenfield Avenue just east of the intersection with Sir Francis Drake Boulevard. During the weekday morning from 7 AM to 9 AM, an average of 4 bicyclists per hour were counted on Center Boulevard just west of Sir Francis Drake Boulevard.

Between 2002 and 2008, four pedestrian collisions and twelve bicyclist collisions were recorded along the Hub bypass bicycle route. As noted in the previous section, most of these collisions occurred on San Anselmo Avenue between Center Boulevard and Pine Street. In addition to these collisions on the bike route, an additional five pedestrian collisions and four bicyclist collisions occurred on other streets within the Hub.

Lincoln Park, which is a narrow, winding residential roadway, has limited sight lines for bicyclists and motorists.

Pedestrian and Transit Access

Bus service is provided along Sir Francis Drake Boulevard and Red Hill Avenue. Seven local routes serve the Hub resulting in substantial peak commute period bus traffic on Center Boulevard at the San Anselmo bus depot. Center Boulevard between Bridge Avenue and Sir Francis Drake Boulevard is dedicated to the transit stop and layover on the south side of the street.

There are sidewalks on both sides of the route. San Anselmo Avenue has curb extensions and in-street planters.

3.9. Red Hill Avenue/Miracle Mile

Right-of-Way Conditions

Red Hill Avenue provides the primary route for all east-west automobile and transit in this part of Marin County. Red Hill Avenue is a four-lane arterial street with a center median and posted speed limits of 35 miles per hour. The road occupies the former railroad bed, and is raised above the adjacent parallel streets.

There are numerous constraints to constructing bicycle facilities along Red Hill Avenue. Mature trees occupy the center median, and between Hilldale Drive and Ross Valley Drive existing buildings occupied by commercial businesses occupy the center median. The eastbound travel lanes are several feet lower than the westbound travel lanes. The road is paralleled by Greenfield Avenue to the south.

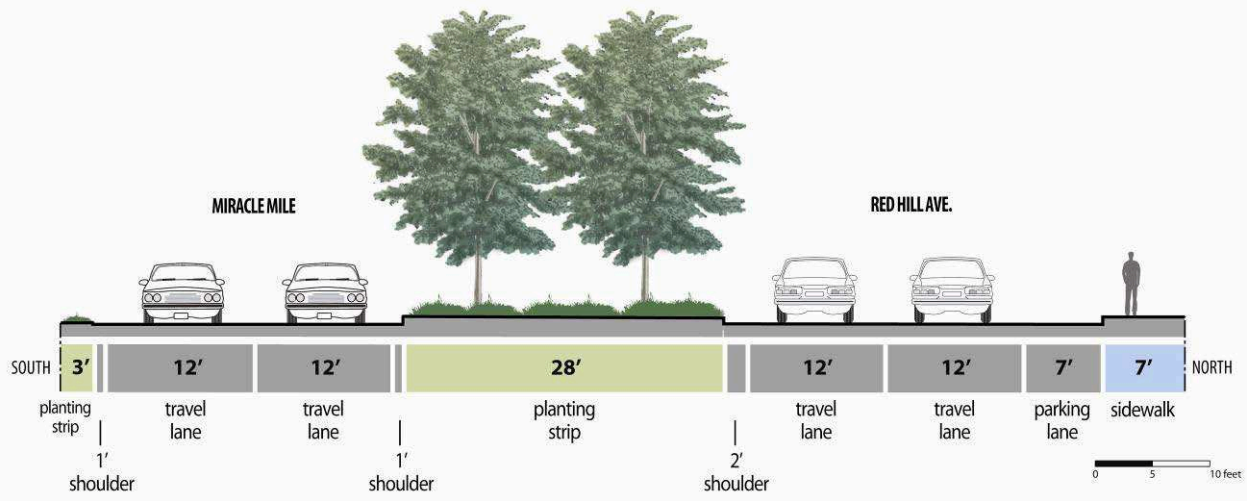


Figure 3-13: Red Hill Avenue/Miracle Mile between Essex Avenue and Spring Grove Avenue

Traffic Operations and Safety

Based on turning movement traffic counts conducted in 2009 it is estimated that a daily average of nearly 4,000 motor vehicles turn from Sir Francis Drake Boulevard onto Red Hill Avenue. Although no bicycle counts are available, field review suggests that this segment carries very limited existing bicycle travel due to the high traffic speeds and narrow travel lane widths.

Between 2002 and 2008, there were two recorded pedestrian collisions and three recorded bicyclist collisions along Red Hill Avenue. Both pedestrian collisions occurred at the intersection of Forbes Avenue. The bicyclist collisions occurred at the intersections with Buena Vista Avenue, Essex Avenue and Sir Francis Drake Boulevard.

Red Hill Avenue is traffic signal controlled at Hilldale Avenue, Ross Valley Drive, and Greenfield Avenue.

Pedestrian and Transit Access

There is a continuous sidewalk provided along the north side of Red Hill Avenue. Four Golden Gate Transit bus routes serve Red Hill Avenue, all on 30 minute peak headways.

Existing Bicycle Facilities

There are no existing bicycle facilities along Red Hill Avenue. This route has been identified as a proposed Class I Multi-Use Path in the San Anselmo Bicycle and Pedestrian Master Plan, 2008.

3.10. Greenfield Avenue

Right-of-Way Conditions

Greenfield Avenue is a two-lane local street with a posted speed limit of 25 miles per hour. From Sir Francis Drake Boulevard to Lincoln Park, Greenfield Avenue is one way eastbound. Between Sir Francis Drake Boulevard and Hilldale Avenue, Greenfield Avenue is directly adjacent to Red Hill Avenue and serves as a frontage road for the businesses along the south side. This section of Greenfield Avenue has on-street parking along both sides of the street. Parking is angled on the north side of the street between Spring Grove Avenue and Hilldale Drive. Potential bicycle improvements to this section of Greenfield Avenue are constrained by Red Hill Avenue to the north, the existing parking demand and utilization, and right-of-way.

One-way eastbound block of Greenfield Avenue just east of Sir Francis Drake Boulevard

East of Hilldale Drive, Greenfield Avenue narrows and enters a residential neighborhood. Parallel parking is provided on both sides of this section of Greenfield Avenue. Potential bicycle facilities are constrained by the narrow right-of-way here.

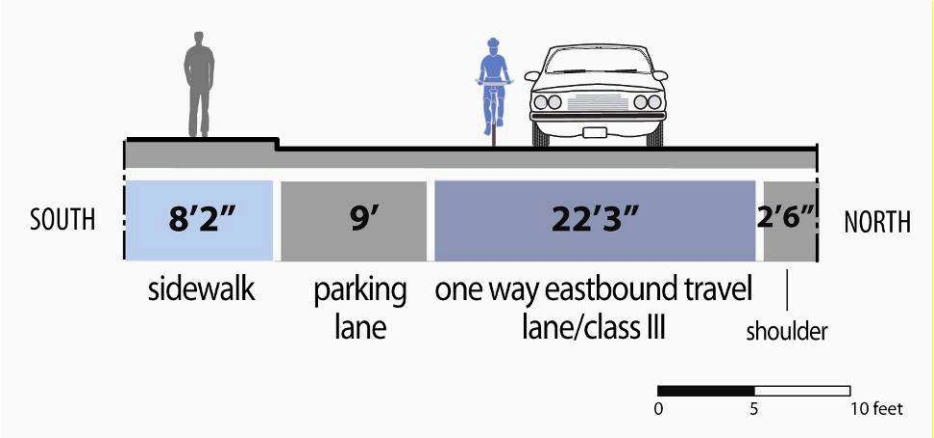


Figure 3-14: Greenfield Avenue (Sir Francis Drake Boulevard to Lincoln Park)

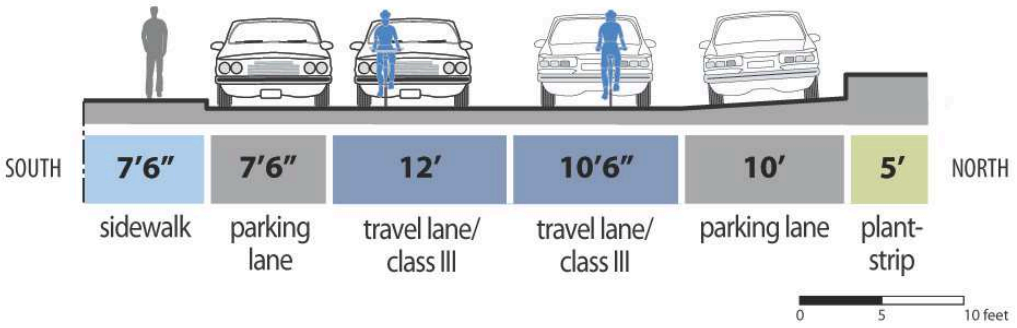


Figure 3-15: Greenfield Avenue (Lincoln Park to Spring Grove Avenue)

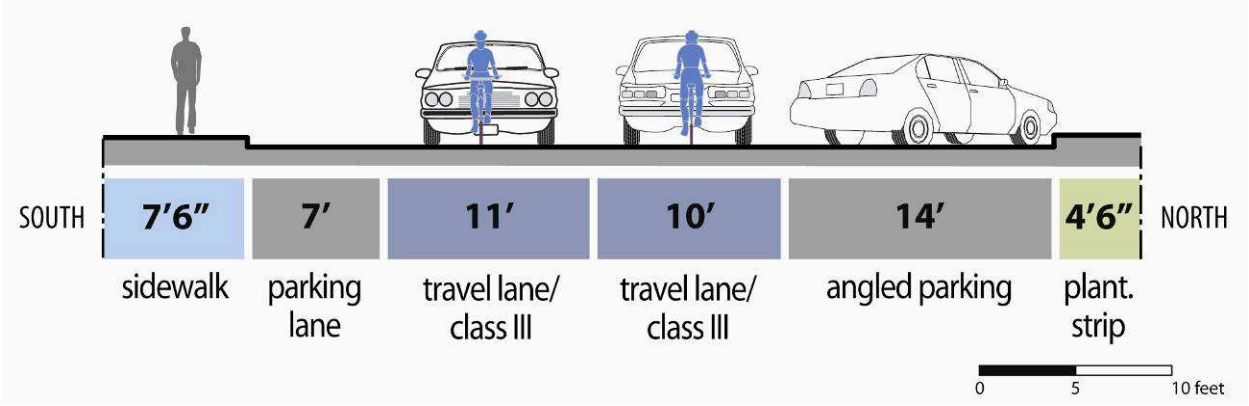


Figure 3-16: Greenfield Avenue (Spring Grove Avenue to Hilldale Drive)

Traffic Operations and Safety

Between 2002 and 2008 there were four recorded bicycle collisions, and no recorded pedestrian collisions. Collisions occurred at Ross Valley Drive, Lincoln Park and Spring Valley Drive.

Counts conducted in 2009 between 9 AM and 11 AM recorded an average of 17 bicyclists per hour traveling on Greenfield Avenue.

The intersections with neighborhood streets are stop sign controlled.

Pedestrian and Transit Access

In the commercial district, a continuous sidewalk is provided along the south side of the street. There are no pedestrian facilities on the north side of the street.

In the residential neighborhood, sidewalks are provided along both sides of the street.

Existing Bicycle Facilities

Greenfield Avenue is a designated Class III bicycle route.

3.11. Second Street

Right-of-Way Conditions

Red Hill Avenue connects to Fourth Street and Second Street in San Rafael. Second Street is a regional arterial that provides the primary route for all east-west motor vehicle traffic in this area of Marin County and feeds Highway 101 in San Rafael. The road is a four-lane arterial with a posted speed limit of 35 miles per hour. Much of the corridor has a landscaped median and center turn lanes, and the remainder a narrow concrete median. The north side of the street is occupied by commercial buildings while the south side of the street is residential. There is on-street parking and sidewalks on both sides of the street. The sections below illustrate the traffic lane configuration and physical conditions along this segment.

Second Street at Miramar Avenue facing west.

Traffic Operations and Safety

Between 2002 and 2008, there was one recorded pedestrian collision, at East Street, and no recorded bicyclist collisions.

Counts conducted in 2009 during the weekday morning peak period (7 AM to 9 AM) recorded an average of 15 bicyclists per hour on traveling on Second Street between Marquard Avenue and West Street. The same survey recorded an hourly average of 15 motorists turning right or left from Marquard Avenue onto Second Street/West End Avenue.

When eastbound bicyclists arrive at the Second Street and Fourth Street intersection from West End Avenue they must either navigate the four-leg pedestrian crossing to reach the Class III bicycle route on Fourth Street leading to Downtown San Rafael or ride eastbound on Second Street for several blocks to reach Miramar Avenue. Many bicyclists ride on the narrow sidewalk on the south side of Second Street, seeking refuge from the high-speed eastbound regional car traffic. This pattern creates frequent pedestrian and bicycle conflicts on the sidewalks. Westbound bicyclists using the South San Rafael Class III network along First Street, also use the southside sidewalk on Second Street to make the connection to West End Avenue. Other than routing bicyclists through the Downtown, a substantial detour, this is the only potential alignment for the Fairfax to San Rafael Cross Marin Bikeway connection to Andersen Drive and the CalPark Hill Tunnel.

Pedestrian and Transit Access

As described above, a sidewalk exists on the south side of Second Street. It varies in width from approximately five feet to less than four feet in width and is barrier separated from the adjacent travel lane at its narrowest point.

Marin County Transit lines 22 and 23 run on Second Street providing a direct connection to the San Rafael Transit Center.

Existing Bicycle Facilities

This route is a designated Class III bicycle route and is used primarily by commuter bicyclists who are frequently connecting to the bicycle lanes on Andersen Drive.

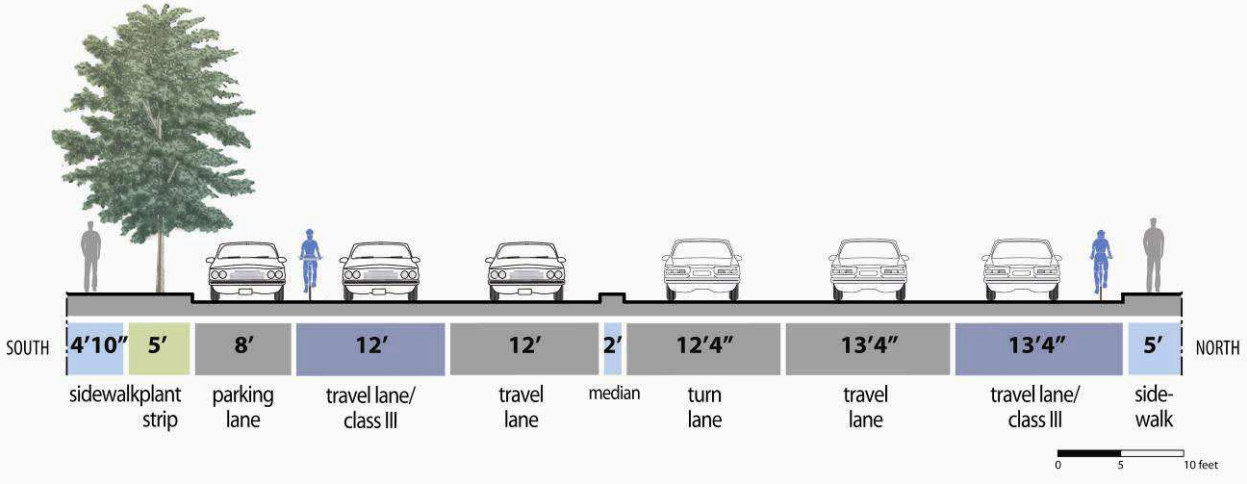


Figure 3-17: Second Street (West Street to East Street)

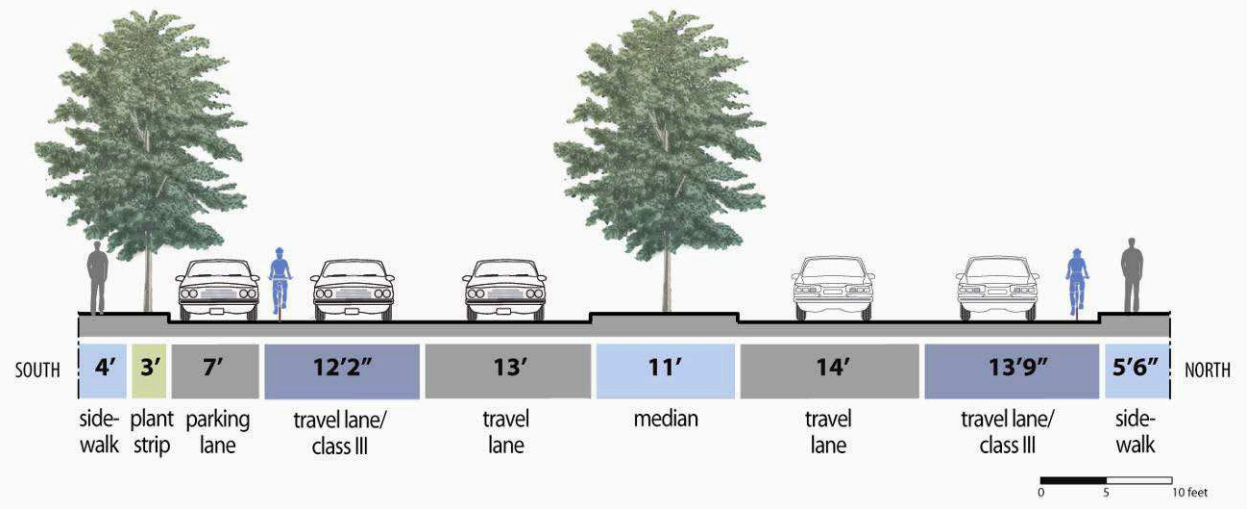


Figure 3-18: Second Street (East Street to Ida Street)

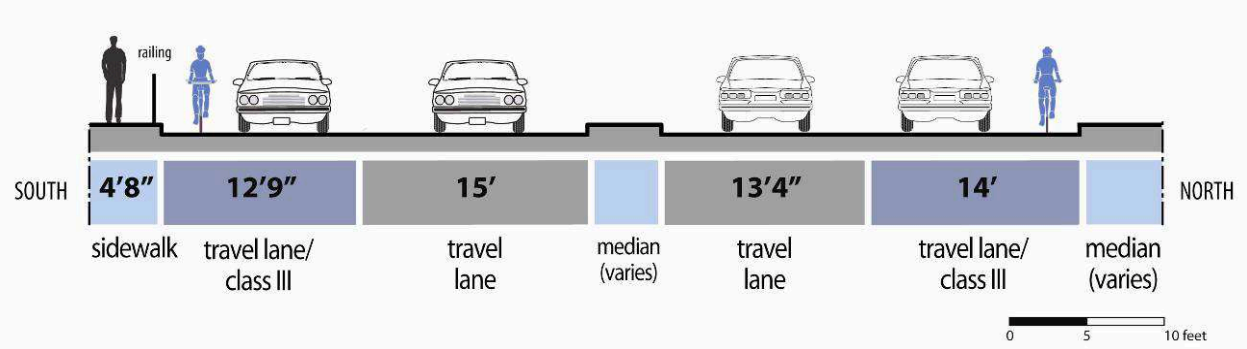


Figure 3-19: Second Street (Approximately 25' East of Ida Street Intersection)

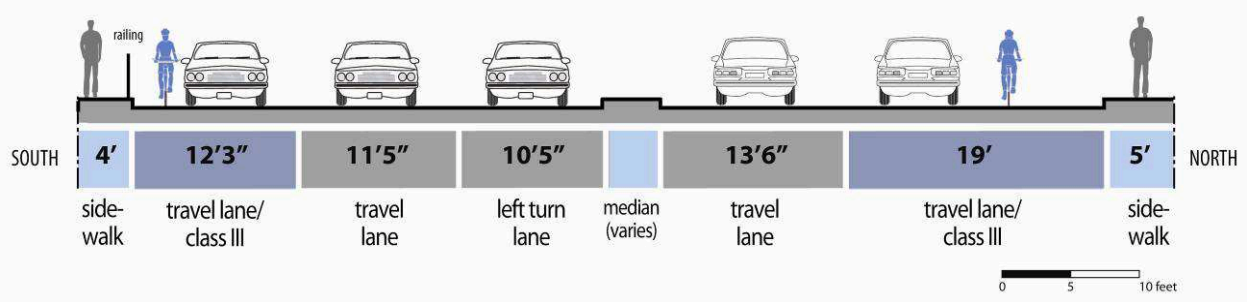


Figure 3-20: Second Street (Approximately 25' West of G Street Intersection)

3.12. First Street

Right-of-Way Conditions

First Street is a local, mostly two-lane street that roughly parallels Second Street from Miraflores Avenue to A Street. The roadway serves a mix of residential and commercial land uses. It has a posted speed limit of 25 miles per hour. On-street parking and sidewalks exist on both sides of the street.

Residences that front on the south side of First Street between D Street and E Street have driveways and garages. The north side of this block of First Street is occupied by San Rafael Creek.

Traffic Operations and Safety

In 2006 and 2007, traffic counts were conducted along First Street at B Street, C Street, D Street and E Street. Based on these intersection counts, average daily traffic is estimated between 1,500 and 6,900.

For one block, from E to D Street, First Street is one-way westbound. First Street intersects B Street at an offset intersection.

Pedestrian and Transit Access

The one-way block between E Street and D Street does not have any pedestrian facilities. The rest of the corridor has sidewalks on both sides.

There is no fixed-route bus transit service on this street.

Existing Bicycle Facilities

This street is a designated Class III bicycle route and is used primarily by commuter bicyclists who are frequently connecting to the bike lanes on Andersen Drive.

4. User Needs Analysis

This chapter presents estimates for future bicycle activity along the Fairfax to San Rafael Cross Marin Bikeway with implementation of the recommended improvements. The methodology used to develop this forecast is described in this chapter and is based on existing data for the corridor, including US Census Data, local bicycle counts, and findings from the National Bicycle Documentation Project (NBDP)[1]. This chapter also provides an explanation of existing bicycle user groups along the corridor and highlights user needs identified through public outreach.

4.1. Bicyclist Preference

Bicyclists' needs and preferences vary based on skill level and the type of trip. For example, people who bicycle for recreational purposes may prefer scenic, winding, off-street trails, while people who bicycle to work or bicycle for errands may prefer more direct on-street bicycle facilities. This feasibility study takes into consideration these differences in order to design a system that serves all user types. The following sections describe the different types of bicyclists, their respective reasons for bicycling, and their different needs.

Commuter bicyclist on the Center Boulevard bicycle lane in Fairfax.

In many Dutch, Danish, and German cities, a set of standard measures are implemented to promote bicycling across skill levels and trip types. Those pertinent to the Fairfax to San Rafael Cross Marin Bikeway project are listed below.

Measures Used to Promote Bicycling in the Netherlands, Denmark, and Germany[2]
Extensive systems of separate cycling facilities ▪ Well maintained, fully integrated paths and lanes ▪ Connected off-street short-cuts, such as mid-block connections, and passages through dead ends for cars
Intersection modifications and priority traffic signals ▪ Advance green lights for cyclists ▪ Advanced cyclist waiting positions (ahead of cars) fed by special bike lanes facilitate safer and quicker crossings and turns
Traffic calming ▪ Traffic calming of residential neighborhoods via speed limit (30km/h) and physical infrastructure deterrents for cars

[1] The NBPD is a nationwide effort by Alta Planning + Design and the Institute of Transportation Engineers (ITE) to provide a consistent model for data collection for use by planners, governmental agencies, and bicycle and pedestrian professionals. The web site address is: http://bikepeddocumentation.org/

[2] Derived from the study conducted by John Pucher and Ralph Buelher, *At the Frontiers of Cycling: Policy Innovations in the Netherlands, Denmark, and Germany*, published in the World Transport Policy and Practice, volume 13, number 3.

Bicyclist Skill Level

Bicyclists can be separated into two skill levels: casual and experienced. Casual bicyclists include youth and adults who are occasional riders. Some casual bicyclists, such as youth under the driving age, may be unfamiliar with operating a vehicle on roads and the related laws. Experienced bicyclists include commuters, long-distance road bicyclists, racers, and those who bicycle as a primary means of transportation. A comparison of the characteristics for different types of bicyclists is provided in Table 4-1.

Table 4-1: Characteristics of Casual and Experienced Bicyclists

Casual Bicyclists	Experienced Bicyclists
Prefer off-street bike paths or bike lanes along low-volume, low-speed streets.	Prefer on-street or bicycle-only facilities to multi-use paths.
May have difficulty gauging traffic, may be unfamiliar with the rules of the road, and may choose to walk bike across intersections.	Comfortable riding with vehicles on streets. Negotiates streets like a motor vehicle, including "taking the lane" and using left-turn pockets.
May use less a direct route to avoid arterials with heavy traffic volumes.	May prefer a more direct route.
May ride on sidewalks and ride the wrong way on streets and sidewalks.	Avoids riding on sidewalks or on multi-use paths. Rides with the flow of traffic on streets.
May ride at speeds comparable to walking, or slightly faster than walking.	Rides at speeds up to 20 mph on flat ground, up to 40 mph on steep descents.
Prefers riding shorter distances: up to 2 miles.	May ride longer distances, sometimes more than 100 miles.

The casual bicyclist benefits from bicycle facilities that include separation from motor vehicles, route markers, multi-use paths, bicycle lanes on low-volume streets, traffic calming, and educational programs. Casual bicyclists may also benefit from a connected network of marked routes that lead to parks, schools, shopping areas, and other destinations. To encourage youth to ride, routes must be considered safe enough for their parents to allow them to ride.

The experienced bicyclist benefits from a connected network of bicycle lanes on high-volume arterial roadways, wider curb lanes, and loop detectors at signals. The experienced bicyclist who is primarily interested in exercise benefits from loop routes that lead back to the point of origin.

Characteristics of Recreational and Utilitarian Bicyclists

In addition to being separated based on experience level, bicyclists can be separated into two types based on trip purpose: recreational and utilitarian. Recreational bicyclists can take trips ranging from 50-mile weekend group rides to a family outing, and all levels in between. Utilitarian bicyclists include those commuting to work, which are a primary focus of state and federal bicycle funding, and bicyclists going to school, shopping, or running other errands.

Table 4-2: Characteristics of Recreational and Utilitarian Bicyclists

Recreational Bicyclists	Utilitarian Bicyclists
Directness of route not as important as visual interest, shade, protection from wind.	Directness of route and connected, continuous facilities more important than visual interest, etc…
Loop trips may be preferred to backtracking.	Generally travel from residential to shopping or work areas and back.
Trips may range from under a mile to over 50 miles.	Trips generally are 1-5 miles in length.
Short-term bicycle parking should be provided at recreational sites, parks, trailheads and other recreational activity centers.	Short-term and long-term bicycle parking should be provided at stores, transit stations, schools, and workplaces.
Varied topography may be desired, depending on the skill level of the bicyclist.	Flat topography is desired.
May be riding in a group.	Often ride alone.
May drive with their bicycles to the starting point of a ride.	Use bicycle as primary transportation mode for the trip; may transfer to public transportation; may or may not have access to a car for the trip.
Trips typically occur on the weekend or on weekdays before morning commute hours or after evening commute hours.	Trips typically occur during morning and evening commute hours (commute to school and work). Shopping trips also occur on weekends.
Type of facility varies, depending on the skill level of bicyclist.	Generally use on-street facilities, may use pathways if they provide easier access to destinations than on-street facilities.

The needs of recreational bicyclists vary depending on the bicyclists' skill level. Road bicyclists out for a 100-mile weekend ride may prefer well-maintained roads with wide shoulders and few intersections, and few stop signs or stop lights. Casual bicyclists out for a family trip may prefer a quiet path with adjacent parks, benches, and water fountains.

Utilitarian bicyclists needs include: direct, continuous, and connected commute routes, protected intersection crossing locations, secure places to store bicycles at destinations, and bicycle facilities on arterial roadways.

4.2. Demand Analysis

One goal of the Fairfax-San Rafael Bicycle Connector Feasibility Study is maximizing the number of recreational and commuter bicyclists who will benefit from the corridor improvements. The number and diversity of bicyclists attracted to the corridor will vary depending on the level of improvements. Therefore, this analysis compares existing bicycle activity in the corridor with estimates of bicycle activity for the short-term as well as for the medium-term improvements.

To estimate the number of existing bicyclists using the Fairfax-San Rafael corridor and to forecast the short and medium-term usage, the project team used existing counts from the 1999 Marin County Bicycle Plan, the 2007 Non-Motorized Transportation Pilot Program (NTPP), and the 2008 Transportation Authority of Marin bicycle count program. The counts were conducted during peak usage hours, and were recorded in accordance with the National Bicycle and Pedestrian Documentation Project.

The counts for this study were conducted in 1999, 2007, and 2008, and they were gathered at three locations: (1) Broadway at Bolinas Road in Fairfax, (2) San Anselmo Avenue at Tunstead Avenue in San Anselmo, and (3) Fourth Street at B Street in San Rafael.

Table 4-3: Peak Hour Bicycle Counts 1999, 2007 and 2008

	Location	Peak Hour Count 1999	Peak Hour Count 2007	Peak Hour Count 2008
Weekday	Broadway/ Bolinas Rd, Fairfax	20	61	57
	San Anselmo Ave/ Tunstead Ave, San Anselmo	34	41	40
	Fourth St/B St, San Rafael	Not available	31	19
Weekend	Broadway/ Bolinas Rd, Fairfax	42	167	82
	San Anselmo Ave/ Tunstead Ave, San Anselmo	73	102	34
	Fourth St/B St, San Rafael	32	27	46

Source: 1999 Marin County Bicycle Plan, 200 Non-Motorized Transportation Pilot Program, 2008 Transportation Authority of Marin bicycle count program.

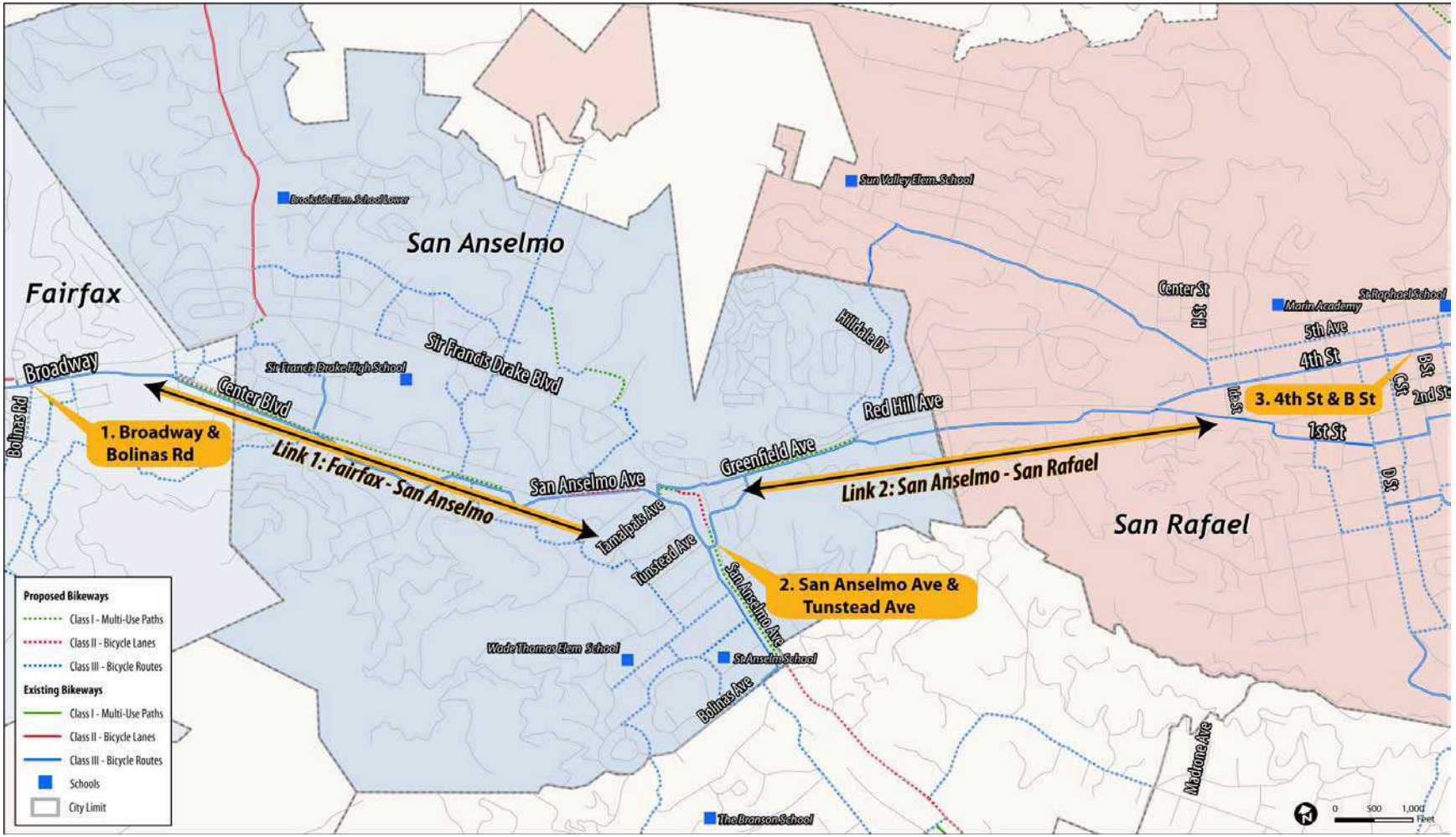


Figure 4-1: Count Locations

For the existing and future demand analysis it is assumed that there are two links along the corridor: Link 1 is from Fairfax to San Anselmo and Link 2 is from San Anselmo to San Rafael. It is also assumed that 70 percent of the bicyclists in the corridor are trying to connect between cities. The remaining 30 percent are bicycling locally. To estimate activity levels on the two links, the authors averaged peak hour counts for each link using the 1999, 2007, and 2008 data and then adjusted to reflect the 70 percent of bicyclists using the corridor between cities. Table 4-4 shows the average peak hour counts and the 70 percent factor results.

Table 4-4: Average Peak Hour Count Data and Adjustment Factor

			Average Peak Hour Count	Average Count with 70% Adjustment
Link 1	Fairfax to San Anselmo	Weekday	44	31
		Weekend	84	59
Link 2	San Anselmo to San Rafael	Weekday	32	22
		Weekend	54	38

Table 4-5 shows, daily, monthly, and annual estimated number of bicyclists for the two corridor links. These are derived from peak hour counts using factors from the NBPD. The NBPD has established factors for determining daily count estimates from peak hour counts. These factors are based on 365-day, 24-hour a day automatic counts and manual counts on bikeways across the U.S. Based on this data, peak hour counts account for six percent of the daily users. For the monthly estimates, the number of daily weekday users is then multiplied by 20, or the approximate number of weekdays in a month, and added to the number of weekend users multiplied by eight, or the approximate number of weekend days in a month. To estimate the number of annual users, the NBPD uses monthly factors. It is assumed that the monthly estimates account for seven percent of annual users. Based on this methodology and combining weekdays and weekends, Table 4-5 shows an existing estimated 275,000 annual bicyclists on Link 1 and 186,000 annual bicyclists on Link 2.

Table 4-5: Project Area Existing Bicyclists

		Total Peak Hr Users	Adjustment for 24 hr[1]	Percent of Daily Users during the Peak Hour[2]	Daily Estimate[3]	Monthly Estimate[4]	Percent of Annual Users per month[5]	Annual Estimate	Annual Estimate of Existing Users
Link 1 Fairfax to San Anselmo	Wkday	31	33	0.06	543	10,900	0.07	156,000	275,000
	Wknd	59	62	0.06	1033	8,300	0.07	119,000	
Link 2 San Anselmo to San Rafael	Wkday	22	23	0.06	385	7,700	0.07	110,000	186,000
	Wknd	38	40	0.06	665	5,300	0.07	76,000	

[1] Peak hour has a 5% adjustment to derive the daily estimate. This is because daily estimates are based on 6 AM to 10 PM factors and an additional 5% walk and bike during other times.
[2] Daily Estimates are based on factors for bicycle facilities derived in the National Bicycle & Pedestrian Documentation Program.
[3] Monthly total based on 20 weekdays and 8 weekend days in a month.
[4] Annual estimates are based on factors for bicycle facilities derived in the National Bicycle Pedestrian Documentation Program.

This study proposes short-term improvements to the Fairfax to San Rafael Cross Marin Bikeway, to be constructed within zero to five years, and medium-term improvements, to be constructed within five to ten years. Using the existing count data analysis for this project, other count data in Marin County including the *NTPP Summary of 2007 and 2008 Bicycle and Pedestrian Counts and Surveys*[3], and NBPD counts

[3] February 2008. Available here: http://www.walkbikemarin.org/documents/NTPP_Count_Survey_Report_Update_2.09r.pdf

nationwide, it is assumed that the number of bicyclists in the corridor will increase 10 percent with the short-term recommended improvements and increase 30 percent over and above the short-term growth with the medium-term recommended improvements. Table 4-6 shows the increase in the number of bicyclists for the short- and medium-term projects.

Table 4-6: Project Area Estimated Future Annual Bicyclists

	Existing	Short – Term[1]	Medium – Term[2]
Link 1 Fairfax to San Anselmo	275,000	303,000	394,000
Link 2 San Anselmo to San Rafael	186,000	205,000	267,000

[1] Assumed 10% increase from Existing.
[2] Assumed 30% increase from Short-Term.

The majority of bicycle trips in Marin County are for recreational purposes. Recreational bicyclists are a varied user group since they encompass a broad range of skill and fitness levels. Based on results from the *Nonmotorized Transportation Pilot Program Summary of 2007 and 2008 Bicycle and Pedestrian Counts and Surveys*, 63 percent of Marin bicycle trips are for recreational purposes. The existing, short and medium-term bicycle useage estimates were multiplied by this percentage to estimate the number of recreational bicyclists using the Fairfax to San Rafael Cross Marin Bikeway corridor. Table 4-7 shows that 248,000 and 168,000 recreational bicyclists are anticipated to use Links 1 and 2, respectively, with the medium-term recommended improvements. Similar calculations can be made for the number of students commuting on the corridor (3 percent), the number of commuters (17 percent), the number of people using the corridor for shopping (14 percent), and the number of people using it for personal business (3 percent).

Table 4-7: Estimated Number of Bicyclists on Fairfax to San Rafael Cross Marin Bikeway by Trip Purpose

	Existing	Short - Term	Medium - Term
	Recreational Bicyclists (63%)		
Link 1 Fairfax to San Anselmo	173,000	191,000	248,000
Link 2 San Anselmo to San Rafael	117,000	129,000	168,000
	Student Bicyclists (3%)		
Link 1 Fairfax to San Anselmo	8,000	9,000	12,000
Link 2 San Anselmo to San Rafael	6,000	6,000	8,000
	Work Commute Bicyclists (17%)		
Link 1 Fairfax to San Anselmo	47,000	52,000	67,000
Link 2 San Anselmo to San Rafael	32,000	35,000	45,000
	Shopping Bicyclists (14%)		
Link 1 Fairfax to San Anselmo	39,000	42,000	55,000
Link 2 San Anselmo to San Rafael	26,000	29,000	37,000
	Personal Business Bicyclists (3%)		
Link 1 Fairfax to San Anselmo	8,000	9,000	12,000
Link 2 San Anselmo to San Rafael	6,000	6,000	8,000

Notes: Trip purpose percentages from Nonmotorized Transportation Pilot Program Summary of 2007 and 2008 Bicycle and Pedestrian Counts and Surveys. Numbers may not add up to total estimated use due to rounding.

5. Bikeway Design Standards

The Fairfax to San Rafael Cross Marin Bikeway follows many existing designated bicycle facilities and traverses a wide variety of street conditions. The majority of the project corridor is built-out from an urban development standpoint and the character of the individual neighborhoods and streets is important to local residents and visitors alike. These two factors taken together require a design toolkit that can be implemented consistently to create a recognizable theme for the Fairfax to San Rafael Cross Marin Bikeway within this existing context. The Fairfax to San Rafael Cross Marin Bikeway toolkit includes both standard and innovative bikeway treatments, accepted traffic calming features, traffic controls for a range of street types, and wayfinding strategies.

Ultimately, the Fairfax to San Rafael Cross Marin Bikeway could meet the needs of local and regional bicyclists, improve operation of the major roadways in the corridor, and improve bicyclist access to neighborhoods and businesses via lower traffic streets. The challenge is to find ways of accommodating motorized and non-motorized uses with minimum compromising of safety or functionality. The design standards presented here provide a range of options for achieving this end.

Each of the design standards presented here also appear in the Chapter 6 design details for the Proposed Improvements.

5.1. Applicable Documents and Standards

Planning, design, and implementation standards in this document are derived from the following sources:

- AASHTO, Guide for the Development of Bicycle Facilities, 1999.
- California Manual of Uniform Traffic Control Devices (MUTCD), 2006.
- Caltrans: Highway Design Manual (Chapter 1000: Bikeway Planning and Design).
- California Building Standards Commission, California Code of Regulations (CCR), Title 24, 2007.
- Department of Justice, Code of Federal Regulations, ADA Standards for Accessible Design, 1994.
- Pedestrian and Bicycle Facilities in California: A Technical Reference and Technology Transfer Synthesis for Caltrans Planners and Engineers, 2005.

The sources listed above provide details on many aspects of bicycle facilities, but a) may contain recommendations that conflict with each other; b) are not, in most cases, officially recognized requirements; and c) do not cover all conditions. All design guidelines must be supplemented by the professional judgments of the designers and engineers.

5.2. Bicycle Facility Design Standards

The design guidelines presented here are a combination of minimum standards outlined by the California Highway Design Manual's Chapter 1000 (Chapter 1000), recommended standards prescribed by the American Association of State Highway and Transportation Officials (AASHTO) Guide for the Development of Bicycle Facilities and the Manual on Uniform Traffic Control Devices (MUTCD), as well as design solutions tailored to Fairfax and San Rafael's bicycle facility needs. The minimum standards and guidelines presented by Chapter 1000 and AASHTO provide basic information about the design of bicycle network infrastructure, such as bicycle lane dimensions, striping requirements and recommended signage and pavement markings.

Caltrans Bikeway Classification Overview

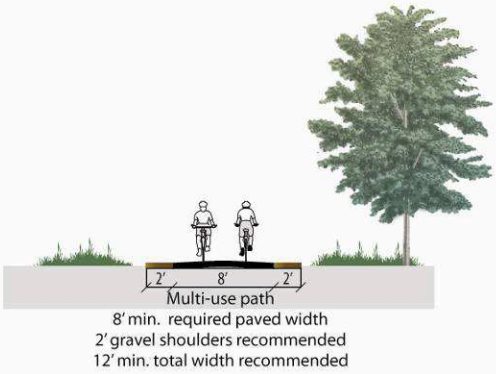
Description

Caltrans has defined three types of bikeways in Chapter 1000 of the Highway Design Manual: Class I, Class II, and Class III. Minimum and recommended standards for each of these bikeway classifications are shown below. Fairfax to San Rafael Cross Marin Bikeway project area includes segments of all three types of bikeways described below.

Illustrative Graphic

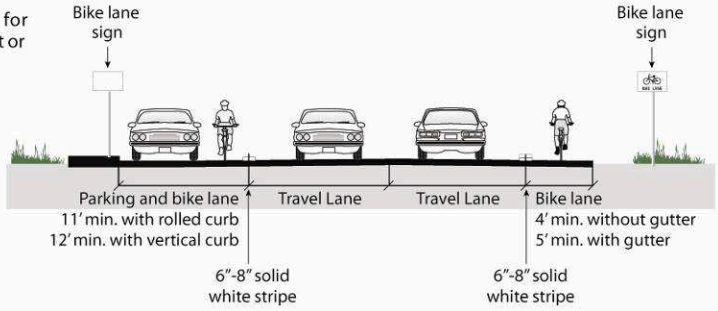
CLASS I
Multi-Use Path

Provides a completely separated right of way for the exclusive use of bicycles and pedestrians with crossflow minimized.



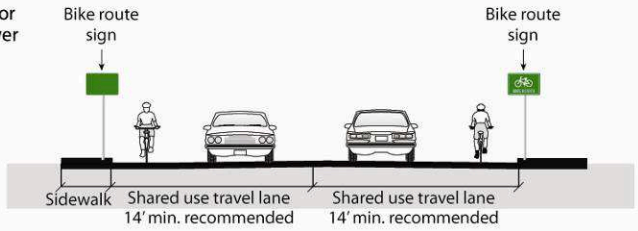
CLASS II
Bike Lane

Provides a striped lane for one-way bike travel on a street or highway.



CLASS III
Bike Route
Signed Shared Roadway

Provides for shared use with pedestrian or motor vehicle traffic, typically on lower volume roadways.

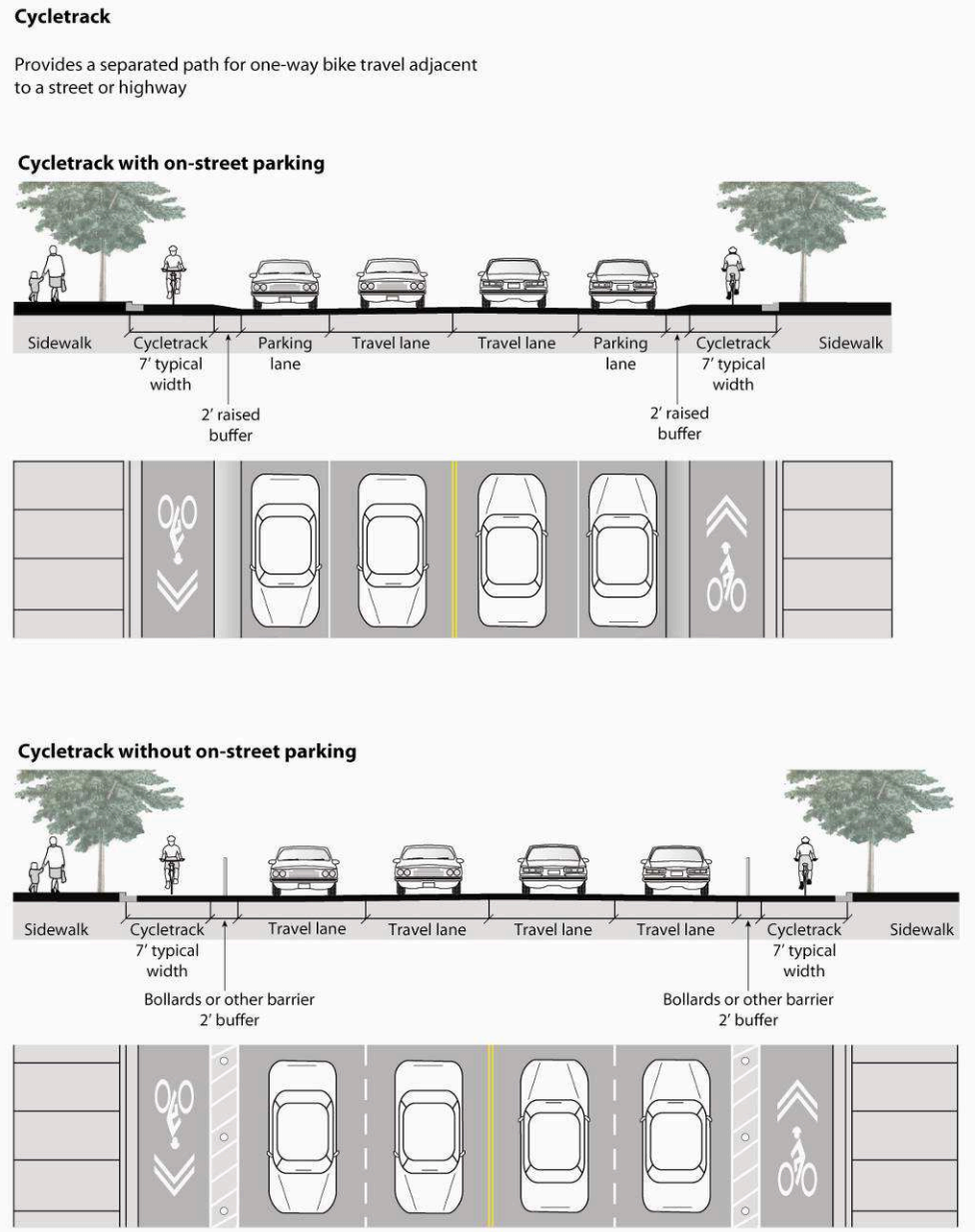


Separated Class II Bike Lane (Cycletrack)

Description

Cycletracks combine the user experience of a separated path with the on-street infrastructure of a bike lane. They are separated from vehicle traffic lanes, parking lanes and sidewalks and provide space exclusively for bicyclists. When on-street parking is available, cycletracks are located on the outside of the parking lane.

Illustrative Graphic



Bicycle Boulevard

Description

Bicycle boulevards have been implemented in a variety of locations including Berkeley, Palo Alto and Davis, California and Portland, Oregon. A bicycle boulevard, also known as bicycle priority street, is a roadway that allows all types of vehicles, but which has been modified to enhance bicycle safety and security. Roadways are designed to be places where cars and bicycles can equally share right-of-way. Bicycle boulevards tend to be residential streets with lower traffic volumes, typically between 3000 to 5000 average daily vehicles, but can include secondary commercial streets.

Illustrative Graphic

Potential Applications

- Residential streets with low traffic volumes (typically between 3000 to 5000 average daily vehicles).
- Can include secondary commercial streets.

Guidelines

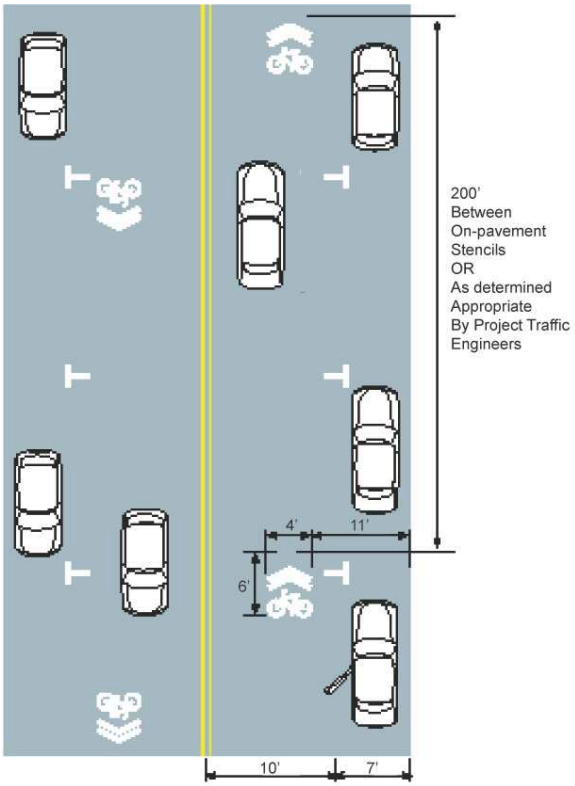
- Bicycle boulevard pavement markings should be installed in conjunction with wayfinding signs.
- Can be designed to accommodate the particular needs of the residents and businesses along the routes, and may be as simple as pavement markings with wayfinding signs or as complex as a street with traffic diverters and bicycle signals.

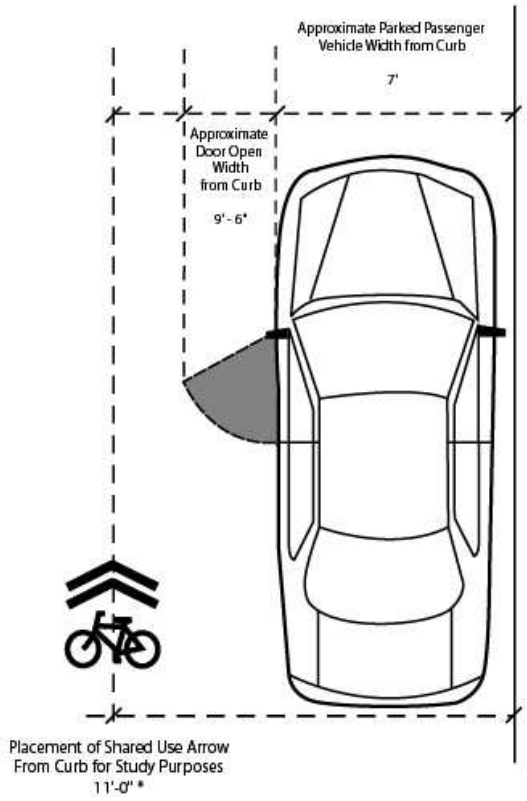
Shared Road Bicycle Marking

Description

The primary purpose of the shared road bicycle marking is to provide positional guidance to bicyclists on roadways that are too narrow to be striped with bicycle lanes. Markings may be placed on the street to inform motorists about the presence of cyclists, and also to inform cyclists how to position themselves with respect to parked cars and the travel lane. The shared road bicycle marking has been approved by Caltrans for use in California jurisdictions adjacent to on-street parking.

Illustrative Graphic





Potential Applications

- Bicycle network streets that are too narrow for standard striped bicycle lanes.
- Areas that experience a high level of "wrong-way" riding.
- Bicycle network streets that have moderate to high parking turnover.

Guidelines

- Shared lane arrow markings should be installed in conjunction with “share the road” signs.
- Arrows should be spaced approximately 200’ center to center, with the first arrow on each block or roadway segment placed no further than 100’ from the nearest intersection.

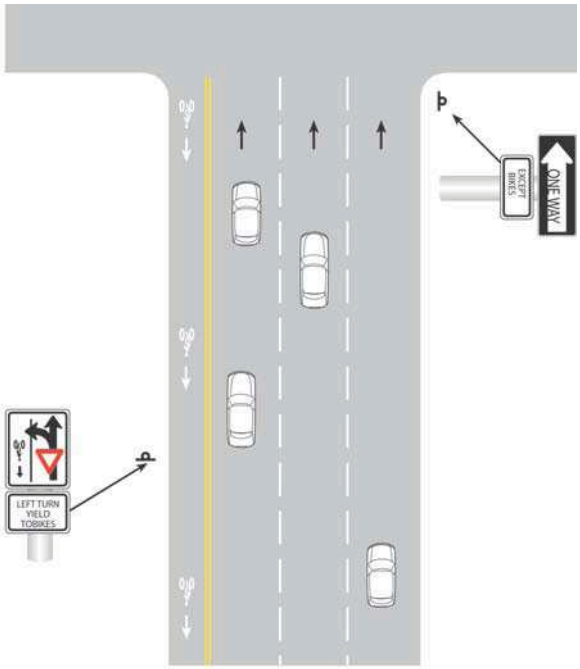
Contraflow Bike Lane

Description

A contraflow bicycle lane allows bicyclists to travel the opposite direction of motor vehicle traffic on a one-way street. Several design options are available depending on the existing conditions: lanes with no physical separation; lanes with separation only at intersections, or separation only mid-block; and lanes with complete separation (including lanes located between parallel parking and the sidewalk). Factors that should be considered during design include vehicle and bicycle turning movements, vehicle and bicycle ADT, available street width, existence of on-street parking and rate of turnover, and transit routes. Contraflow lanes are most often marked with a double yellow line. If parked cars are involved, it is important to provide enough room between the parked cars and the bike lane for a "door zone," so parked car doors are not opened into the bike lane. Contra-flow lanes are not an approved facility type and are considered to be experimental.

Illustrative Graphic

Source: Sacramento Transportation & Air Quality Collaborative, 2005



Potential Applications

- Bicycle network streets that are too narrow for standard striped bicycle lanes.
- Areas that experience a high level of "wrong-way" riding.

Guidelines

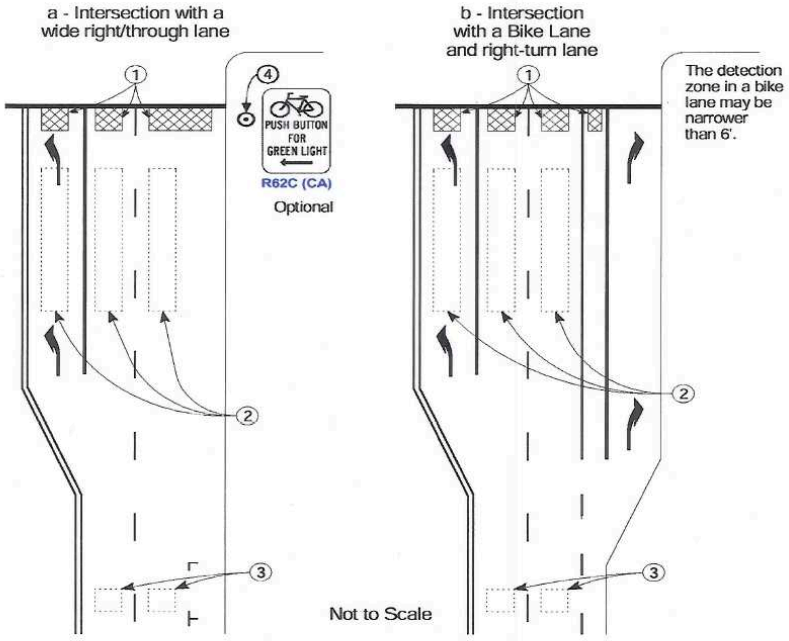
- The contraflow lane must be placed on the correct side of the street, to the driver's left.
- Any intersecting alleys, major driveways and streets must have signs indicating to motorists that they should expect two-way bicycle traffic.
- Existing traffic signals should be modified for bicyclists, with loop detectors or push buttons. The push buttons must be placed so they can be easily reached by bicyclists.

Limit Line Detection Zones

Description

Traffic Operations Policy Directive 09-06, issued August 27, 2009 modified MUTCD 4D.105 (CA) to require bicyclists to be detected at all traffic-actuated signals on public and private roads and driveways. If more than 50% of the limit line detectors need to be replaced at a signalized intersection, then the entire intersection should be upgraded so that every line has a limit line detection zone. Bicycle detection must be confirmed when a new detection system has been installed or when the detection system has been modified.

Illustrative Graphic



Source: Traffic Operations Policy Directive 09-06

Potential Applications

- At all traffic-actuated signals on public and private roads and driveways.

Guidelines

- The Reference Bicycle Rider must be detected with 95% accuracy within a 6 foot by 6 foot Limit Line Detection Zone
- Where Limit Line Detection Zones are provided, minimum bicycle timing should be 14.7 feet per second, plus a 6 second start-up time.
- Table4D-109(CA) provides the minimum bicyclist phase length for intersections of different lengths.

Traffic Calming

Traffic calming interventions slow traffic by modifying the physical environment of a street.

Description	Graphic
Speed Table. A speed table is long raised speed hump with a flat section in the middle and ramps on the ends. Speed tables are generally long enough for the entire wheelbase of a passenger car to rest on top. The long, flat design allows cars to pass without slowing as significantly as with speed humps or cushions. Because they slow cars less than similar devices, speed tables are often used on roads with typical residential speed limits. Speed tables are sometimes called flat top speed humps, trapezoidal humps, speed platforms, raised crosswalks, or raised crossings. In addition to application midblock, tables can also be applied at intersections. Communities throughout the nation have used a variety of traffic calming measures on bicycle boulevards and traffic calmed streets. The neighborhood traffic circle is one of the most universally applied measures for streets with a grid system, such as in Berkeley and Portland. It is not possible to implement the traffic circle in the tight, angled intersections found throughout Marin County. The next best way to achieve the same results as the traffic circle is the raised intersection. The raised intersection requires site-specific drainage analysis and is more expensive than the traffic circle, but it is generally worth the additional cost.	 *Source: http://www.ite.org/traffic/table.asp*
Median Pedestrian/Bicycle Refuge. On wide, multi-lane roadways, bicyclists can benefit from median refuge islands, which offer a place to wait after crossing only half of the street. Refuge islands increase the visibility of bicyclist crossings and can decrease bicyclist collisions by reducing crossing exposure time for bicyclists. They also allow bicyclists to consider cross traffic from one direction at time, making it easier to find a gap and simplifying crossing.	 *Source: http://www.ite.org/traffic/table.asp*

Curb Extensions. Curb extensions, also called bulb-outs, are engineering improvements intended to reduce pedestrian crossing distance and increase visibility. Curb extensions can either be placed at corners or at mid-block crosswalk locations, and extend out to about 8 feet to align with the edge of the parking lane. In addition to shortening the crosswalk distance, curb extensions serve to increase pedestrian visibility by allowing pedestrians to safely step out to the edge of the parking lane where they can see into the street, also making them more visible to oncoming drivers. At corners, curb extensions serve to reduce the turning radius, and provide space for perpendicularly-aligned curb ramps. Where bus stops are located, curb extensions can provide additional space for passenger queuing and loading.	 *Source: PBIC Image Library*
Colored Pavement. For aesthetic reasons, crosswalks are sometimes constructed with distinctive paving materials such as colored pavement. Crosswalks with unique materials or colored pavement should use concrete pavers or asphalt, and textures should maintain a smooth travel surface and good traction. Regardless of any colored or unique pavement treatment used, marked crosswalk locations should always be marked with parallel transverse lines.	 *Source: Alta Image Library*

On-Street Parking

On-street parking configuration has a significant effect on bicyclist safety. Design guidelines below present specific design strategies that can improve bicyclists safety where angle parking is located. These design strategies are particularly valuable in commercial and retail areas with angled parking where there is high parking turnover.

Description	Graphic
Back-in-Angle Parking. Back-in-angle parking is similar to both parallel and standard angle parking, but is intended to improve bicyclist safety through increased visibility. Compared to standard angle parking, the driver is able to see bicyclists more easily when exiting the parking stall. Additionally, with back-in-angle parking vehicle cargo loading is positioned on the curb rather than the street. A potential concern is that vehicles may enter the spaces head-in from the opposite side of the street, but this can be addressed with enforcement, signage, and drive education. In addition, vehicles overhanging the sidewalk or backing into street furniture can be alleviated by proper design and placement. Back-in-angle parking has been implemented in over 26 cities in the United States, including Wilmington, Delaware (in place for over fifty years), Seattle (in place for over thirty years), Washington, D.C. (in place for over twenty years), Tucson, and several cities in California, including San Francisco, Santa Barbara, and Ventura. In cities where this type of parking has been implemented, the number of parking-related collisions has decreased since installation. In Tucson, after implementing back-in-angle parking, bicycle collisions decreased from an average of 3-4 collisions per month to no reported collisions for 4 years following implementation. In Montreal, Quebec, Canada, since the implementation of a back-in-angle pilot project in 2001, no collisions have been reported and speed was reduced by approximately 3 mi/hr.	 *Source: City of Vancouver, WA*  *Source: City of Kelowna, British Columbia, Canada*

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6. Proposed Improvements

This chapter presents proposed improvements to achieve the Fairfax to San Rafael Cross Marin Bikeway project goals that will result in safe and separate bicycle accommodation where feasible. Accommodation should be equivalent to the North-South Greenway. (See Chapter 1 Section 1.3 of this report for the project goals and objectives.) As stated before, much of the proposed corridor is already served by on-street bicycle facilities; therefore, this feasibility study focuses on closing gaps in those facilities, improving existing bicycle facilities, and improving north-south connections to the east-west corridor.

The projects defined in this chapter are designed to respond to and meet the goals and objectives set out at the beginning of this Fairfax to San Rafael Cross Marin Bikeway feasibility study. Other design criteria include functionality and efficiency, historic, environmental, aesthetic and visual impacts, accessibility, estimated usage, safety and liability, right-of-way impacts, roadway crossings, consistency with local plans, estimated levels of use, traffic impacts and cost to implement.

This chapter emphasizes short-term improvements that can be implemented quickly and at low cost within approximately zero to five years. The medium-term alternatives in some cases represent the optimal design, but require additional traffic study, civil engineering analysis, community outreach and potential right-of-way acquisition. Medium-term projects are those that could be completed within approximately five to ten years.

6.1. Summary of Proposed Improvements

Table 6-1summarizes the individual project boundaries, proposed improvements and estimated implementation costs. Each improvement is assigned a number beginning with the westernmost project and progressing to the eastern terminus of the corridor. Each project listed in the table is discussed in detail in the following sections of this chapter. Figure 6-1 illustrates the locations of the improvements along the corridor.

Table 6-1: Summary of Proposed Improvements

Project Number	Location	Improvement	Short-Term Project Cost*	Medium-Term Project Cost**
1	SFD/ Olema Road intersection (west), Fairfax	Intersection improvement	$36,000	--
2	Olema Road, Fairfax	Bicycle boulevard	--	$16,000
3	SFD/ Olema Road intersection (east), Fairfax	Intersection improvement	$43,000	--
4	SFD (Olema Road to Claus Road, Fairfax	Bicycle lane striping	$56,000	--
5	Broadway Boulevard (Olema Road to Claus Road), Fairfax	Bicycle boulevard and intersection treatments	--	$378,000
6	Broadway Boulevard/Fairfax Parkade, Fairfax	Bicycle lanes and pedestrian improvements	--	$470,000
7	Center Boulevard, Fairfax	Wayfinding	$3,400	--
8	Lansdale Avenue/San Anselmo Avenue and Center Boulevard, San Anselmo	Short-term (Lansdale Avenue/San Anselmo Avenue): Bicycle boulevard and speed tabled intersections. Medium-term (Center Boulevard): Cycletrack	$1,326,000	$3,186,000

Project Number	Location	Improvement	Short-Term Project Cost*	Medium-Term Project Cost**
9	Hub Bypass, San Anselmo	Short-term: Corner bulbs at Bank Street/Sir Francis Drake intersection, bicycle boulevard. Medium-term: Crossing project and creek path modifications	$225,000	$559,000
10	Red Hill Avenue/Greenfield Avenue (Lincoln Park to Hilldale Drive), San Anselmo	Short-term: Restripe back-in-angle parking and bicycle boulevard	$131,000	--
11	Red Hill Avenue/Greenfield Avenue/West End Avenue (Hilldale Drive to 2nd/4th Street intersection), San Rafael	Bicycle boulevard treatment and intersection treatments	--	$112,000
12	2nd Street (2nd/4th Street intersection to First Street), San Rafael	Short-term: Intersection treatments. Medium-term: Sidewalk extension, bicycle boulevard treatment on G Street	$116,000	$1,338,000
13	First Street (2nd Street to B Street), San Rafael	Bicycle boulevard treatment and contraflow bike lane	$43,000	--
14	First Street (B Street to Anderson Drive), San Rafael	Short-term: Bicycle boulevard treatment. Medium-term: Class I bike path	$2,600	$69,000
15	Anderson Drive to Mahon (Creek Pathway), San Rafael	Wayfinding	$6,600	--
		TOTAL COSTS	**$1,988,600**	**$6,128,000**

* Summary cost figures rounded to the nearest significant figure.

**Short-Term and Medium-Term Project costs reflect separate projects and are mutually exclusive.

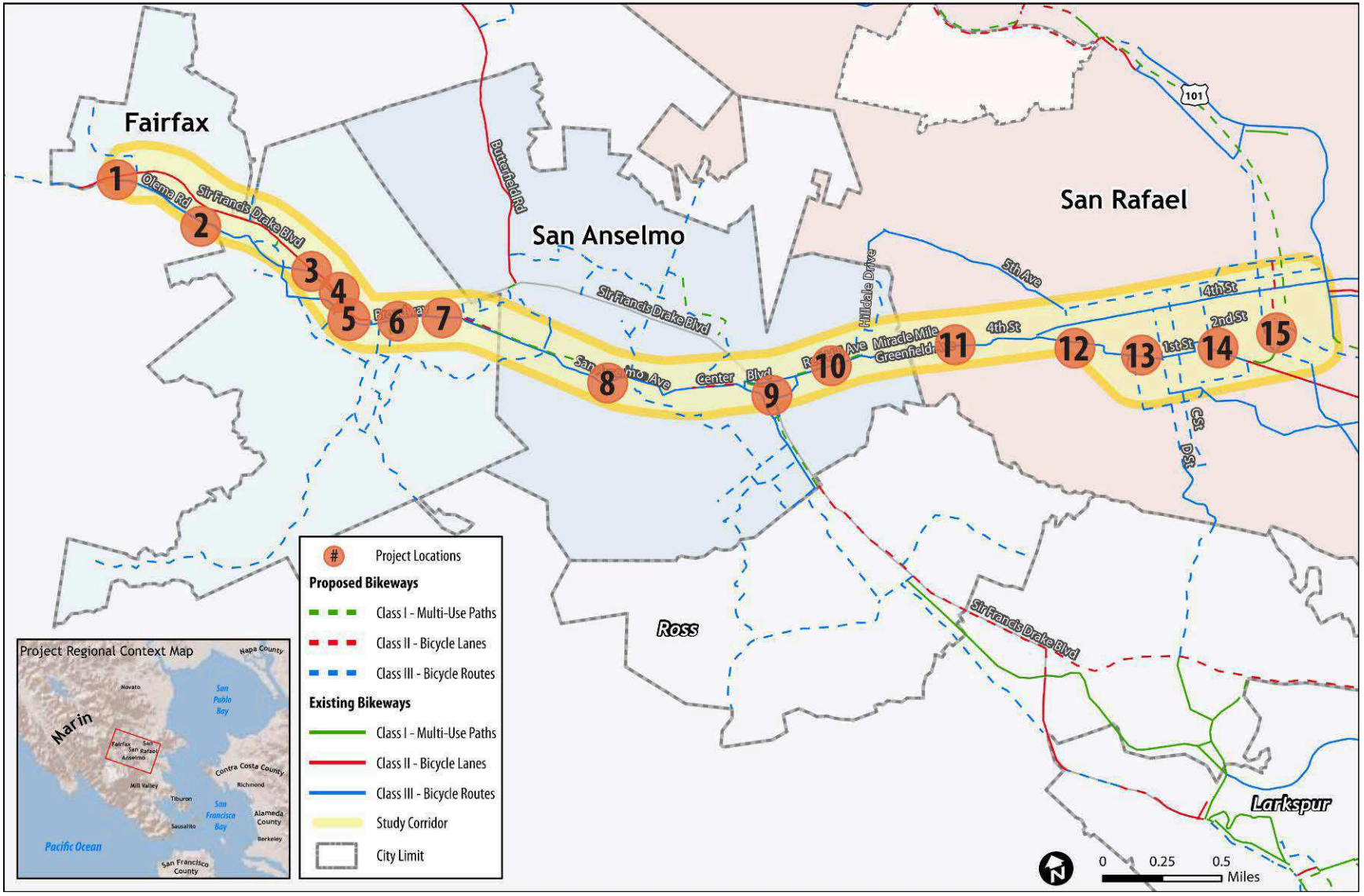


Figure 6-1: Overview Map of Proposed Project Sites

6.2. Cost Estimating Methodology

Table 6-2 presents frequently recurring unit costs used in the preparation of the planning level cost estimates. Other unit costs appear in the project cost estimates, but are not frequently used. Unit costs were developed based on recently built projects in the San Francisco Bay Area.

Table 6-2: Unit Costs

Item	Unit	Unit Cost
Bench	each	$1,500.00
Asphalt Parking Area	square foot	$2.75
Asphalt Pathway with Sub-Base	square foot	$3.80
Asphalt Pathway with Sub-Base	square foot	$2.75
Asphalt Pathway with Sub-Base	square foot	$7.00
Barrier, Metal	linear foot	$50.00
Bicycle Boulevard Signing	mile	$15,840.00
Bicycle Boulevard Signing	mile	$8,500.00
Bicycle Loop Detector	each	$3,000.00
Bike Locker	each	$1,200.00
Bike Racks	each	$400.00
Bollards	each	$500.00
Curb Extension/Bulb-out	each	$20,000.00
Bus Concrete Pad	each	$6,500.00
Bus Shelter	each	$10,000.00
Class I Path (Total)	mile	$666,740.00
Class II Bike Lane (Total)	mile	$22,560.00
Class III Bike Route (Total)	mile	$8,500.00
Concrete	square foot	$9.00
Concrete Paving Remove	cubic yard	$15.00
Crosswalk, Thermoplastic	square foot	$6.00
Curb	linear foot	$15.00
Curb and Gutter	linear foot	$35.00
Curb Ramp	each	$2,500.00
Curb, Remove	linear foot	$3.30
Drainage inlet, Relocation	each	$5,000.00
Fencing, Remove	linear foot	$9.89
High Visibility Crosswalk	each	$1,200.00
Median Island	each	$20,000.00
Raised Crosswalk	each	$15,000.00
Raised Intersection	each	$60,000.00
Retaining wall, Structural	square foot	$150.00
Right Turn Pavement Marking	square foot	$3.39
Sharrow Pavement Markings	each	$100.00
Sidewalk Widening	square foot	$25.00
Sign	each	$250.00

Item	Unit	Unit Cost
Stop Bar	each	$200.00
Stop Pavement Marking	each	$400.00
Striping	linear foot	$2.00
Striping (Broken)	linear foot	$1.18
Striping, Remove	linear foot	$1.50
Textured Concrete	square foot	$10.00
Joint Pole Relocation	each	$7,500.00

6.3. Fairfax to San Rafael Cross Marin Bikeway Improvement Projects

Each of the projects defined below represents a set of physical improvements that can be implemented by one of the three potential lead agencies in the Fairfax to San Rafael Cross Marin Bikeway project area – Town of Fairfax, Town of San Anselmo, and the City of San Rafael. Each of the projects is defined to address the project goals and a set of operational and physical needs identified through this study. The descriptions below define the following project characteristics:

- Project Need Summary
- Short-Term Project Definition (where applicable)
- Medium-Term Project Definition (where applicable)
- Planning-Level Cost Estimate
    - Short-Term (where applicable)
    - Medium-Term (where applicable)

6.4. Project 1: SFD/Olema Road Intersection (West)

Project Need Summary

As identified in Chapter 3 of this study, at this intersection, bicyclists have difficulty judging gaps in approaching high speed automobile traffic due to limited sight lines, and there are no clearly defined bike lanes through the intersection. The intersection improvements identified here address the needs of bicyclists accessing SFD from Olema Road and the need to provide a defined path for through bicyclists on SFD. In the existing condition, shoulder striping along SFD is discontinued in advance of the intersection, and the travel lanes are not clearly delineated. The following short-term improvements address these conditions.

SFD facing north toward the Olema Road intersection (western of the two Olema Road intersections)

Short-Term Project Definition

Recommended short-term project improvements include both shoulder and striping improvements and are shown in Figure 6-2 and Figure 6-3.

- Continue the shoulder striping along south side of SFD.
- Improve the westbound bike lane along SFD.
- Stripe a buffer area along the north side of SFD between the westbound bicycle lane and the parking lane.
- Install bicycle crossing warning signage for motorists.
- Install a curb extension along the existing no parking zone.
- Install a skip striped bike lane through the intersection for westbound bicyclists.

Estimated Cost

Table 6-3: Estimated Cost for Project 1: SFD/Olema Road Intersection (West)

Description	Item	Unit	Unit Cost	Amount	Total Cost
Shoulder striping	Striping	LF	$2.00	465	$930
Curb extension	Bulb-out	EA	$20,000.00	1	$20,000
Skip striped bike lane	Striping (Broken)	LF	$1.18	265	$313
Striped buffer area	Striping	LF	$2.00	650	$1,300
Bicycle crossing warning signage for motorists	Sign	EA	$250.00	2	$500
				CONSTRUCTION COST	**23,043**
Design and Permitting (25%)	25% of Construction Total				$5,761
Planning Level Contingency (30%)	30% of Construction Total				$6,913
				TOTAL PROJECT COST	**$35,716**

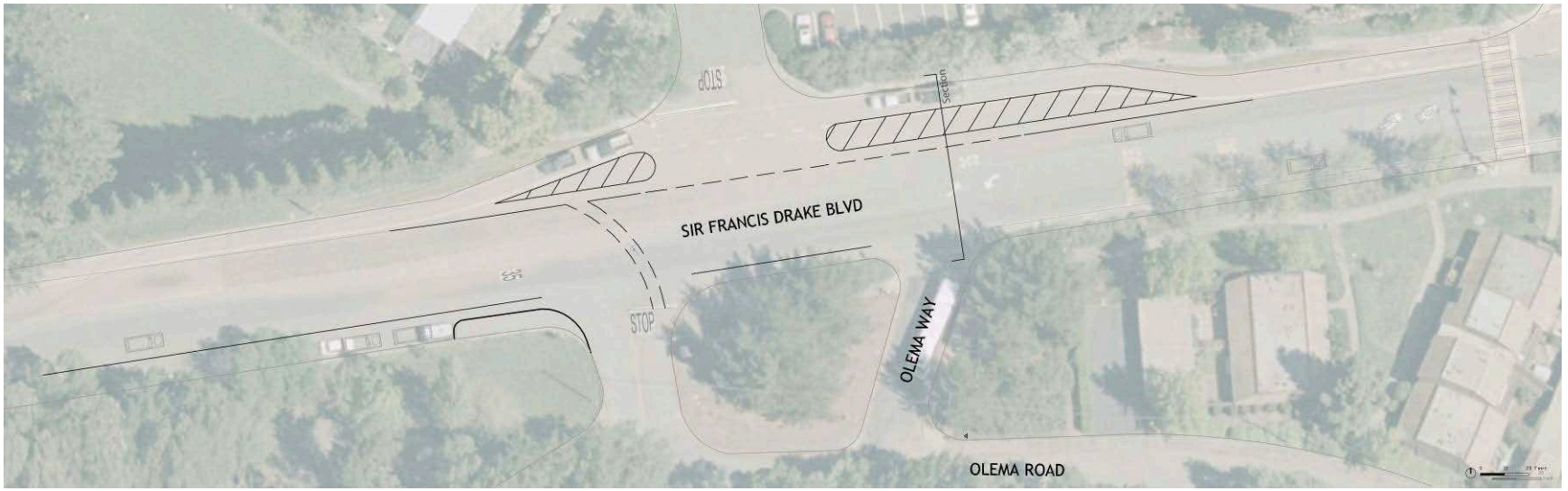


Figure 6-2: Plan View of Proposed Improvements for Project 1: SFD at Olema Road (west)

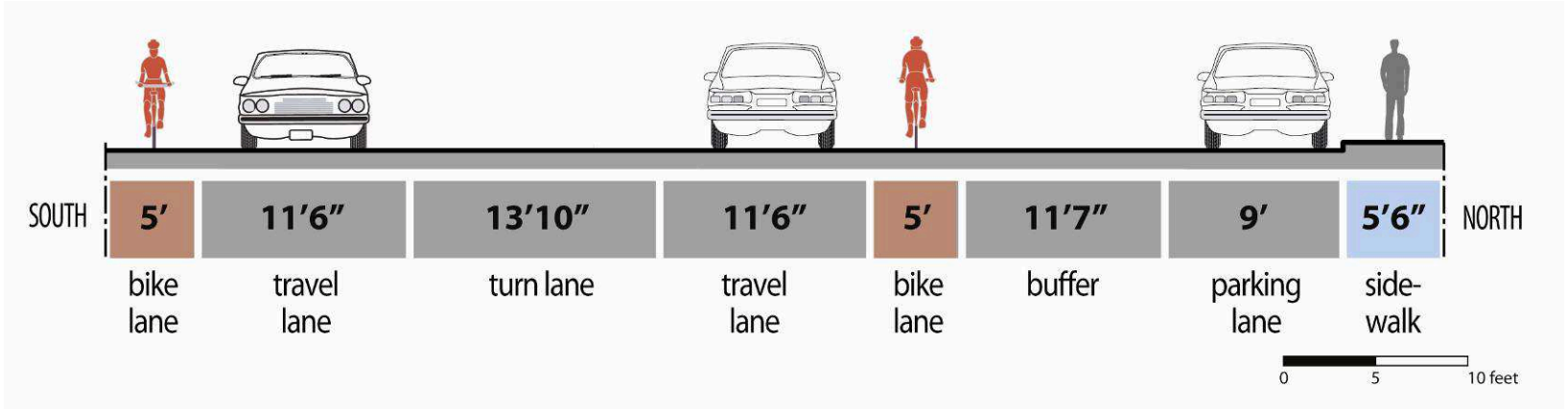


Figure 6-3: Section of Proposed Improvements for Project 1: SFD at Olema Road (west)

6.5. Project 2: Olema Road Bicycle Boulevard

Project Need Summary

Between its two intersections with SFD, Olema Road has no documented bicycle safety issues or functional bikeway concerns. SFD, directly parallel to Olema Road, has continuous bicycle lanes this entire segment of the Fairfax to San Rafael Cross Marin Bikeway corridor and no improvements are envisioned at this point in time. Olema Road is nonetheless an important segment of the overall Fairfax to San Rafael Cross Marin Bikeway and should be identifiable as such in order to provide clear wayfinding for bicyclists, increase driver awareness of bicyclists along the corridor, and to provide overall Fairfax to San Rafael Cross Marin Bikeway continuity.

Medium-Term Project Definition

Recommended medium-term project improvements for Olema Road include:

- Shared-use pavement arrows, including block begin and block end and at appropriate intervals.
- Fairfax to San Rafael Cross Marin Bikeway identity and wayfinding signage.

Estimated Cost

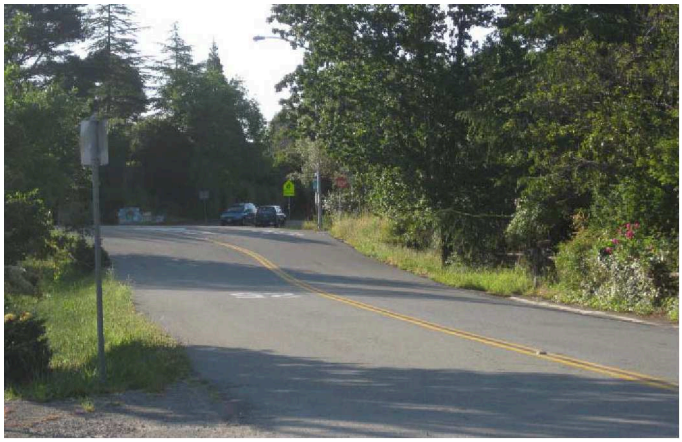
Table 6-4: Estimated Cost for Project 2: Olema Road

Description	Item	Unit	Unit Cost	Amount	Total Cost
Shared-use pavement arrows	Sharrow Pavement Markings	EA	$100.00	26	$2,600
Bikeway identity and wayfinding signage	Bicycle Boulevard Signing	MI	$8,500.00	0.93	$7,905
				CONSTRUCTION COST	**$12,905**
Design and Permitting (25%)	25% of Construction Total				$2,626
Planning Level Contingency (30%)	30% of Construction Total				$3,152
				TOTAL PROJECT COST	**$16,283**

6.6. Project 3: SFD/Olema Road Intersection (eastern intersection)

Project Need Summary

The eastern end of Olema Road intersects SFD at an oblique angle, limiting visibility for motorists leaving Olema Road and entering SFD. As a result, motorists must encroach on the intersection in order to gain visibility. In addition, for southbound motorists on Olema Road, the existing intersection geometry is similar to a free right turn and does not encourage a complete stop.



Olema Road looking east toward SFD (eastern of the two Olema Road intersections)

This intersection is most problematic for bicyclists who are exiting the Class I multi-use path (visible at the bottom of Figure 6-4) that runs between this intersection and the Fairfax library. Motorists southbound on Olema stop,

blocking the path, while attempting to gain sight lines onto Sir Francis Drake. During peak traffic periods and during light traffic periods motorists may not come to a complete stop. In addition, northbound bicyclists do not have a clearly defined path of travel when transitioning from the multi-use path to SFD or Olema Road.

Traffic counts conducted as a part of the Fairfax to San Rafael Cross Marin Bikeway study determined that few motorists turn left onto Sir Francis Drake during the morning peak travel period (7:00AM to 9:00AM).

Short-Term Project Definition

Recommended short-term project improvements for the SFD/Olema Road intersection (east) are shown in Figure 6-4 and include:

- Consolidate two turning lanes at SFD/Olema Road (east) into a single turn lane.
- Install a curb extension and extend the multi-use path to the new curb line.
- Continue bike lane striping through intersection.
- Remove 50 feet of existing fence along SFD immediately north of Olema Road.

Estimated Cost

Table 6-5: Estimated Cost for Project 3: SFD/Olema Road (east)

Description	Item	Unit	Unit Cost	Amount	Total Cost
Fence removal	Fencing, Remove	LF	$9.89	50	$495
Curb extension and extension of multi-use path	Concrete	SF	$9.00	1970	$17,730
	Curb and Gutter	LF	$35.00	173	$6,055
	Curb Ramp	EA	$2,500.00	1	$2,500
Consolidate two turning lanes into a single turn lane	Striping	LF	$2.00	28	$56
	Stop Bar	EA	$200.00	1	$200
	Stop Pavement Marking	EA	$400.00	1	$400
	Striping, Remove	LF	$1.50	28	$42
Bike lane striping	Striping (broken)	LF	$1.18	160	$189
Bike lane striping	Striping	LF	$2.00	110	$220
				CONSTRUCTION COST	**$27,886**
Design and Permitting (25%)	25% of Construction Total				$6,972
Planning Level Contingency (30%)	30% of Construction Total				$8,366
				TOTAL PROJECT COST	**$43,224**

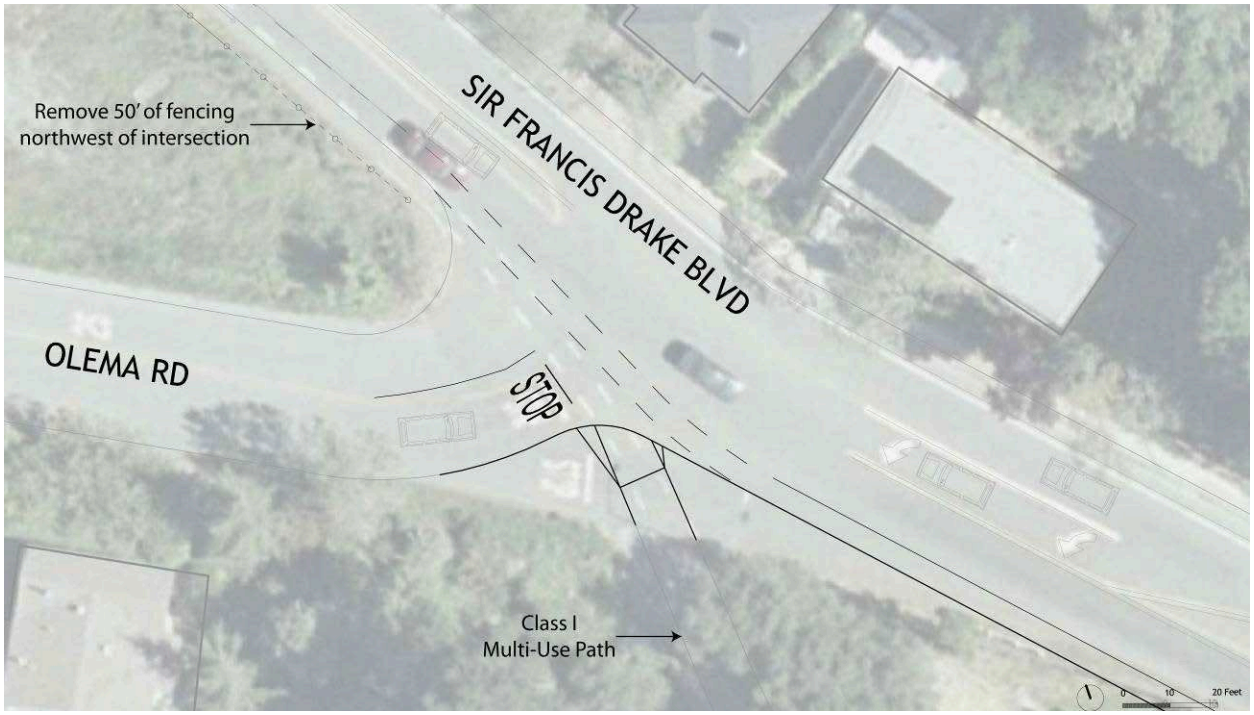


Figure 6-4: Plan View of Proposed Improvements for Project 3: SFD/Olema Road (east)

6.7. Project 4: SFD Bike Lane (Olema Road (east) to Claus Drive)

Project Need Summary

The SFD right-of-way along this segment is constrained by existing commercial and residential development. This segment of SFD includes a westbound bike lane and a discontinuous eastbound bike lane. SFD, immediately east of Olema Road (east), includes neither an eastbound bike lane nor shoulder, causing a pinch point for bicyclists. Eastbound bicyclists are expected to use the Class I trail leading from that intersection to the library and Broadway Boulevard. This transition is inconvenient to bicyclists who would prefer to stay on SFD. This project proposes to complete the gaps in the eastbound bike lane to provide clearly defined paths of travel for bicyclists and motorists and improve overall east-west bikeway continuity. Based on the needs identified at this location, short-term improvements to the corridor segment are proposed.

East of the SFD/Olema Road (east) intersection

Short-Term Project Definition

Recommended short-term project improvements for SFD between Olema Road (east) and Claus Drive are shown in Figure 6-5 through Figure 6-8 and include:

- Complete gaps in eastbound bike lane along SFD. (This improvement will require right-of-way acquisition.)

Estimated Cost

Table 6-6: Estimated Cost for Project 4: SFD (Olema Road (east) to Claus Drive)

Description	Item	Unit	Unit Cost	Amount	Total Cost
Eastbound bike lane	Class II Bike Lane (EB only)	MI	$11,280.00	0.33	$3,722
	Asphalt Paving	SF	$2.75	1,260	$3,465
	ROW Acquisition	Acre	$1,000,000.00	0.029	$29,000
				CONSTRUCTION COST	**$36,187**
Design and Permitting (25%)	25% of Construction Total				$9,047
Planning Level Contingency (30%)	30% of Construction Total				$10,856
				TOTAL PROJECT COST	**$56,090**