Sebastopol Bike Lane Feasibility Study

Prepared for the

City of Sebastopol

Submitted by

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Balancing Functionality and Livability
Traffic Engineering • Transportation Planning

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Introduction

The *Sebastopol Bicycle and Pedestrian Master Plan* (BPMP) was adopted by the Sebastopol City Council in May 2008 as part of a countywide planning effort by the Sonoma County Transportation Authority (SCTA). The Plan is intended to be used to guide implementation of local projects and programs and document City policy. It is also a component of the SCTA *Countywide Bicycle & Pedestrian Master Plan* intended to improve coordination in realizing the countywide bicycle and pedestrian system. The purposes of the SCTA *Countywide Bicycle & Pedestrian Master Plan* were to:

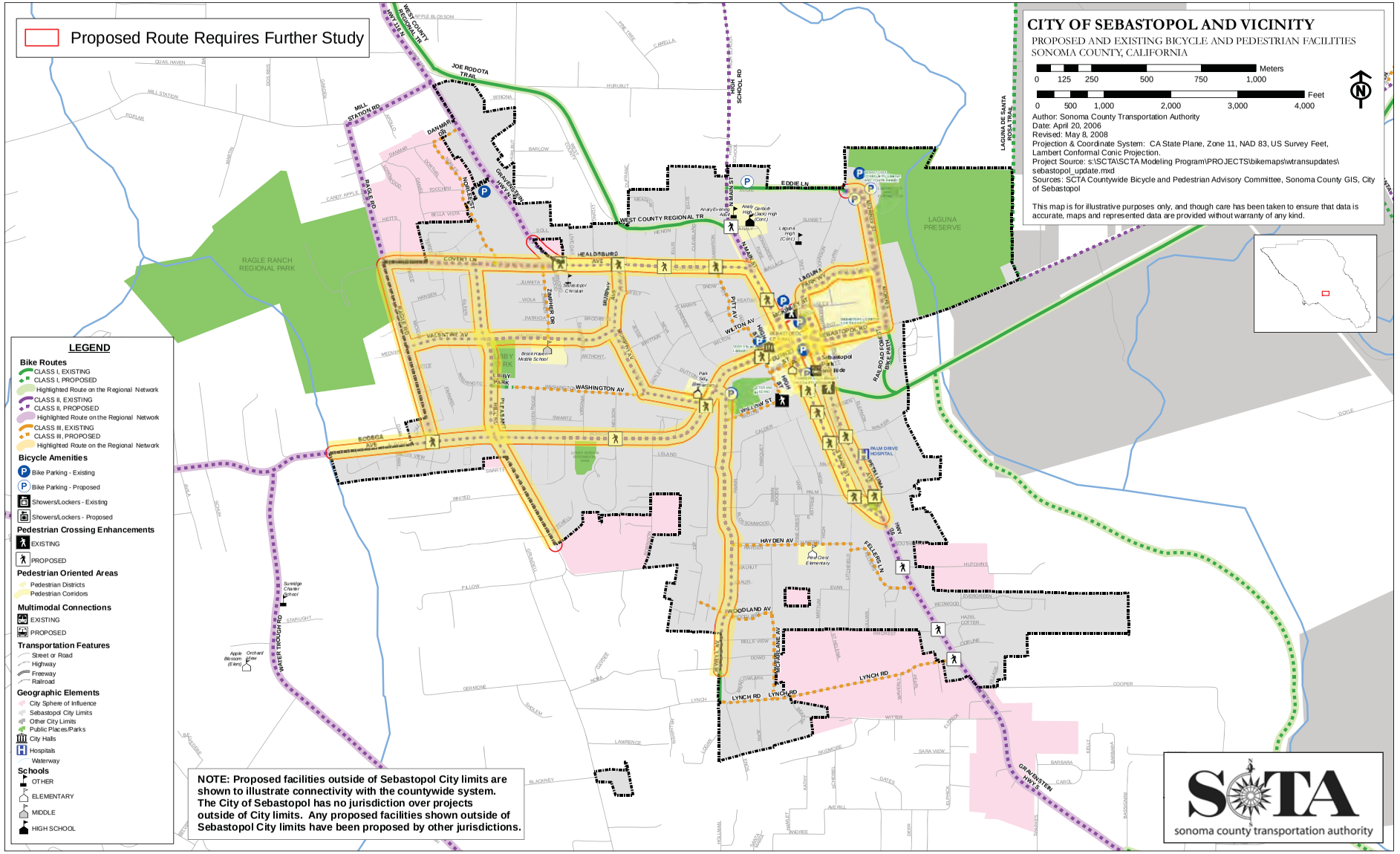
- Assess the needs of bicyclists and pedestrians in Sebastopol and throughout Sonoma County in order to identify a set of local and countywide improvements and implementation strategies that will encourage more people to walk and bicycle;
- Identify local and countywide systems of physical and programmatic improvements to support bicycling and walking;
- Provide local agencies that adopt the Plan with eligibility for various funding programs, including the State Bicycle Transportation Account (BTA);
- Act as a resource and coordinating document for local actions and regional projects; and
- Foster cooperation between entities for planning purposes and create Geographic Information System (GIS) maps and a database of existing and proposed facilities countywide.

To achieve these, the Plan included recommendations for physical improvements and programs that could be developed to enhance and expand existing facilities, eliminate gaps, address constraints, provide for greater local and regional connectivity, and increase the potential for walking and bicycling as transportation modes. The Plan identified several streets in Sebastopol as proposed Class II facilities (ie., bike lanes) with the caveat that the proposal requires further study. The Plan included the map shown in Figure 1.

Bicyclist riding on Petaluma Avenue in Sebastopol, a street that currently has no bike lanes

Bicyclist on Main Street Sidewalk

This map delineates 18 street segments in the City of Sebastopol to be studied further, including local streets and some owned and maintained by the State of California Department of Transportation (Caltrans). The distinction between state and local facilities is important because Caltrans may wish to apply design criteria that differ from City of Sebastopol, such as minimum travel lane, bicycle lane or parking lane widths. Of the 18 study street segments, six are within state jurisdiction and 12 under local control, as shown in Table 1.



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Sebastopol Bike Lane Feasibility Study

City of Sebastopol

Figure 1

Proposed and Existing Bicycle and Pedestrian Facilities

Table 1 Study Segments	
Street/Segment	**Jurisdiction**
State Highways (6)	
Healdsburg Ave – Covert Ln to North Main St	Caltrans
North Main St – Sebastopol Ave to Healdsburg Ave	Caltrans
South Main St – Sebastopol Ave to Petaluma Ave	Caltrans
Petaluma Ave	Caltrans
McKinley St – Petaluma Ave to North Main St	Caltrans
Sebastopol Ave – Morris St to Main St	Caltrans
Local Streets (12)	
Covert Ln	City
North Main St – Healdsburg Ave to Eddie Ln	City
Bodega Ave – Main St to West City Limit	City
Ragle Rd – Covert Ln to Bodega Ave	City
Pleasant Hill Rd – all within City limits	City
Pleasant Hill Ave North	City
Valentine Ave	City
Murphy Ave	City
Washington Ave – Huntley St to Bodega Ave	City
Jewell Ave	City
Laguna Park Way	City
Morris St	City

This Bike Lane Feasibility Study presents an analysis of the opportunities and constraints and feasibility of installing Class II bicycle lanes on these streets. Where Class II bike lanes are found to be infeasible this report includes recommendations for alternatives to Class II bike lanes. These recommendations are offered for the consideration and approval of the City Council. Subsequent to acceptance of this report these recommendations will be included by amendment into the Sebastopol Bicycle and Pedestrian Master Plan.

Evaluation Criteria

Following is a description of the guidelines used in evaluating the feasibility of bicycle facilities on the study street segments and the additional alternative bicycle facilities which were considered where bike lanes were not considered feasible.

Guidelines and Design Assumptions

The following guidelines and design assumptions were applied to determine the feasibility of various bicycle facility alternatives. The feasibility and method to achieve Class II facilities (bike lanes) was determined for all study segments.

- Because of the expense of road widening, new bicycle markings were recommended where they could be retrofitted within existing curb-to-curb street cross section.
- Where there is inadequate pavement width to accommodate a bike lane, pavement reallocation measures such as use of narrower lanes, elimination of lanes, and elimination of on-street parking were evaluated for feasibility.
- On-street parking is an important community commodity, though parking prohibition was considered where parking is consistently under-utilized and bike lanes are an important need.
- On the Caltrans study segments the width of travel lanes currently vary between 10 and 18 feet, though the 10-foot travel lanes are adjacent to parking lanes. The width of parking lanes ranges from seven to ten feet, with a predominant width of eight feet. The minimum dimensions were applied during the initial design phase to facilitate development of a wide variety of alternative designs. Upon meeting with Caltrans, it was determined that through travel lanes should be at least 10.5 feet wide and turning lanes should be a minimum 11 feet wide, with one-half (0.5) foot being the smallest design width increment. Therefore, a lane width may be 10.5, 11, 11.5 or 12 feet wide, depending on location; parking lanes must be a minimum seven feet wide.
- On local streets travel lanes are as narrow as nine feet and parking lanes are as narrow as six feet wide. Therefore, travel lane widths of 9 and 9.5 feet and parking lane widths of 6 and 6.5 feet were considered for local streets.

Morris Street, north of Laguna Park Way

- Street classification and jurisdiction are important factors when considering a reduction in travel lane widths. For example, a 9 or 9.5-foot lane width would be too narrow for arterial or collector streets but would be reasonable on some local streets. A City of Sebastopol arterial street may have sufficiently low travel speeds and volumes that 10 or 10.5-foot lane widths would be adequate, but a lane width less than 10.5 feet is expected to be unacceptable on a State-owned arterial street. These factors were considered in making recommendations, though exceptions were considewred under certain conditions.
- Standard bike lanes may be five or six feet wide. In constrained situations, non-standard bike lane widths of four feet were considered on local streets but not on Caltrans maintained streets.
- Where bike lanes were determined to be infeasible or unacceptable, alternatives included use of the Shared Roadway bicycle markings ("sharrows"). See the full description of "sharrows" which follows including excerpts from the *California Manual on Uniform Traffic Control Devices* (MUTCD-CA) and the National MUTCD that provide guidance on the application of these markings.
- Per MUTCD-CA requirements "'sharrows'" are permitted only where there is existing on-street parallel parking (Section 9C.103). The deployment of "sharrows" where on-street parking is prohibited would conform to the National MUTCD standards; however, it would

not conform to MUTCD-CA standards. This non-standard approach was considered in some cases.

- California law, per the *California Vehicle Code* (Section 21202), permits the implementation of bike lanes on a one-way street on either the right or left side of the road. However, based on a scan of existing one-way streets with bike lanes in California, the most common practice is to implement bike lanes on right side of the street. Where bike lanes were considered for installation on one-way streets, this 'right-side only' convention was applied.

- Continuity of facilities was considered in order to create a logical and safe system of roadway signs and markings. For example, it is reasonable to install bike lanes on adjacent segments rather than install them for short distances on non-contiguous street segments even if the road width is sufficiently wide. Public safety and liability concerns were also considered, including bicycle crash history, in order to create a safe transportation network for all travel modes.

Bicycle Facility Alternatives

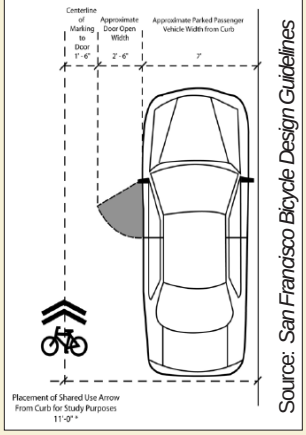
Where the bike lanes are either infeasible or would require modifications which are not acceptable to the community (such as removal of parking), alternative bicycle facilities were considered which may be more feasible and/or appropriate for the street segment in question. A total of five (5) alternative bicycle facilities were considered, including three types of standard facilities and two non-standard. The three standard facilities are defined in the MUTCD-CA. The alternatives are listed in a hierarchy of preference:

- Standard Class II Bikeways (bike lane markings)
- Standard Shared Roadway bicycle markings (shared lane markings aka "sharrows")
- Non-standard application of bike lane markings
- Non-standard application of shared lane markings
- Standard Class III Bikeways (bike routes)

Shared Lane Marking

The SLM consists of a standard bicycle symbol combined with chevron arrows.

Positional Layout of Shared Lane Markings



Source: *San Francisco Bicycle Design Guidelines*

Shared Lane Markings

The shared lane marking (SLM), known as "shared roadway bicycle marking" in the MUTCD, and as "sharrows" by the bicycling public, is a pavement legend which may be placed in the travel lane adjacent to on-street parking. The purpose of the marking is to provide positional guidance to bicyclists on roadways that are too narrow to be striped with bike lanes. Unlike bike lanes, a SLM does not designate a particular part of the street for the exclusive use of bicyclists. It is simply an informational marking to guide bicyclists to the best place to ride on the road to avoid the "door swing" of parked cars, and to help motorists expect to see and share the lane with bicyclists. The marking gives bicyclists freedom to move further to the left within a travel lane rather than brave the door zone, squeezed between moving and parked cars. The marking is usually repeated every several hundred feet. Without such markings, bicyclists might seek refuge on the sidewalk, ride in a serpentine pattern between parked vehicles, or travel in the wrong direction. Perhaps the most important benefit of SLM is that they send a message to cyclists and drivers alike that bikes belong on the road.

Shared Lane Markings were approved for use in California in 2007 after device testing was performed by the City of San Francisco. While the version of the 2010 MUTCD adopted by California specifies that the device is to be used only where there is existing on-street parallel parking (Section 9C.103), the national MUTCD provides for use of the device on streets without on-street parking. Further, jurisdictions around the nation are recognizing the benefit of utilizing the device in locations where it may not be obvious where cyclists should be riding, such as at intersections with multiple turn lanes, as a guide marking through intersections (similar to skip lines), and as a guide-marking between bikeways.

Marking Placement

Laterally – According to the California MUTCD guidelines, SLM shall be placed so that the centers of the markings are a minimum of 11 feet from the curb face or edge of paved shoulders, and the distance may be increased beyond 11 feet. According to the National MUTCD, if SLM are used on a street without parking, the markings should be placed far enough from the curb to direct cyclists away from gutters, seams, and other obstacles, or near the center of the lane if the lane is less than 14 feet wide.

Longitudinally – SLM should be placed immediately after intersections and spaced at intervals of 250 feet. The longitudinal spacing of the markings may be increased or decreased as needed for roadway and traffic conditions (Source: *2010 CA MUTCD*).

MUTCD Guidance

Guidance from the *2010 California Manual on Uniform Traffic Control Devices* and the *2009 National Manual on Uniform Traffic Control Devices* on the function of bicycle markings and the use of the Shared Roadway Bicycle Marking is provided below.

2010 California MUTCD

Section 9C.01 Functions of Markings

Support: Markings indicate the separation of the lanes for road users, assist the bicyclist by indicating assigned travel paths, indicate correct position for traffic control signal actuation, and provide advance information for turning and crossing maneuvers.

Section 9C.103 (CA) Shared Roadway Bicycle Marking

Option: The shared roadway bicycle marking shown in Figure 9C-104(CA) may be used to assist bicyclists with positioning on a shared roadway with on-street parallel parking and to alert road users of the location a bicyclist may occupy within the traveled way.

Standard: The shared roadway bicycle marking shall only be used on a roadway (Class III Bikeway (Bike Route) or Shared Roadway (No Bikeway Designation) which has on-street parallel parking. If used, shared roadway bicycle markings shall be placed so that the centers of the markings are a minimum of 3.3 m (11 ft) from the curb face or edge of paved shoulder. On State highways, the shared roadway bicycle marking shall be used only in urban areas.

Option: For rural areas, the SHARE THE ROAD (W16-1) plaque may be used in conjunction with the Bicycle Warning (W11- 1) sign (see Sections 2C.51 and 9B.18).

Support: Information regarding classification of rural versus urban roadways can be found at the Caltrans website: www.dot.ca.gov/hq/tsip/hpms/Page1.php

Guidance: If used, the shared roadway bicycle marking should be placed immediately after an intersection and spaced at intervals of 75 m (250 ft) thereafter.
If used, the shared roadway bicycle marking should not be placed on roadways with a speed limit at or above 60 km/h (40 mph).

Option: Where a shared roadway bicycle marking is used, the distance from the curb or edge of paved shoulder may be increased beyond 3.3 m (11 ft). The longitudinal spacing of the markings may be increased or reduced as needed for roadway and traffic conditions. Where used, bicycle guide or warning signs may supplement the shared roadway bicycle marking.

2009 National MUTCD

Section 9C.07 Shared Lane Marking

Option: The Shared Lane Marking shown in Figure 9C-9 may be used to:

a. Assist bicyclists with lateral positioning in a shared lane with on-street parallel parking in order to reduce the chance of a bicyclist's impacting the open door of a parked vehicle,
b. Assist bicyclists with lateral positioning in lanes that are too narrow for a motor vehicle and a bicycle to travel side by side within the same traffic lane,
c. Alert road users of the lateral location bicyclists are likely to occupy within the traveled way,
d Encourage safe passing of bicyclists by motorists, and
e. Reduce the incidence of wrong-way bicycling.

Guidance: The Shared Lane Marking should not be placed on roadways that have a speed limit above 35 mph.

Standard: Shared Lane Markings shall not be used on shoulders or in designated bicycle lanes.

Guidance: If used in a shared lane with on-street parallel parking, Shared Lane Markings should be placed so that the centers of the markings are at least 11 feet from the face of the curb, or from the edge of the pavement where there is no curb.
If used on a street without on-street parking that has an outside travel lane that is less than 14 feet wide, the centers of the Shared Lane Markings should be at least four feet from the face of the curb, or from the edge of the pavement where there is no curb.
If used, the Shared Lane Marking should be placed immediately after an intersection and spaced at intervals not greater than 250 feet thereafter.

Option: Section 9B.06 describes a Bicycles May Use Full Lane sign that may be used in addition to or instead of the Shared Lane Marking to inform road users that bicyclists might occupy the travel lane.

Existing Conditions

A comprehensive inventory of existing conditions was completed for the study segments. This effort included compiling traffic volume information, researching and evaluating a variety of collision data, and conducting a physical inventory of the study street segments. This information was useful in identifying the existence of any physical constraints, together with providing key operational characteristics. Such information was essential for conducting an analysis of the opportunities and constraints associated with development of bike facilities along each street.

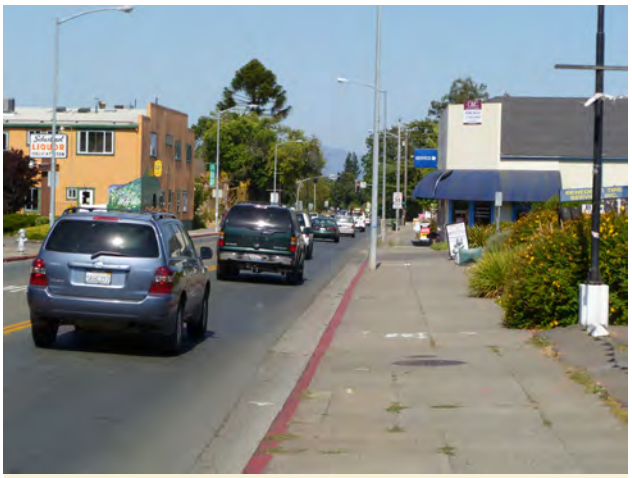
Street Inventory

An inventory of the geometrics of the study segments was completed in June and July of 2010 in order to provide the details necessary for evaluating the opportunities and constraints associated with installation of bike facilities on the 18 study street segments. The inventory included obtaining the operational elements of each street such as lane configuration, lane widths, sidewalk widths, parking conditions, total paved widths, segment lengths, posted speed limits, and pedestrian crossing facilities. Because each street included a variety of characteristics, the study segments were broken down into smaller segments with consistent features. In total, the study area was broken into 74 sub-segments, with the information recorded on 'Lane Configuration Worksheets', copies of which are provided in Appendix A. A sample worksheet for Morris Street is shown in Figure 2, with the location of all segments shown in Figure 3, and a tabulated summary provided in Table 2.

Street surface conditions such as can be found on streets in disrepair also constitute a physical constraint that may affect the feasibility of development of bicycle facilities. For example, pot holes, bad pavement, steep cross-grades, drain inlets, and roadside ditches can constitute hazards to bicycle travel, affecting the ability of a jurisdiction to install bike lanes. An inventory of these surface conditions is outside the scope of this evaluation, though it is recognized that such an inventory will be necessary. At such time as the project design phase commences, such an inventory may result in a finding that bike lanes cannot be installed without prior repair on one or more streets recommended in this evaluation for bike lane installation. It is also acknowledged that such repairs have cost and prioritization implications.

North Main Street looking south near Wallace Street

North Main Street near Analy High School



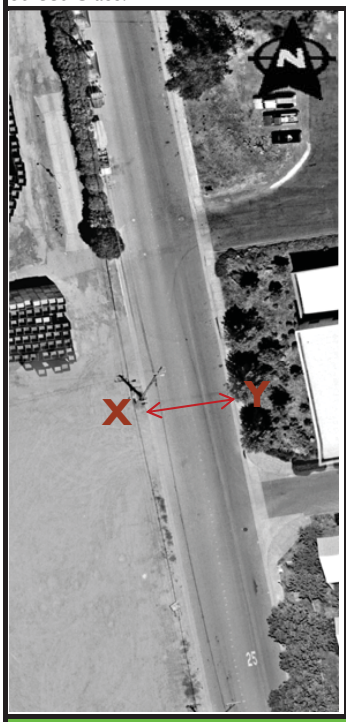
Sebastopol Avenue looking east just past Petaluma Avenue

Lane Configuration Worksheet

Street: Morris Street	Jurisdiction: City of Sebastopol
Segment: 1-From Sebastopol Ave to Eddie Lane	

Street Characteristics

Length (ft):	2025'	Posted Speed Limit (MPH):	25
ADT:	3,300	Sidewalk Width (ft):	0'-5'
Street Class:	Local	Number of PED XINGS within segment:	1



Alternatives	Parking	Bike Lane	Travel Lane	Median/Turn	Travel Lane	Bike Lane	Parking	Curb to Curb	Balance
Exsting Conditions									
	8	-	14	-	14	-	8	**44**	N/A
Alternatives									
Bike Lanes									
A	7	5	10	-	10	5	7	**44**	0
B	8	5	13	-	13	5	-	**44**	0
C									
D									
Shared Lane Markings									
E	8	SLM		-	SLM		8		
		22			22			**44**	0
Combination or Class III									
F									

Recommendations

Improvement Estimate:

Design Guidelines							Notes:
Jurisdiction / Roadway Type	Parking	Bike Lane	Travel Lane	Median	TWLTL	Shared	Section just north of SR 12 with turn lane would require the elimination of parking. Alt B would result in substandard 4 foot bike lanes.
Caltrans	8	5	12	11	11	15	
City Residential	7	5	10	N/A	10	N/A	
City Arterial	7	5	11	11	10	14	

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Figure 3

Study Segments

Table 2
Lane Configuration Worksheets Summary

Segment #	Street Name	Segment Name	Curb to Curb	ADT	Jurisdiction
1	Morris St	From Sebastopol Ave to Eddie Ln	44'	3,300	City of Sebastopol
1A	Laguna Park Way	From Morris St to McKinley St	40'	5,000	City of Sebastopol
2	Petaluma Ave	From South Main St to Palm Ave	43'	13,000	State of California
3	Petaluma Ave	From Palm Ave to Barnes Ave	40'		
4A	Petaluma Ave	From Barnes Ave to 100' south of Burnett	40'		
4B	Petaluma Ave	From 100' south of Burnett to Sebastopol Ave	40'		
5	Petaluma Ave	From Sebastopol Ave to McKinley St	40'		
6	Sebastopol Ave	From Morris St to Brown St	43'	24,000	State of California
7	Sebastopol Ave	From Brown St to Petaluma Ave	40'		
8	Sebastopol Ave	From Petaluma Ave to Main St	46'		
9	McKinley St	From Petaluma Ave to Weeks Way	38'	12,800	State of California
10	McKinley St	From Weeks Way to North Main St	33.5'		
11	South Main St	From Petaluma Ave to Palm Ave	36'	14,500	State of California
12	South Main St	From Palm Ave to Willow St	50'		
13	South Main St	From Willow St to Bodega Ave	54.5'		
14	North Main St	From Sebastopol Ave to McKinley St	58'	22,300	
15	North Main St	From McKinley St to Healdsburg Ave	59'		
16A	North Main St	From Healdsburg Ave to Analy Ave	55'	6,000	City of Sebastopol
16B	North Main St	From Analy Ave to Eddie Ln	40'		
17	Healdsburg Ave	From North Main St to Pitt Ave	53'	22,000	State of California
18	Healdsburg Ave	From Pitt Ave to Florence Ave	54'		
19	Healdsburg Ave	From Florence Ave to Murphy Ave	54.5'		
20	Healdsburg Ave	From Murphy Ave to Covert Ln	52'		
21A	Bodega Ave	From North Main St to High St	44'	12,000	City of Sebastopol
21B	Bodega Ave	From North Main St to High St	44'		
22	Bodega Ave	From High St to Florence Ave	38'		
23	Bodega Ave	From Florence Ave to Washington Ave	40'		
24	Bodega Ave	From Washington Ave to Robinson Ave	40'		
25	Bodega Ave	From Robinson Ave to 250' West of Robinson Ave	40'		
26	Bodega Ave	From 250' West of Robinson to Nelson Way	57'		
27	Bodega Ave	From Nelson Way to 300' West of Nelson Way	59'		
28	Bodega Ave	From 300' West of Nelson Way to Virginia Ave	32'		
29	Bodega Ave	From Virginia Ave to Golden Ridge Ave	36'		
30	Bodega Ave	From Golden Ridge Ave to 300' West of Golden Ridge Ave	43'		
31	Bodega Ave	300' West of Golden Ridge Ave to Pleasant Hill Ave North	30'		
32A	Bodega Ave	From Pleasant Hill Ave North to W Hills Cir	55'		
32B	Bodega Ave	From W Hills Cir to Ragle Rd	47'		
33	Bodega Ave	From Ragle Rd to Valley View Ct	38'	6,838	

Table 2
Lane Configuration Worksheets Summary

Segment #	Street Name	Segment Name	Curb to Curb	ADT	Jurisdiction
34	Bodega Ave	From Valley View Ct to City Limits	44.5'		
35	Jewell Ave	From Meadowlark Dr to Woodland Ave	43'	970	City of Sebastopol
36	Jewell Ave	From Woodland Ave to Shaun Ct	40'		
37	Jewell Ave	From Shaun Ct to Hayden Ave	40'		
38	Jewell Ave	From Hayden Ave to Palm Ave	38'		
39	Jewell Ave	From Palm Ave to Leland St	36'		
40	Jewell Ave	From Leland St to Calder Ave	37'		
41	Jewell Ave	From Calder Ave to 100' North of Calder Ave	30'		
42	Jewell Ave	From 100' North of Calder Ave to Willow St	30'		
43	Jewell Ave	From Willow St to 150' South of Bodega Ave	37'	3,500	
44	Jewell Ave	From 150' South of Bodega Ave to Bodega Ave	80.5'		
45	Washington Ave	From Bodega Ave to Murphy Ave	39'	1,000	City of Sebastopol
46	Murphy Ave	From Washington Ave to Valentine Ave	30'	2,500	City of Sebastopol
47	Murphy Ave	From Valentine Ave to Bateley Ct	40'		
48	Murphy Ave	From Bateley Ct to Healdsburg Ave	40'		
49	Valentine Ln	From Murphy Ave St to 100' West of Springdale St	28'	2,500	City of Sebastopol
50	Valentine Ln	From 100' West of Springdale St to Zimpher Dr	40'		
51	Valentine Ln	From Zimpher Dr to Pleasant Hill Ave	40'		
52	Valentine Ln	From Pleasant Hill Ave to Washington Ave	40'		
53	Valentine Ln	From Washington Ave to Ragle Rd	36'		
54	Pleasant Hill Rd	From City Limits to 100' North of Mitchell Ct	36.5'	2,400	City of Sebastopol
55	Pleasant Hill Rd	From 100' North of Mitchell Ct to 250' South of Bodega Ave	22'		
56	Pleasant Hill Rd	From 250' South of Bodega Ave to Bodega Ave	48'		
57	Pleasant Hill Ave N	Fron Bodega Ave to Valentine Ave	40'	3,180	City of Sebastopol
58	Pleasant Hill Ave N	From Valentine Ave to Covert Ln	41'		
59	Covert Ln	From Healdsburg Ave to 150' East of Norlee St	64'	4,200	City of Sebastopol
60	Covert Ln	From 150' East of Norlee St to Pleasant Hill Ave North	53'		
61	Covert Ln	From Pleasant Hill Ave North to 150' West of Teresa Ct	52'		
62	Covert Ln	From 150' West of Teresa Ct to Ragle Rd	46'		
63	Ragle Rd	From Bodega Ave to 100' North of Bodega Ave	46'	3,600	City of Sebastopol
64	Ragle Rd	From 100' North of Bodega Ave to Holly Ct	41'		
65	Ragle Rd	From Holly Ct to Frankel Ln	29'		
66	Ragle Rd	From Frankel Ln to Ragle Pl	29'		
67	Ragle Rd	From Ragle Pl to Valentine Ave	32'		
68	Ragle Rd	From Valentine Ave to 450' North of Valentine	31'		
69	Ragle Rd	From 450' North of Valentine Ave to 100' South of Covert Ln	30'		

Traffic Volumes

Average daily traffic volumes (ADT) were researched and used if published or else collected using machine counters. Traffic volume data for state facilities is published by the Caltrans on their website, www.dot.ca.gov. Volumes were collected for the local Sebastopol streets in early June 2010 in order to capture traffic patterns while local schools were still in session, though work zone traffic control operations for a construction project on several streets was underway and resulted in the need to obtain ADT information via records research. Traffic volumes ranged from 12,800 to 22,300 vehicles per day on SR 116; approximately 6,850 to 12,000 vehicles per day on Bodega Avenue; and 970 to 4,200 vehicles per day on other local streets.

Collision Analysis

Collision Rankings

The California Office of Traffic Safety publishes information and reports evaluating a wide variety of traffic-related collisions, with some reports providing comparisons which can be helpful in determining if a troubling pattern exists. The comparisons are available on the basis of population and on vehicle miles traveled with the lower the percentile, the worse the community appears compared to other communities. Graphs of two collision rankings 2003 to 2008, which are the most recent six years reported, are shown to the right.

According to a review of these collision rankings for 2003 through 2008 Sebastopol consistently ranks within the worst 30th percentile of similar-sized communities in terms of bicycle-involved collisions. One positive trend is that the ranking has improved over the six-year period. No data for 2009 was available from OTS at the time of this analysis.

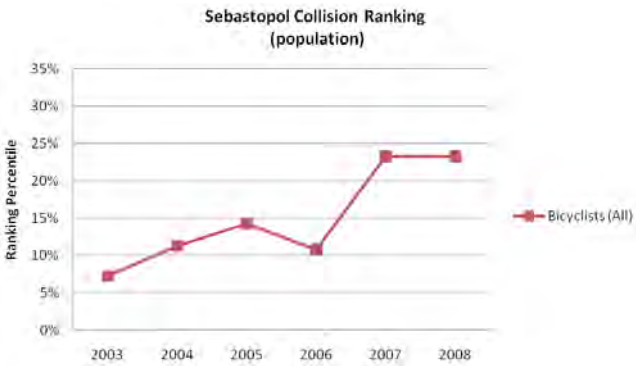
Collision Records

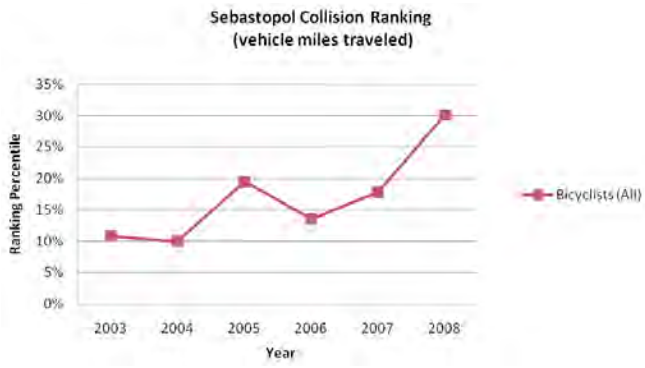
The bicycle collision history for the Sebastopol area was reviewed for a ten-year period from January 1, 1999, through December 31, 2009, to determine any trends or patterns that could indicate safety issues. The collision data was obtained from the California Highway Patrol (CHP) as published in their State Wide Integrated Traffic Records System (SWITRS) reports. There were 62 reported crashes involving bicycles in this ten-year period, indicating an average collision rate of 6.2 bike-involved crashes per year. However, there were only seven crashes reported during the last three years of the review period, 2007 through 2009, indicating a much lower average collision rate of 2.33 bike-involved crashes per year.

Continuing to focus on the seven collisions reported during the last three years it was noted that the fault was assigned fault to the driver for five collisions and the bicyclist for two. Additionally, five of the seven collisions occurred at dusk or when dark. All of the collisions occurred on State highways at intersections within the central business district, including the following locations:

- Main Street/Bodega Avenue
- Main Street/Calder Street
- McKinley Street/Weeks Street/Petaluma Avenue
- Sebastopol Avenue/Petaluma Avenue
- Main Street/Keating Avenue
- Healdsburg Avenue/Florence Avenue
- Main Street/Palm Drive

Four of the seven bicyclists involved in these collisions were proceeding straight along the roadway and were struck broadside by a vehicle during a turning maneuver. It appears that drivers may be unaware of the presence of bicyclists traveling along the downtown streets. Such a pattern may be correctable by providing some type of bicycle facilities, especially in the downtown area.





Feasibility Process

Utilizing the information gathered in the preliminary work effort, including the inventory of existing conditions and an understanding of the design assumptions found acceptable to City and Caltrans staff, the next step was to identify the opportunities and constraints associated with the development of Class II bike lanes or other bicycle accommodations for each of the study corridors. It was also important to present preliminary ideas to the community to obtain feedback. Following is a summary of the tools, methodology, and public involvement that were used in this process.

Fit Matrices Tool

"Fit matrices" were developed to determine the lane types (travel, bike, and parking) and the range of lane widths that could be combined together to fit within the segment's existing curb-to-curb cross section. Two alternative matrices were developed; one to accommodate Class II Bikeway facilities (bike lanes) and the second to accommodate shared lane markings and Class III Bikeways. The matrices present the range of potential lane widths that could be combined to fit within each segment based the following parking scenarios: No Parking Permitted, Parking on One Side of the Street only, and/or Parking on Both Sides of the Street. Both fit matrices include appropriate street classifications based on the *Street System Functional Classification* from the *Sebastopol General Plan* (1994) Chapter II, Transportation. The matrices are included in Appendix B.

Development of Alternatives

- Both fit matrices were applied to each street segment, with the various widths associated with *all possible alternatives* recorded on the Lane Configuration Worksheet under the appropriate headings, including "Bike Lanes," "Shared Lane Markings", and/or "Combination."
- To achieve the objectives of the study, alternatives were identified for each segment that would accommodate Class II bike lanes to the maximum extent practicable.
- In cases where bike lanes appeared to be infeasible and parking is permitted on the street, an alternative was developed which included bike lanes and restricted parking areas.

Covert Lane near Norlee Street

- If the potential of bike lanes appeared to be unacceptable because it would require the removal of parking, other alternatives were developed which either (1) reduced travel lane widths, (2) removed center turn lanes if operationally acceptable and/or (3) utilized "sharrows."
- Consideration was given to the physical placement of "sharrows" where such markings were one of the design alternatives.
- On narrower residential streets or residential streets with very low traffic volumes, consideration was given to the creation of bike routes.
- Notes were included in the worksheet to capture relevant design considerations that were not readily apparent.

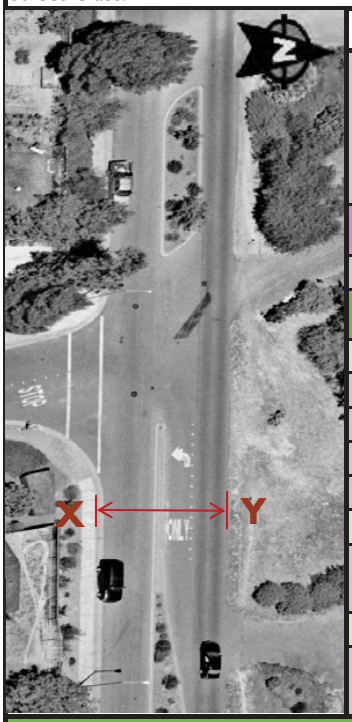
By applying the fit matrices and methodology to the inventory of existing conditions, alternative cross sections for each segment were developed that represent the various bicycle facilities possible for each segment. These alternatives were recorded in the middle section of the Lane Configuration Worksheets included in Appendix A. As an example, five alternatives were developed for the segment of Covert Lane from Teresa Court to Ragle Road (Segment 62). Alternatives A through D include installing bike lanes, either through reducing travel lane widths or parking lane widths, by removing the median, or by installing non-standard bike lanes. Alternative E is a shared lane marking alternative. Alternatives A through E are shown in Figure 4.

Lane Configuration Worksheet

Street: Covert Lane	Jurisdiction: City of Sebastopol
Segment: 62-From 150' West of Teresa Ct to Ragle Rd	

Street Characteristics

Length (ft):	610'	Posted Speed Limit (MPH):	25
ADT:	4,200	Sidewalk Width (ft):	5'8"-0'
Street Class:	Collector	Number of PED XINGS within segment:	1



Alternatives	Parking	Bike Lane	Travel Lane	Turn Lane	Travel Lane	Bike Lane	Parking	Curb to Curb	Balance
Exsting Conditions									
	8	-	12	12	14	-	-	**46**	N/A
Alternatives									
Bike Lanes									
A	6	5	10	10	10	5	-	**46**	0
B	8	5	14	-	14	5	-	**46**	0
C	6	5	9	12	9	5	-	**46**	0
D	6	4	10	12	10	4	-	**46**	0
Shared Lane Markings									
E	8	SLM		12	SLM			**46**	0
	20				14				
Combination or Class III									
F									

Recommendations

Alternative E: Shared Lane Markings

Improvement Estimate:

Design Guidelines	Parking	Bike Lane	Travel Lane	Median	TWLTL	Shared
Caltrans	8	5	12	11	11	15
City Residential	7	5	10	N/A	10	N/A
City Arterial	7	5	11	11	10	14

Notes:

Alt A would require median reconstruction.

Alt B would require median removal.

Alt D would result in non-standard bike lanes.

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Sebastopol Bike Lane Feasibility Study — Figure 4

City of Sebastopol — Covert Lane Segment 62 Lane Configuration Worksheet

Corridor Continuity

The context of the segments within their respective street corridors was a consideration in determining the recommended alternative, with the principle of continuity along the street corridor an essential design consideration. Continuity of facilities is critical in creating a logical and safe system of roadway signs and markings. Another consideration was the local travel paths bicyclists utilize within Sebastopol when traveling between home and local destinations. While the bicycle facilities are expected to serve the bicycling community in general as well as in regional terms, these facilities will also serve Sebastopol residents in their short-distance bicycle trips.

Public Workshop

A community workshop was held on October 28, 2010, at Park Side Elementary School to present the draft recommendations to the public and solicit public comments. The workshop included a presentation that summarized the work, the guiding principles of the effort, and the segment alternatives. Copies of the lane configuration worksheets were available and maps were posted on the walls and provided as handouts. Participants were invited to view and comment on the alternatives and recommendations for individual segments within each corridor. Attendees were given comment cards and four weeks to provide additional comments or suggestions, with the comments directed to City staff.

Twenty-three community members attended the workshop and signed the meeting roster, noting their name, address and affiliation with an organization in some cases. Many comments focused on bicycle safety or the lack of facilities that created a feeling of safety, and many comments were on the inconvenience of reduced street parking. The workshop notification and sign in sheet are provided in Appendix C. Also included in this appendix is a list of the verbal comments received at the workshop which were transcribed on flip charts during the meeting, together with comment cards and email comments received in October and November.

Due to the concerns mentioned at the workshop associated with the loss of parking, additional work was performed to determine the number of parking spaces proposed to be removed, together with determining the demand associated with these parking spaces.

Healdsburg Avenue, heading north on SR 116 at Harrison Street

South Main Street near Walker Avenue

Parking Survey

An inventory of street parking was performed in November and December 2010 in order to quantify the parking supply along the study segments where a reduction in the parking supply was being considered. Most of the streets have unmarked spaces, and parking along the curb may result in inefficient use of the space. In addition to determining the parking supply, an inventory of the demand for these spaces was performed on five occasions, including three surveys during normal business hours on a weekday, (Monday, November 8, Monday, November 29, and Tuesday, December 14), and two surveys during evening hours, one on a weekday, (Tuesday November 30 at 10:00 p.m.) and one on a weekend, (Friday, December 3, 2010, at 10:00 p.m.) Table 3 provides a summary of the parking survey locations and associated parking use, with inventory details included in Appendix D.

Table 3
Parking Supply and Demand

Street Segment Segment Limits	Side of the Street	Parking Supply (Number of Spaces)	Parking Demand (Number of Parked Vehicles)
Bodega Avenue			
Golden Ridge to Virginia	North Side	8	0
Virginia to Nelson		7	0
Sub-total		*15*	*0*
Petaluma Avenue			
Joe Rodota Trail to Fannen	East Side	5	0 - 2
Fannen to Walker		12	0 - 6
Walker to Palm		24	1 - 9
Sub-total		*41*	*1 - 17*
Laguna Park Way			
Morris St to McKinley St	South Side	31	0 - 1
Morris Street			
Sebastopol to Laguna Park Wy	East Side	14	0 - 2
North Main Street			
Analy High to Eddie Ln	East Side	17[1]	0 - 14
Healdsburg Avenue			
Harrison to Cleveland	North Side	7	0 - 1
Cleveland to Ellis		9	0 - 4
Ellis to Dufranc		13	0 - 10
Sub-total		*29*	*0 - 15*
Covert Lane			
Pleasant Hill to w/o Teresa Ct	North Side	27	0
	South Side	28	0
Sub-total		*55*	*0*
Total		**202**	**Varies**

Notes [1] If eliminated, this supply can be replaced by removing the parking restrictions on the west side of the street south of Analy Avenue

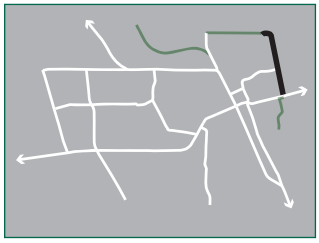
Following is a brief summary of the parking survey results:

- No cars were observed parked during any of the five survey periods in any of the spaces on Bodega Avenue where parking removal would be necessary to fit bike lanes.
- Of the 41 parking spaces on the east side of Petaluma Avenue south of Sebastopol Avenue, the number of vehicles parked ranged between one and 17.
- On Laguna Park Way, out of 31 parking spaces on the south side of the street, no vehicles were observed parked during the five survey days. Additionally, five vehicles were observed parked during the five survey periods on the north side of the street.
- Of the 14 possible parking spaces on the east side of Morris Street south of Laguna Park Way no more than two vehicles were parked at one time.
- 14 out of the 17 parking spaces along Analy High School were occupied during the survey periods, indicating a high parking demand on North Main Street north of Healdsburg Avenue.
- A maximum of 15 of the 29 spaces on the north side of Healdsburg Avenue were occupied during the survey periods.
- No cars were observed parked during any of the five survey periods in any of the spaces on Covert Lane where parking removal would be necessary to fit bike lanes.

Segment Evaluations and Recommendations

Based on application of the evaluation criteria, including bicycle facility alternatives, design assumptions, and existing conditions of the study segments, preliminary recommendations for a network of bicycle facilities were developed. After a study session presentation to the City Council in February 2011, requested plan modifications were completed and additional evaluation was completed and submitted to Caltrans to determine their level of support. Following are descriptions of the final recommendations, which are shown graphically in Figure 5.

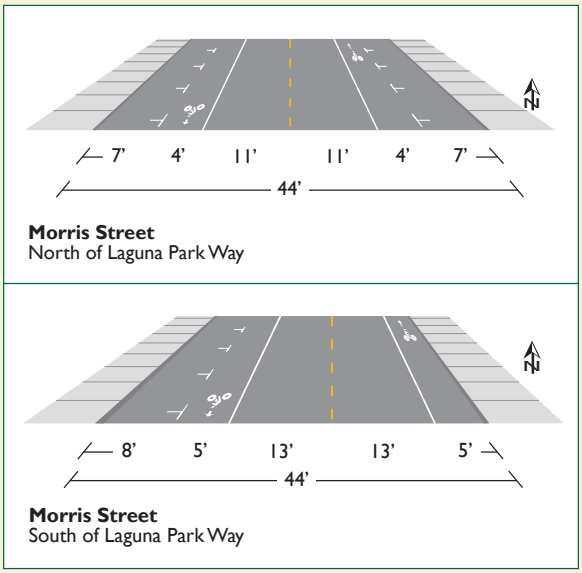
Morris Street



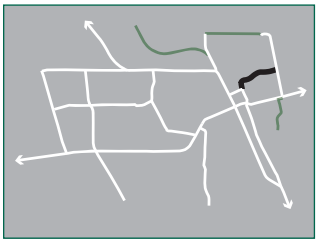
Morris Street is a north-south oriented street located between Sebastopol Avenue and Eddie Lane. In addition to serving several industrial land uses with higher than average volumes of heavy vehicles, Morris Street provides access to the Sebastopol Community Center, Laguna Park, Laguna trails, several City service buildings and meeting locations. It is strategically located for regional bicyclists, providing an important link to two Class I bike paths, the north-south Joe Rodota Trail and the path along Eddie Lane, as well as a connection to Laguna Park Way and Downtown.

The street is 44 feet wide with two wide travel lanes and parking on both sides. Installation of bike lanes would require narrow travel lanes or narrow bike lanes, or the elimination of parking. For example, street parking is commonly used on the segment north of Laguna Park Way and the significant number of heavy vehicles on the corridor would be best served by a minimum 11-foot travel lane. In order to add bike lanes while maintaining parking and 11-foot travel lanes, the width of the bike lanes would be limited to four feet. The segment south of Laguna Park Way includes a southbound left-turn lane at the signalized intersection of Sebastopol Avenue. 14 parking spaces are provided along the east side of the street but this parking is underutilized, as evidenced from the parking surveys which indicated a maximum of two vehicles parked in these spaces; if parking is eliminated bike lanes could be installed.

Recommendation: Install narrow bike lanes on Morris Street north of Laguna Park Way. Install standard bike lanes south of Laguna Park Way through the elimination of 14 parking spaces on the east side of the street.

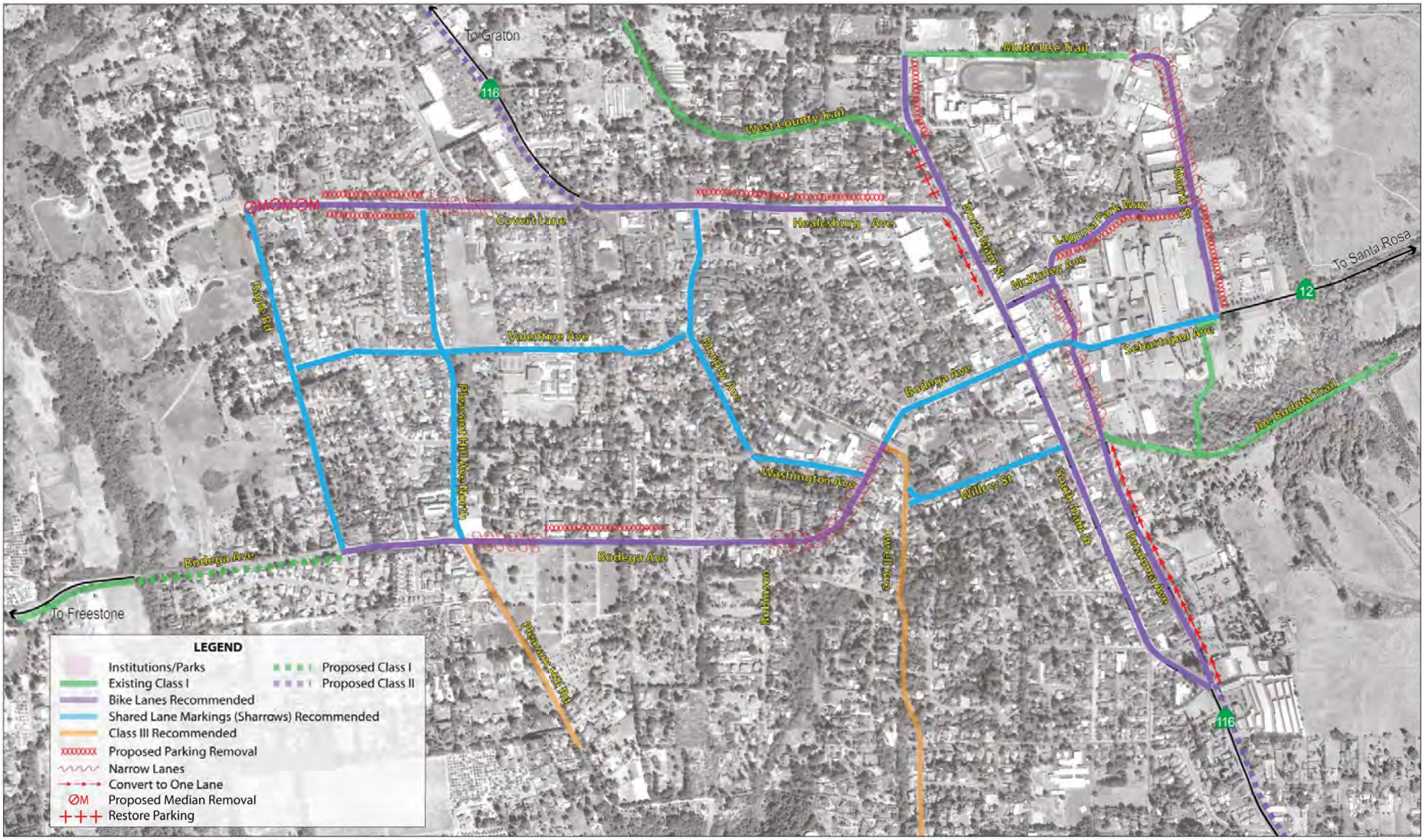


Laguna Park Way



Laguna Park Way runs east-west Morris Street and McKinley Street, providing access to City Police Department offices, the Community Skate Park, residential neighborhood streets to the north, connections to Analy High School and several commercial establishments, including a movie theater. It provides an alternate east-west route through the central business district to Sebastopol Avenue, which has a very high volume and is physically constrained.

This one-quarter mile long street is 40 feet wide and has two travel lanes and parking lanes, so is too narrow to accommodate bike lanes unless parking is prohibited on one side. There are 62 parking spaces available on the street, including 31 spaces on each side of the street. The highest demand for parking during the inventory period was observed at 10 p.m. on



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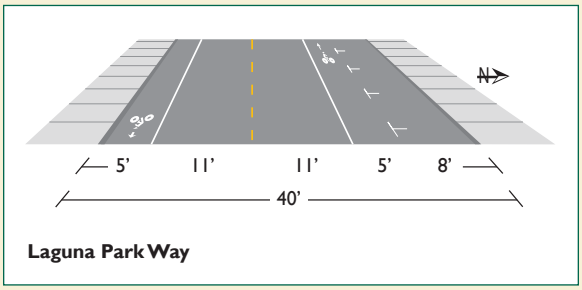
Sebastopol Bike Lane Feasibility Study
City of Sebastopol

Figure 5
Recommendations

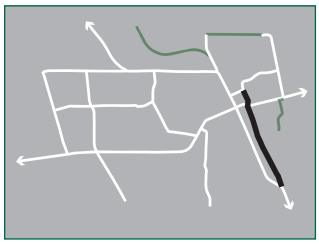
Friday evening, December 3, with one parked vehicle observed on each side of the street between Johnson Street and Flynn Street. However, it should be noted that several vehicles are observed parking in this area during after-school hours and on weekends when the skate park has its highest activity. If parking were removed on one side 31 spaces would remain, which would be adequate to accommodate the existing demand; if the parking demand were to exceed this supply on occasion, vehicles would be expected to park on McKinley Street east of Petaluma Avenue.

Recommendation: Eliminate 31 parking spaces on one side of Laguna Park Way and install bike lanes. The side of the street where parking would be eliminated remains to be determined.



Laguna Park Way

Petaluma Avenue



Petaluma Avenue is part of the SR 116 corridor, the most-traveled north-south transportation route in Sebastopol, providing connections to communities north and south of town, including Graton and Petaluma, and access to many important local destinations, including commercial enterprises, a hospital, and numerous residential communities. It intersects Sebastopol Avenue, also known as SR 12, and the Joe Rodota Trail, a Class I multi-use path that is one of the most traveled bicycle facilities within Sonoma County. From South Main Street to McKinley Street, the street is the northbound half of a one-way couplet, with South Main Street and a portion of North Main Street constituting the southbound half of the couplet. To the south Petaluma Avenue becomes Gravenstein Highway South, which is a three-lane, two-way facility. Caltrans is expected to replace the striped shoulders with bike lanes on this section which is not a part of the study area.

Petaluma Avenue carries approximately 13,000 vehicles per day within two travel lanes; parking is permitted on both sides south of Burnett Avenue and north of Sebastopol Avenue. Caltrans staff has indicated support for restriping their roadway for the installation of bike lanes on Petaluma Avenue under several conditions, including minimum 11-foot travel lanes and five-foot bike lanes. This is possible if parking is removed along one side, or if parking is to be maintained, by elimination of one northbound travel lane south of the Joe Rodota Trail.

The survey results of the parking demand along the east side of Petaluma Avenue indicates that there is a distinct increase in demand for parking spaces north of Sebastopol Avenue as compared to south of Sebastopol Avenue. For example, of the 24 parking spaces available between Palm Avenue and Walker Avenue, either four or five vehicles were parked during daytime hours, one was parked on a Tuesday at 10 p.m. and nine vehicles were parked on a Friday night at 10 p.m. The majority of these spaces were vacant during all observation periods. This pattern was also evident in the segments between Walker Avenue and Fannen Avenue and between Fannen Avenue and Joe Rodota Trail (there is no parking permitted between Joe Rodota Trail and Sebastopol Avenue). However, the 11 parking spaces in the heavily commercialized business district north of Sebastopol Avenue are consistently occupied during daytime hours, ranging between five and seven vehicles on the dates that the surveys were conducted.

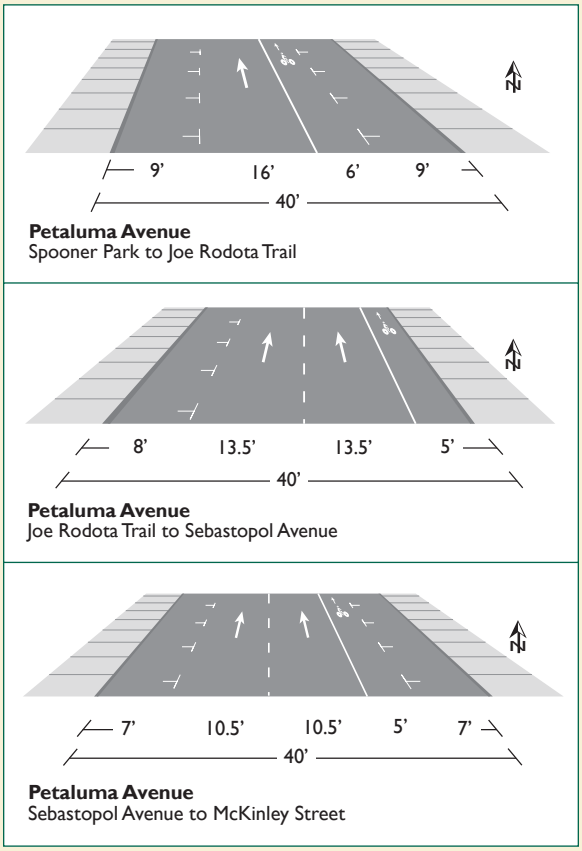
Based upon City Council direction, additional information was provided to Caltrans in order to determine their support for the various alternatives under consideration. Corridor lane configuration drawings were created to provide geometric concepts on the transitions between a proposed single northbound travel lane from Gravenstein Highway South and the Joe Rodota Trail, and the existing two- and three-lane configurations between the Joe Rodota Trail and Sebastopol Avenue. Based on the additional evaluation, Caltrans has indicated that the single northbound lane south of the Joe Rodota Trail and the narrow lane configuration between Barnes Avenue and Sebastopol Avenue appear to be acceptable, though it is likely that they will specify particular improvements at such time as detailed

bike lane design plans are submitted for their review and approval. In addition, truck turning templates were developed for the intersections of Petaluma Avenue/Sebastopol Avenue and Petaluma Avenue/ McKinley Street in order for Caltrans to assess the acceptability of the proposed lane configuration to accommodate large vehicle turning maneuvers in this segment, which they have indicated is also acceptable. They also indicated a concern regarding the operations of the intersection of Petaluma Avenue/ McKinley Street due to the potential conflicts with bicyclists in the proposed bike lane turning left from Petaluma Avenue onto McKinley Street and motorists proceeding north onto Laguna Park Way. "Bike tracking pavement markings from Petaluma Avenue to McKinley Street through the intersection may be an appropriate design element. The conceptual lane configuration drawings and truck turning templates are provided in Appendix E.

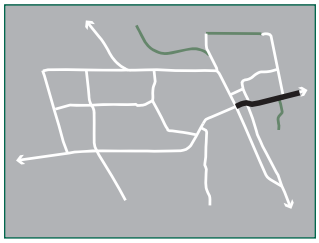
Caltrans has also reiterated that the preferred alternative that includes a combination of 10.5-foot travel lanes plus a five-foot bike lane and seven-foot parking lanes on Petaluma Avenue between Depot Street and McKinley Street would require approval of a Design Exception. In the event that they do not approve this configuration, a continuous bike lane on Petaluma Avenue would require parking removal on the east side of the street in this block, which is recommended if the preferred alternative is not approved. This would result in the loss of eleven parking spaces on the east side of the street between Depot Street and McKinley Street. Another alternative would be widening the street slightly on the east side.

Recommendation: Install bike lanes on Petaluma Avenue. This can be accomplished as follows:

- *South of Joe Rodota Trail* – eliminate one northbound travel lane, install a single six-foot bike lane on the east side of the street, and maintain parking on both sides of the street.
- *Between Joe Rodota Trail and Barnes Avenue* – maintain two 12-foot travel lanes and an eight-foot parking lane on the west side of the street, and install a six-foot bike lane on the east side of the street.
- *Between Barnes Avenue and Sebastopol Avenue* – maintain the existing three northbound travel lanes, but reduce the width of the number two through-lane in order to accommodate a single northbound five-foot bike lane.
- *Between Sebastopol Avenue and Depot Street* – install a single northbound six or seven-foot bike lane, and maintain the existing two wide travel lanes.
- *Between Depot Street and McKinley Street* – install a five-foot bike lane by creating two 10.5-foot travel lanes and two seven-foot wide parking lanes (preferred alternative). If unacceptable to Caltrans as may be discovered in their Design Exception process, remove 11 parking spaces on the east side of the street in order to add a single northbound bike lane and also maintain two sufficiently wide travel lanes and an eight-foot parking lane on the west side of the street. If this alternative is not acceptable, widen the street by several feet.
- Intersection transitions will require more effort during the design phase. For example, through-intersection markings of the bike lane may be an appropriate design element for turn through the intersection of Petaluma Avenue/McKinley Street, given Caltrans' concern for intersection operations.

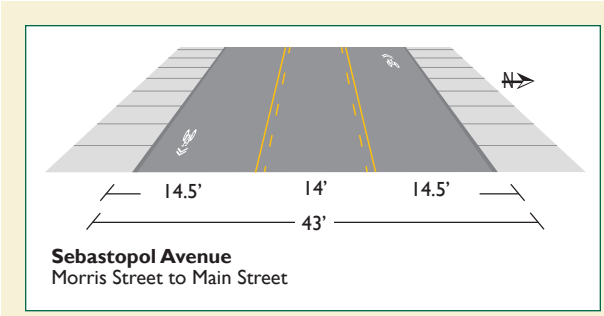


Sebastopol Avenue

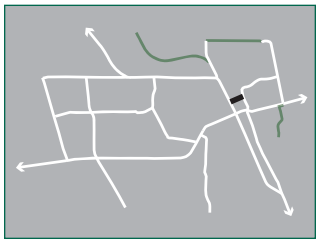


Sebastopol Avenue from Morris Street to Main Street is a state highway, also known as SR 12. It consists of three travel lanes with no street parking. It carries 24,000 vehicles per day and is an essential east-west transportation corridor in Sebastopol. The only way to accommodate bike lanes in the segment between Brown Street and Petaluma Avenue would require sub-standard bike lane widths combined with a 10.5-foot wide turn lane, which Caltrans does not support, or widening of the roadway, which is infeasible due to expense. Though the segments on either side of this are less constrained and bike lanes could fit, continuity of facilities is important, which is why bike lanes are not recommended on Sebastopol Avenue. It is recommended that shared lane markings be installed as they provide a visible indication that bicyclists should be expected to ride within the travel lanes and also guide the bicyclists to be part of the main travel flow.

Recommendation: Install shared lane markings on Sebastopol Avenue.

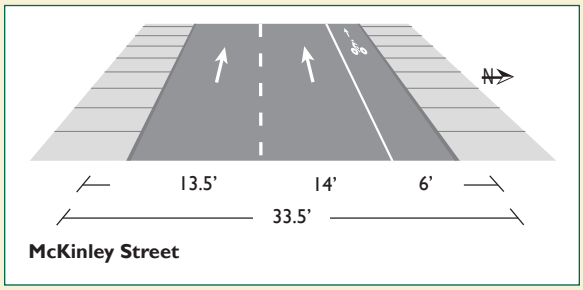


McKinley Street

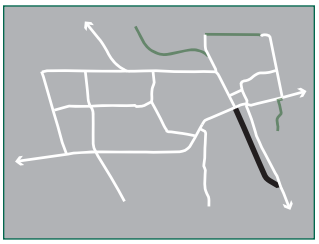


McKinley Street is a one-way street that is part of the SR 116 one-way couplet as an extension of Petaluma Avenue northbound. It is located within the central business district and has an ADT of approximately12,800 vehicles carried on two travel lanes. The existing striped shoulders and extra wide travel lanes can be reallocated for a single westbound bike lane, which is recommended. There is no parking on either side of the street in this block.

Recommendation: Install a westbound bike lane on the north side of McKinley Street.

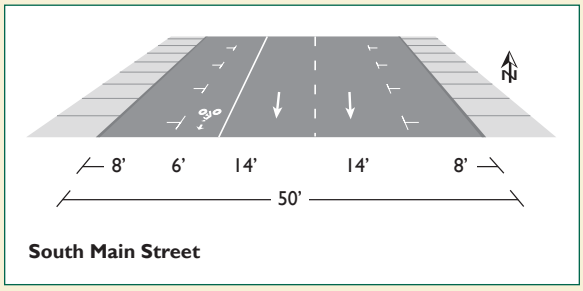


South Main Street

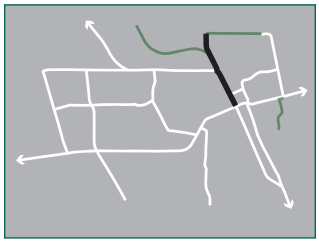


This Caltrans-maintained one-way street is part of the SR 116 corridor and varies in width between 36 and 54 feet. As a one-way street, a single southbound bike lane is sufficient and this can be accommodated without the loss of any parking. It is recommended that a bike lane be installed on South Main Street.

Recommendation: Install a southbound bike lane on the west side of South Main Street.



North Main Street



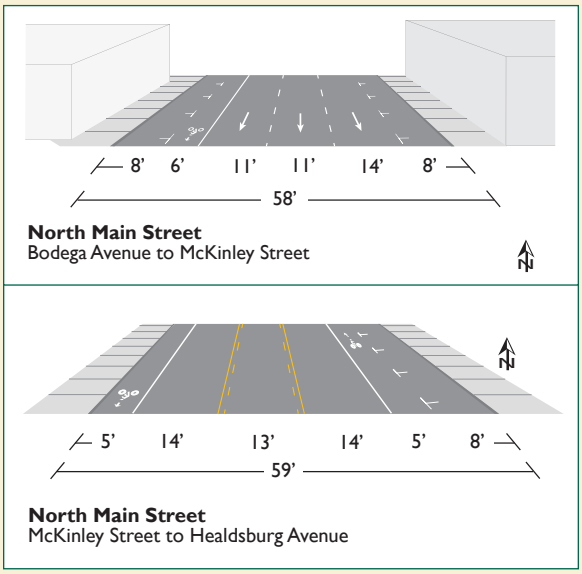
North Main Street has different configurations within the Caltrans-maintained segment and the two segments that are City-owned.

Caltrans Segment

The Caltrans segment has a three-lane one-way configuration between McKinley Street and Bodega Avenue/Sebastopol Avenue, and four lanes with two-way travel north of McKinley Street, to Healdsburg Avenue, with both segments forming a portion of the SR 116 corridor. This corridor is the essential north-south transportation route in Sebastopol, providing connections to communities north and south of town and access to many important local destinations, including the central business district and other business districts, a hospital, and numerous residential communities. It carries approximately 22,300 vehicles per day; parking is permitted on both sides south of McKinley Street and along the east side only north of McKinley Street.

Caltrans staff has indicated support for restriping their roadway for the installation of bike lanes on North Main Street under several conditions, including 11-foot travel lanes and five-foot bike minimum lane widths. On the one-way segment, only one bike lane on the west side is necessary and there is ample roadway width to accomplish this reconfiguration. However, for the two-way segment between McKinley Street and Healdsburg Avenue bike lanes would be needed on both sides of the street. To maintain street parking on the east side in this heavily commercialized business district, the elimination of one of the two southbound travel lanes would be necessary in order to fit the bike lanes and parking within the existing street width. Conceptual geometric configurations and capacity calculations indicate that the minimum lane widths and level of service (LOS) standards required by city and state operational guidelines would be met with the reduced number of lanes, with the intersection of North Main Street/McKinley Street expected to operate at LOS C under existing and future (Year 2035) traffic volumes. The conceptual lane configuration drawings and LOS calculations are provided in Appendix E.

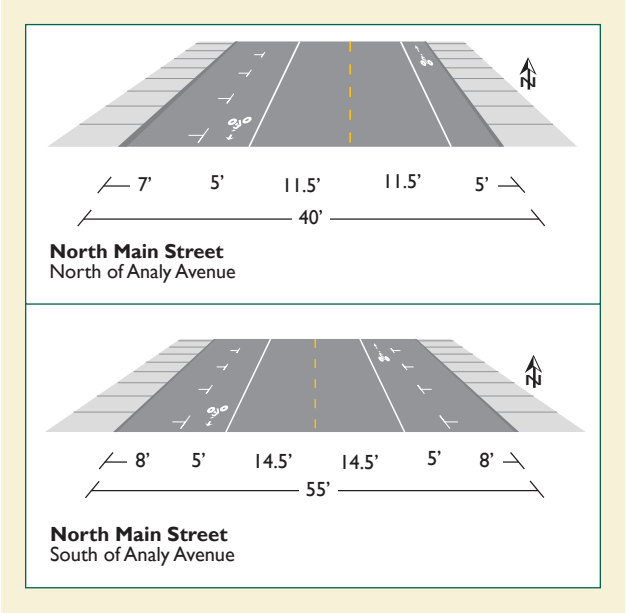
Recommendation: Install a southbound bike lane on the west side of North Main Street between Bodega Avenue and McKinley Street. Install bike lanes on both sides of the street between McKinley Street and Healdsburg Avenue through the elimination of one southbound travel lane.



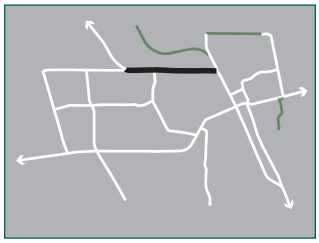
City of Sebastopol Segment

North of Healdsburg Avenue, North Main Street is a local street that carries approximately 6,000 vehicles per day and provides direct access to two multi-use paths, including the West County Trail to the west and the path along Eddie Lane to the east. South of Analy High School it is configured with two travel lanes and parking along the east side of the street, with parking prohibited along the west side of the street. This segment is 55 feet wide, with sufficient space to accommodate two bike lanes without changing parking conditions; in fact, parking could be restored along the west side of the street and still accommodate two bike lanes. However, the segment along the Analy High School frontage and north to Eddie Lane is 40 feet wide and parking would need to be eliminated on one side of the street. Assuming parking is restricted along the high school side, an estimated 17 parking spaces would be lost. However, if parking were restored along the wider segment to the south, parking for 17 vehicles could be restored, essentially relocating the parking supply within close proximity to the high school. The net result is that installing bike lanes would not change the total parking supply along North Main Street.

Recommendation: Install bike lanes on North Main Street between Healdsburg Avenue and Eddie Lane through the prohibition of parking on the east side of the street north of Analy Avenue and the restoration of parking on the west side of the street south of Analy Avenue.



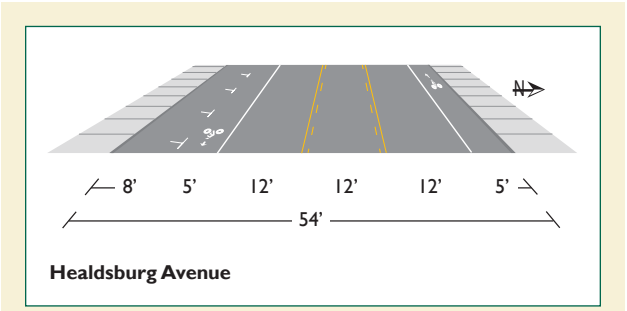
Healdsburg Avenue



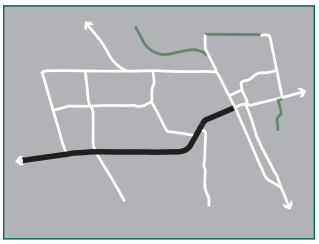
Healdsburg Avenue is also part of the SR 116 corridor, providing two-way travel in three lanes between North Main Street and Covert Lane. The study segment carries 22,000 vpd and varies in width between 52 and 54 feet, with two travel lanes, a center turn lane and parking along both sides except between North Main Street and Pitt Avenue where parking is prohibited. The segment north of Covert Lane is not a part of this study because it is slated for installation of bike lanes as part of a future Caltrans project.

Caltrans staff has indicated that continuity is an essential design feature for installing bike lanes in Sebastopol, with a preference for installing bike lanes along the entire SR 116 corridor rather than intermittently. To install bike lanes on Healdsburg Avenue, it will be necessary to remove parking on one side of the street. If parking were prohibited on the north side of the street, approximately 29 spaces would be lost. During the five parking surveys conducted in November and December, a maximum 15 parked vehicles were observed during normal weekday business hours and a maximum of three parked vehicles were observed during the two night-time surveys, representing 52 percent occupancy and ten percent occupancy, respectively. If this parking supply were eliminated, these vehicles could be parked in parking lots adjacent to the street, on the south side of the street, or along several side streets, including Ellis Court, Dufranc Avenue, Cleveland Avenue, and Harrison Street.

Recommendation: Prohibit 29 parking spaces on the north side of Healdsburg Avenue and install bike lanes.



Bodega Avenue



The Bodega Avenue corridor is more than 1.4 miles in length and because it varies in traffic volumes, roadway width, and parking conditions, it was divided into 16 segments. The traffic volumes are the highest near Main Street, with 12,000 vpd, dropping to approximately 6,800 vpd west of Ragle Road. The road predominantly has two lanes though some segments include a left-turn or right-turn lane at a signalized intersection, or a center turn lane extending for several blocks. Parking is prohibited in some segments and permitted in others, particularly near downtown and where the adjacent land uses are single family homes. This corridor is part of the primary east-west route in Sebastopol, connecting to SR 12 and SR 116 at Main Street, though it is a local road. The concept of continuity was used to

combine the 16 segments into two groups, with bike lanes considered feasible in one group but not in the other.

Bike lanes are not recommended for the group of segments between Main Street and Jewell Avenue because parking would have to be removed and it is highly utilized in this area. For these segments shared lane markings are recommended. The segment between Jewell Avenue and Robinson Road is 40 feet wide, with three travel lanes and no parking. Bike lanes could be installed if the widths of the three travel lanes were reduced from 12 or 14 feet to 10 feet.

The segments between Robinson Road and 300 feet west of Nelson Way have widths of 57 feet or more, and if the unusually wide travel lanes were reduced to standard lane widths, there is adequate road width remaining to install bike lanes.

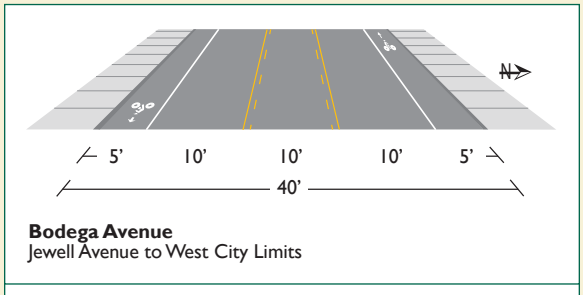
The segments from west of Nelson Way to west of Golden Ridge Avenue are between 32 and 36 feet wide, with two travel lanes and parking permitted on the north side. Parking would need to be prohibited to make room for the bike lanes. None of the 15 parking spaces were occupied during any of the five parking survey periods, indicating significant under-utilization of the parking. The adjacent land uses are multi-family residences with parking lots or developments with frontage on another street where parking is allowed.

The roadway is slightly wider in the segment from west of Golden Ridge Avenue to Pleasant Hill Road/ Pleasant Hill Avenue North and street parking can be maintained, though installation of bike lanes would require reducing travel lane widths to 10 feet in one area near Ragle Road.

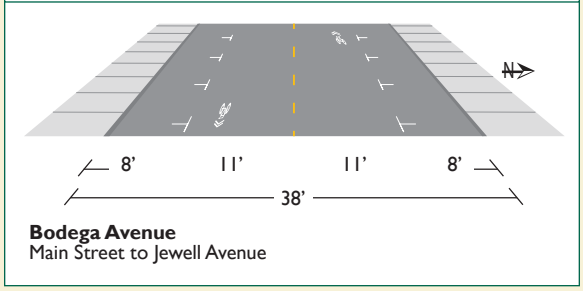
Bike lanes are not recommended for the segments west of Ragle Road because the existing paved travel way is constrained by drainage ditches and narrow steep shoulder grades. It should be noted that the County of Sonoma recently completed construction of a Class I facility on the south side of Bodega Avenue which extends from the intersection with Watertrough Road to the east side of the Atascadero Creek bridge. Given the wide unimproved area on the south side of Bodega Avenue between the terminus of the Class I path and Ragle Road, it is recommended that a Class I bikeway be installed. Such a facility would require expensive road improvements but such improvements are considered a better alternative than shared lane markings because of the newly installed Class I facilities to the west.

Recommendation: Install shared lane markings on Bodega Avenue east of Jewell Avenue and install bike lanes west of Jewell Avenue as follows:

- *Between Jewell Avenue and Robinson Road* – reduce all three travel lanes to 10 feet wide to accommodate five-foot wide bike lanes.
- *Between Robinson Road and 300 feet west of Nelson Way* – five-foot wide bike lanes can fit without any changes other than striping.
- *Between 300 feet west of Nelson Way and Golden Ridge Avenue* – remove 15 parking spaces on the north side of the street to accommodate five-foot wide bike lanes.
- *Between Golden Ridge Avenue and Pleasant Hill Road/Pleasant Hill Avenue North* – reduce both travel lanes to 10 or 11 feet wide as required to fit five-foot wide bike lanes.
- *Between Pleasant Hill Road/Pleasant Hill Avenue North to Ragle Road* – five-foot wide bike lanes can fit without reducing lane widths or eliminating parking.
- *Between Ragle Road and the Atascadero Creek bridge* – install a Class I bikeway along the south side of the street to connect to the existing County of Sonoma Class I facility to the west.

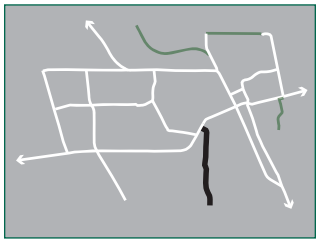


Bodega Avenue
Jewell Avenue to West City Limits



Bodega Avenue
Main Street to Jewell Avenue

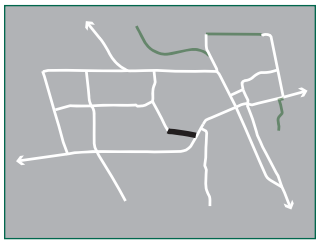
Jewell Avenue



Except between Bodega Avenue and the Willow Street 'triangle', Jewell Avenue has low traffic volumes, suggesting that the nature of the local road is such that bike lanes are unnecessary. Bike lanes are usually installed on well-traveled streets that provide connections to the community and beyond. On low-volume roads such as Jewell Avenue, the bicyclists can ride fairly easily within the travel way without needing an area marked for their exclusive use. Furthermore, shared lane markings do not seem appropriate either, primarily because such markings are most useful where bike lanes are needed, but not feasible. The MUTCD-CA recommends Class III facilities on roads such as Jewell Avenue, with signs posted to indicate that road users should expect bicyclists to use the road for travel along the route, and alert bicyclists to the presence of a route with some connectivity potential.

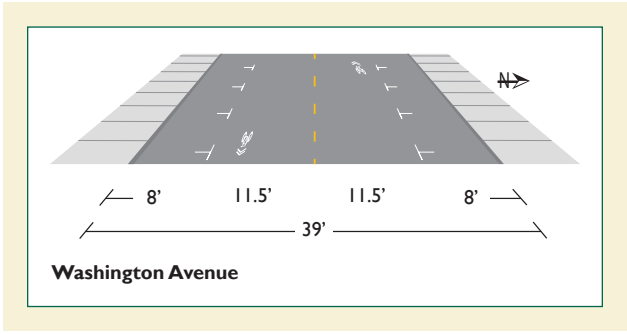
Recommendation: Designate Jewell Avenue as a Class III bikeway.

Washington Avenue

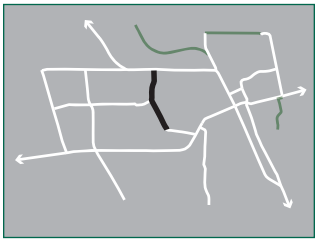


Washington Avenue between Bodega Avenue and Murphy Avenue is a low-volume, low-speed roadway, though it provides side access to Park Side School and is an efficient connection for bicyclists traveling in the area between Bodega Avenue and Healdsburg Avenue. It is 39 feet wide with two travel lanes and parking permitted on both sides which does not allow for bike lanes without removing parking. Parking is highly utilized in this residential/school area. Shared lane markings are therefore the preferred alternative for Washington Avenue, especially if the markings are spaced intermittently between existing school zone markings, speed zone markings, and crosswalks. Such shared lane markings would be expected to alert motorists to the possible presence of bicyclists and add to the existing traffic calming measures on the road.

Recommendation: Install shared lane markings between Bodega Avenue and Murphy Avenue.

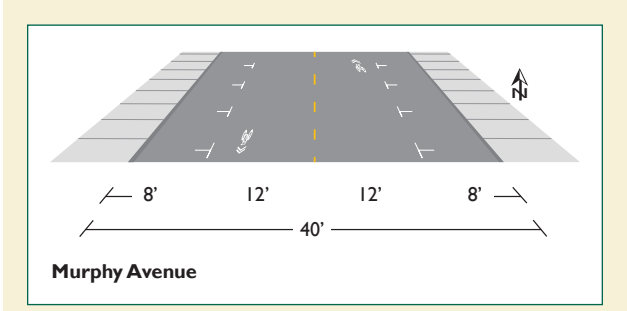


Murphy Avenue

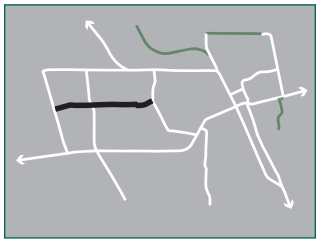


Murphy Avenue is a collector street, providing an alternate north-south route to SR 116 mainly used by area residents because it is somewhat circuitous and has numerous stop-controlled intersections. In addition, this road is not considered appropriate for bike lanes unless parking is removed, and parking is highly utilized in this residential/school area. Shared lane markings are recommended in order to alert motorists to the possible presence of bicyclists.

Recommendation: Install shared lane markings between Washington Avenue and Healdsburg Avenue.

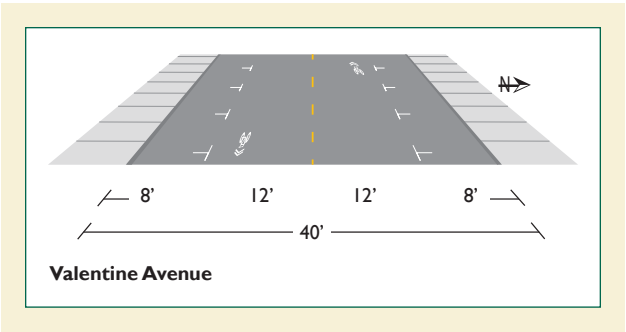


Valentine Avenue

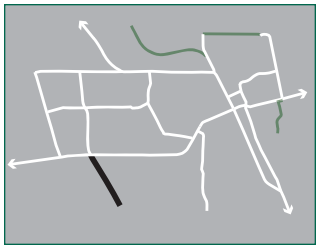


Valentine Avenue is a collector street, providing an alternate east-west route to Bodega Avenue and access to Brook Haven School and the adjacent Libby Park. The street is used for school and park related trips by area residents. Because of the 28 to 40 foot street width, bike lanes are not feasible since it would require parking removal and parking is highly utilized in this residential/school area. Shared lane markings are recommended to improve the safety of the bicycling community by increasing driver awareness of bicyclists along the roadway.

Recommendation: Install shared lane markings on Valentine Avenue between Murphy Avenue and Ragle Road.



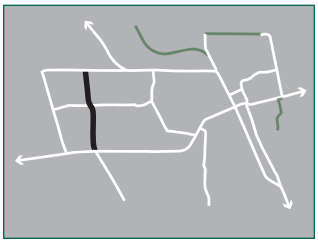
Pleasant Hill Road



Pleasant Hill Road is a predominantly two-lane rural roadway with 12-foot travel lanes and minimal shoulders, though it widens to 36 feet to accommodate parking on the east side of the street near Mitchell Court on the south end and widens to 48 feet at the signalized intersection of Bodega Avenue. The road is too narrow for bike lanes and shared lane markings are not recommended because of the parallel path on the east side of the street that provides a more protected facility for approximately half the length of this corridor. The MUTCD-CA recommends Class III facilities for roads such as Pleasant Hill Road, with signs posted to indicate that road users should expect bicyclists along the route and alert bicyclists to the presence of a road some connectivity potential.

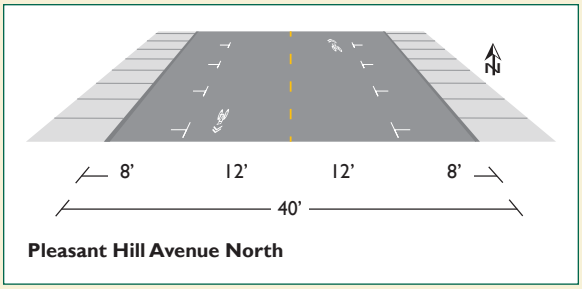
Recommendation: Designate Pleasant Hill Road as a Class III bikeway.

Pleasant Hill Avenue North

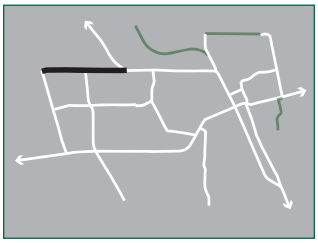


Pleasant Hill Avenue North carries about 3,180 vehicles per day and for this volume bike lanes would be appropriate. However, it is only 40 feet wide with two travel lanes and heavily utilized parking on both sides. Installing bike lanes would require decreasing the parking lane widths to six feet and the travel lane widths to nine feet, and this combination is not recommended as such narrow lanes might create conditions that increase sideswipe collisions. Shared lane markings are feasible for Pleasant Hill Avenue North for various reasons, and these markings would be helpful in guiding bicyclists between Bodega Avenue and Covert Lane, two major roadways in Sebastopol.

Recommendation: Install shared lane markings on Pleasant Hill Avenue North between Bodega Avenue and Covert Lane.



Covert Lane



Covert Lane is an east-west oriented collector street that carries approximately 4,200 vpd, providing a connection between Ragle Ranch Regional Park on Ragle

Road on the west and Healdsburg Avenue. A church faces Covert Lane, but the majority of adjacent land uses, such as the Fiesta Shopping Center and many single family homes, have side yards or back yards along Covert Lane. This results in few vehicles being parked on Covert Lane, except the park users at the west end who tend to park along the south side of the street and walk into Ragle Park. Given its location and traffic volumes, bike lanes are appropriate for the entire street.

There are four distinct segments on Covert Lane, including:

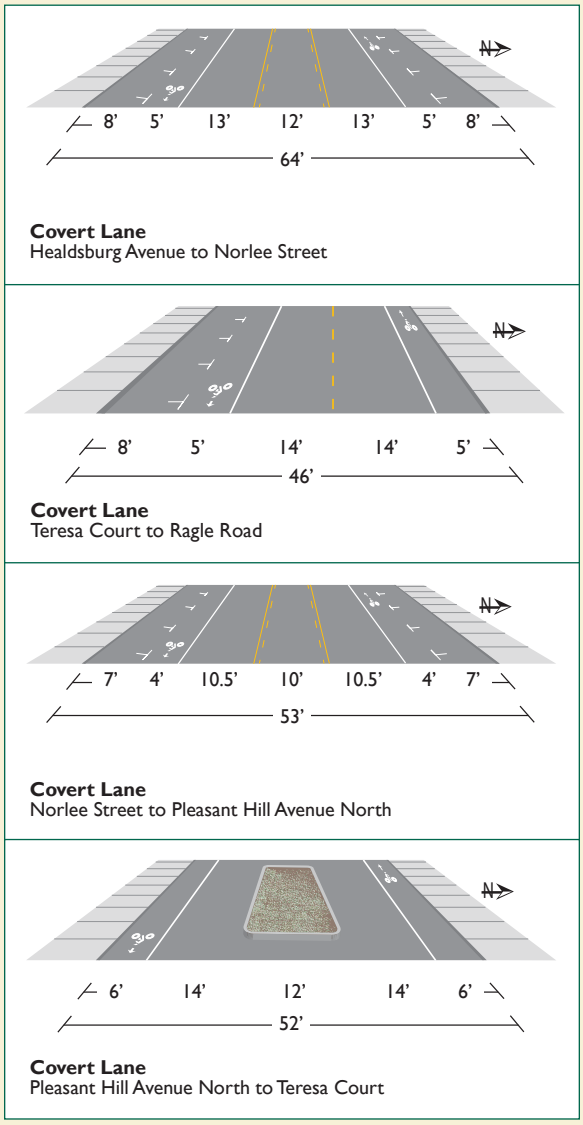
- 64-foot wide, three-lane segment between Healdsburg Avenue and just east of Norlee Street
- 53-foot wide, three-lane segment between Norlee Street and Pleasant Hill Avenue North
- 52-foot wide, two-lane segment with median from Pleasant Hill Avenue North to west of Teresa Court
- 46-foot wide, three-lane segment with median from Teresa Court to Ragle Road

There is sufficient room to accommodate bike lanes in the 64-foot wide segment by decreasing the width of the wide eastbound travel lane. In the 53-foot wide segment between Norlee Street and Pleasant Hill Avenue North, all lanes would need to be narrow, including four-foot bike lanes. This would allow on-street parking to be maintained on both sides of the street near St. Sebastian's Church. In the segment west of Pleasant Hill Avenue North to Teresa Court, parking would need to be removed from both sides of the street. In the most westerly, 46-foot wide segment, parking could remain on the south side to serve the overflow parking from the regional park, but the median and associated turn lanes would need to be removed. Other alternatives were considered as noted on the Lane Configuration Worksheets included in Appendix A.

In total, 55 parking spaces would need to be eliminated on Covert Lane between Pleasant Hill Avenue North and 120 feet west of Teresa Court in order to install bike lanes, including 27 spaces on the north side of the street and 28 spaces on the south side. During the parking survey a maximum of three vehicles were observed parked on the north side and a maximum of six vehicles were observed parked on the south side.

Removing the median west of Teresa Court is an expensive proposition, but due to the principle of corridor continuity, it is recommended that bike lanes be installed on this segment to complete the bike lane facility. Median removal could be deferred and other alternatives implemented as noted on the Lane Configuration Worksheets in Appendix A. For example, if the parking lane width were decreased to six feet and the travel lanes widths decreased to 10 feet, narrow 4-foot bike lanes could be installed in this segment. This alternative, shown as D on the worksheet for Segment 62 may be considered in the short term while funding for median removal is sought.

Recommendation: Install bike lanes on Covert Lane, including standard bike lanes east of Norlee Street, narrow bike lanes between Norlee Street and Pleasant Hill Avenue North, standard bike between Pleasant Hill Avenue North and Teresa Court by eliminating 27 parking spaces on the north side of the street and 28 spaces on the south side, and removing the median and associated turn lanes west of Teresa Court. If median removal is cost prohibitive, install narrow bike lanes, travel lanes and a parking lane between Teresa Court and Ragle Road.



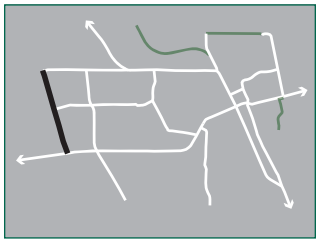
Covert Lane
Healdsburg Avenue to Norlee Street

Covert Lane
Teresa Court to Ragle Road

Covert Lane
Norlee Street to Pleasant Hill Avenue North

Covert Lane
Pleasant Hill Avenue North to Teresa Court

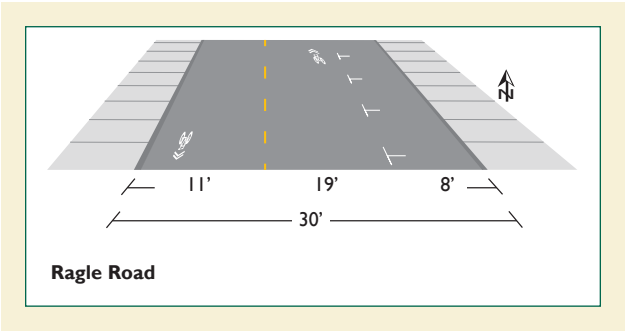
Ragle Road



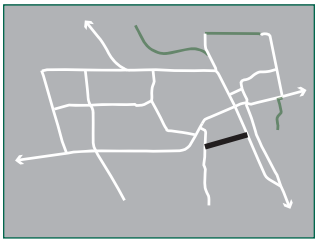
Ragle Road is a north-south corridor on the west side of Sebastopol, ranging in width between 29 feet and 46 feet, though it is predominantly less than 30 feet wide. It provides access to Ragle Ranch Regional Park and numerous single family dwellings within Sebastopol and outside the City in an unincorporated area of Sonoma County. Much of the roadway is unimproved along the unincorporated west side and parking is predominantly permitted along the east side within the City limits. The two travel lanes carry an average traffic volume of 3,600 vehicles per day. Installing bike lanes in a continuous manner would require parking removal, which is not recommended given its high degree of utilization, especially near Ragle Park.

Shared lane markings are a feasible alternative for Ragle Road because the roadway is too narrow for bike lanes. Such markings would guide bicyclists between Bodega Avenue and Covert Lane, which are two major roadways in Sebastopol.

Recommendation: Install shared lane markings on Ragle Road between Bodega Avenue and Covert Lane.

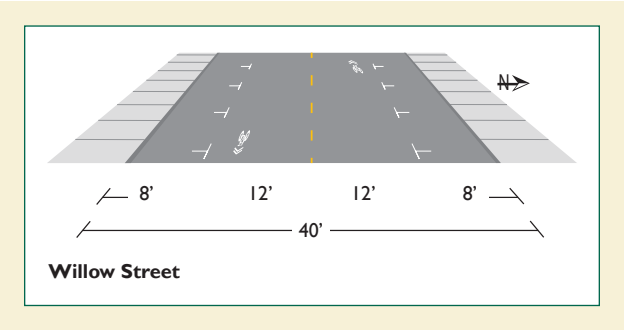


Willow Street



Based upon comments received at the Council study session and City Council direction, Willow Street (between Jewell Avenue and South Main Street) was added to the study area. This collector street serves bicycle trips between the surrounding neighborhoods and Ives Park to the Joe Rodota Trail via enhanced crossings at South Main Street and Petaluma Avenue. Due to its sub-40 foot street width, installation of bike lanes would require parking removal, and since parking is highly utilized in this residential/park area, bike lanes are considered infeasible. Shared lane markings are recommended to improve the safety of the bicycling community by increasing driver awareness of bicyclists along the roadway.

Recommendation: Install shared lane markings on Willow Street between Jewell Avenue and South Main Street.



Recommendation Summary and Cost Estimates

In addition to the map shown in Figure 5, a summary of the recommendations is provided in Table 4.

Table 4
Summary of Draft Recommendations

Segment	Recommendation
Morris St	• Narrow (4 ft) bike lanes north of Laguna Park Way (LPW) • Standard (5 ft) bike lanes south of LPW • 14 parking spaces eliminated on east side south of LPW
Laguna Park Way	• Standard bike lanes • 31 parking spaces eliminated on one side of the street
Petaluma Ave	• One standard northbound bike lane • A northbound travel lane eliminated south of the Joe Rodota Trail • Maintain two travel lanes & existing parking between Joe Rodota Trail & Barnes Ave • Narrow one of three travel lanes between Barnes Ave & Sebastopol Ave • Reduce width of existing wide lanes between Sebastopol Ave & Depot St • Preference is to install narrow parking & travel lanes between Depot St & McKinley St, but if not be approved by Caltrans, eliminate 11 parking spaces on east side of street • Develop intersection transition striping as necessary during the design phase to address Caltrans' concern for intersection operations
Sebastopol Ave	• Shared lane markings
McKinley St	• One westbound bike lane
South Main St	• One southbound bike lane
North Main St (Caltrans)	• One southbound bike lane between Bodega Ave & McKinley Ave • North- & southbound bike lanes between McKinley Ave & Healdsburg Ave • A southbound travel lane eliminated between McKinley Ave & Healdsburg Ave
North Main St (City of Sebastopol)	• Standard bike lanes • Reconfigured parking prohibitions between Healdsburg Ave & Eddie Ln (no net loss of parking)
Healdsburg Ave	• Standard bike lanes • 29 parking spaces eliminated on north side of the street
Bodega Ave	• Shared lane markings east of Washington Ave • Standard bike lanes on all the rest, as follows: ◦ between Washington Ave & Robinson Rd plus reduced travel lanes widths (10 ft) ◦ between Robinson Rd & 300 ft west of Nelson Way ◦ between 300 ft west of Nelson Way & Golden Ridge Ave plus 15 parking spaces removed on the north side of the street ◦ between Golden Ridge Ave & Pleasant Hill Rod/Pleasant Hill Ave N plus narrow travel lane widths (10 or 11 ft) ◦ between Pleasant Hill Rd/Pleasant Hill Ave N to Ragle Rd • A Class I bikeway between Ragle Rd & the Atascadero Creek bridge
Jewell Ave	• Class III bikeway
Washington Ave	• Shared lane markings between Bodega Ave & Murphy Ave
Murphy Ave	• Shared lane markings between Washington Ave & Healdsburg Ave
Valentine Ave	• Shared lane markings between Murphy Ave & Ragle Rd
Pleasant Hill Rd	• Class III bikeway
Pleasant Hill Ave N	• Shared lane markings

Table 4
Summary of Draft Recommendations

Segment	Recommendation
Covert Ln	• Standard bike lanes east of Norlee St • Narrow bike, travel & parking lanes between Norlee St & Pleasant Hill Ave N • Bike lanes installed if 27 parking spaces on the north side of the street & 28 parking spaces on the south side of the street eliminated between Pleasant Hill Ave N & Teresa Ct • Standard bike lanes installed if the median & associated turn lanes are removed west of Teresa Ct • Optional: If median removal west of Teresa Ct is cost prohibitive, install narrow bike lanes (4 ft), travel lanes (10 ft) & a parking lane (6 ft) on the south side of the street
Ragle Rd	• Shared lane markings between Bodega Ave & Covert Ln
Willow St	• Shared lane markings between Jewell Ave & South Main St

Planning Level Cost Estimates

Assumptions of unit costs for the engineering, administration and construction of the recommended bicycle facilities were developed and are presented in Table 5 below. Preliminary construction costs were developed in 2007 as part of the *Countywide Bicycle and Pedestrian Master Plan* in Sonoma County, which were developed by researching the unit costs experienced by the County of Sonoma and other local jurisdictions in Sonoma County and the North Bay at that time. These costs are nearly identical to those included in the *Santa Rosa Bicycle and Pedestrian Master Plan* 2010.

The unit cost assumptions include estimated construction, contingencies, design, and administrative costs. Unit costs may vary considerably depending on the size of the job and the location. For example, the unit cost of striping only 1,000 linear feet can easily cost two to three times that of a 15,000-foot project. The same economy of scale can be applied to sign installation and signal modification projects. However, the unit cost estimates do not include roadway rehabilitation costs even though these costs are likely on some street segments. For instance, throughout the downtown on the state highways, where the current paving is open grade asphalt, there is a series of potholes along the outside edge of the parking lanes in the location of the proposed bike lanes; these would have to be repaired in order to eliminate hazards for cyclists when retrofitting bike lanes. This would significantly increase the cost of implementation.

The estimated engineering costs are higher for corridors within Caltrans' jurisdiction due to more complex engineering approval and permitting processes. For example, the proposed bicycle lanes on Healdsburg Avenue between Murphy Avenue and Covert Lane (study segment 20) would require installation of 11.5-foot travel lanes; Caltrans is expected to require application for a Design Exception since these lanes are less than their standard 12-foot lane widths. A Design Exception application is necessary for each segment of State Highway where non-standard design elements are proposed and these applications involve detailed engineering analysis and documentation. Additionally, any construction work on the State Highways is necessarily more expensive than on local streets because of the traffic volumes and State regulations relating to traffic control requirements and permitted hours of work.

Project management costs on local streets include costs associated with construction oversight, inspection and contract administration, and grant administration duties that commonly accompany public transportation projects. On projects constructed within state rights-of-way, project management duties also include the filing of necessary documents, including applications for encroachment permits to construct improvements within Caltrans' rights-of-way.

These planning level unit cost estimates are itemized in Table 5, and these costs were applied to the corridors using the inventoried lengths of each corridor, together with the recommended facilities; these corridor construction costs are summarized in Table 6.

Table 5
Planning Level Cost Assumptions for Bike Facility Improvement Costs

Capital Project	Construction		Streets under Caltrans Jurisdiction			Streets under Sebastopol Jurisdiction		
	Unit	Cost (C)	Engineering (E) 25% of C	Project Management (PM) 25% of C	Total (C + E + PM)	Engineering (E) 10% of C	Project Management (PM) 25% of C	Total (C + E + PM)
Class I Path	**5,280 feet**	$550,000	**$137,500**	**$137,500**	**$825,000**	**$55,000**	**$137,500**	**$742,500**
Class II Bike Lanes								
Reconfigure Roadway Striping to add Bike Lanes (*Striping removal & new striping installation required*)								
• On existing 2-lane streets	1,000 ft	**$20,000**	5,000	5,000	**$30,000**	2,000	5,000	**$27,000**
• On existing 3-lane streets	1,000 ft	**$25,000**	6,250	6,250	**37,500**	2,500	6,250	**33,750**
• On existing 4-lane streets	1,000 ft	**$30,000**	7,500	7,500	**45,000**	--	--	**--**
Install Bike Lanes, Signs, & Symbols (Up to 4 signs & symbols per 1,000 ft) (*No striping removal required*)	1,000 ft	**$5,000**	1,250	1,250	**7,500**	500	1,250	**6,750**
Signalized intersection electrical work/detectors & detector symbols	Each intersection approach	**$2,000**	500	500	**3,000**	200	500	**2,700**
Remove & replace 12-foot wide median	1,000 ft	**$100,000**	--	--	**--**	2,400	6,000	**32,400**
Shared Lane Markings (SLM)								
Install SLM legends & signs (Up to 8 legends & 4 signs per 1,000 feet)	1,000 ft	**$3,000**	750	750	**4,500**	300	750	**4,050**
Class III Bike Routes								
Install Signing (Up to 4 signs per 1,000 feet)	1,000 ft	**$1,000**	250	250	**1,500**	100	250	**1,350**

Note: Costs to rehabilitate city streets, to resurface portions of streets or grind asphalt near gutters prior to construction of an asphalt overlay, are not included in the tabulated unit costs

Table 6
Study Segment Planning Level Construction Cost Estimates

Street/Segment	Jurisdiction	Estimated Cost*
State Highways		
Healdsburg Ave – Covert Ln to North Main St	Caltrans	$110,200
North Main St – Sebastopol Ave to Healdsburg Ave	Caltrans	$ 58,600
South Main St – Sebastopol Ave to Petaluma Ave	Caltrans	$ 99,300
Petaluma Ave	Caltrans	$103,300
McKinley St – Petaluma Ave to North Main St	Caltrans	$ 15,500
Sebastopol Ave – Morris St to Main St	Caltrans	$ 6,700
Gravenstein Hwy N – Mill Station Rd to Covert Ln**	Caltrans	$ 155,100
Gravenstein Hwy S – Petaluma Ave to Cooper Rd**	Caltrans	$ 118,700
Subtotal State Highways	*Caltrans*	*$667,400*
City Streets		
Covert Ln	City	$135,800
North Main St – Healdsburg Ave to Eddie Lane	City	$ 39,600
Bodega Ave – Main St to Ragle Rd	City	$224,100
Bodega Ave – Ragle Rd to the Atascadero Creek bridge	City	$263,700
Ragle Rd – Covert Ln to Bodega Ave	City	$10,800
Pleasant Hill Rd – all within City limits	City	$ 7,000
Pleasant Hill Ave N	City	$10,600
Valentine Ave	City	$13,300
Murphy Ave	City	$ 2,800
Washington Ave – Huntley St to Bodega Ave	City	$1,300
Jewell Ave	City	$ 5,600
Laguna Park Way	City	$38,200
Morris St	City	$35,600
Willow St	City	$1,800
Subtotal City Streets	*City*	*$790,200*
Total	**City and Caltrans**	**$1,457,600**

Notes: * Pavement rehabilitation costs are not included though may be necessary prior to implementation
** Not a study segment but would be constructed at time of other SR 116 Bike Lanes

Study Participants and References

Study Participants

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