

# Benicia

SOLANO COUNTY ACTIVE TRANSPORTATION PLAN | BENICIA

# **Benicia**

# Overview

The City of Benicia is located on the south coast of Solano County and has a small-town waterfront character. Interstates I-680 and I-780 run through the city, and the I-680 bridge that spans the Carquinez Strait connects Benicia with the Contra Costa County cities of Martinez and Concord. Benicia is mostly made up of residential land uses. I-780 divides more recent, lower density development to the north from gridded older residential development to the south. Retail development is primarily located in the downtown along First Street. There is an industrial park, which includes the Valero oil refinery northeast of the residential areas. Benicia is the fifth largest city in Solano County, with a population of 28,343 as of 2017.

# **Existing Conditions**

This section provides a high-level summary of the existing conditions related to active transportation in Benicia. For more details on demographic and travel patterns among people walking and bicycling and the existing active transportation network in Benicia, refer to Appendix B. Technical Analysis and Summary Memorandums.

# **Active Transportation Profile**

This section evaluates demographic characteristics of the population who currently walk or ride a bicycle in Benicia using data from the United States Census American Community Survey (2016, 5-year estimates) and the California Household Travel Survey (2012). While these surveys are useful, the data may be less accurate for smaller communities like Benicia due to reduced sample sizes; however, the data do provide a general indication of walking and bicycling trends in Benicia.

### **Demographic Characteristics**

According to the United States Census American Community Survey, the population of Benicia increased by five percent from 2010 to 2017. The share of vulnerable populations (people 18 or under and 65 or older), who may be more likely to rely on walking, bicycling, and transit, increased by more than 10 percent. Whereas Benicia's population is split



Figure B-1: Benicia

equally between men and women, the American Community Survey data suggests that women are more likely to bike to work than men, and men are more likely to walk to work than women.

### **Travel Characteristics**

In 2017, the share of employed people ages 16 or older who walked, bicycled, or rode transit to work was seven percent. Based on data from the California Household Travel Survey, over one-third of trips (33%) in Benicia across all modes are for dining, with only about 17 percent of all trips being for work. Additionally, trips for errands (14%) and recreation (12%) make up almost a quarter of all trips taken in Benicia. A majority of all trips taken in Benicia by any mode of transportation (61%) are less than three miles in length, which is considered a reasonable bicycling distance. A third of all trips (34%) are less than one mile, which is considered a reasonable walking distance for most trips. This indicates that almost two-thirds of all trips made within Benicia could be converted to walking or bicycling trips. Trip distances from three to five miles (6% of all trips in Benicia) and over five miles (32%) are often deemed too far for the "interested but concerned" user to consider walking or bicycling. Additional travel patterns for Benicia are depicted in Figure B-2.

# **Benicia Active Transportation Profile**



# General travel characteristics (all modes):



Figure B-2: Benicia Active Transportation Infographic

# **Existing Active Transportation Network**

The active transportation network consists of both pedestrian and bicycle infrastructure that work together to provide mobility options for all those that live, work, study, or play in Benicia. Everyone in Benicia uses active transportation infrastructure, such as sidewalks, at some point in their day, even if just for short distances to reach their destinations.

#### **Existing Pedestrian Network**

The pedestrian network within Benicia consists largely of sidewalk infrastructure supported by crossing treatments, multi-use paved trails, and unpaved recreational trails. Benicia currently has an overall Walk Score of 33 out of 100 according to the real-estate website www.WalkScore.com, indicating that most trips require a car. The city currently has a total of 142 miles of sidewalks. There are approximately 250 miles of maximum potential sidewalk coverage (total roadway mileage multiplied by two to account for both sides of the street), as shown in Figures B-4 and B-5. Depending on land use context, there may be areas of the city with rural characteristics where typical sidewalk infrastructure may not be compatible. However, it was not possible to exclude these areas from the sidewalk inventory.

#### **Existing Bicycle Network**

This section summarizes Benicia's existing bike network. It also presents the results of the bicyclist comfort and connectivity analyses - that is, level of traffic stress (LTS) and bicycle network connectivity analysis (BNA), respectively -for the existing network. Additional information on the LTS and BNA methodologies can be found in the existing conditions section of the Solano County Active Transportation Plan. Benicia has a 125-mile roadway network, 20 lane miles of which currently have designated bicycle facilities, as shown in Figure B-6. This includes eight miles of shared-use paths, six miles of bike lanes, and six miles of bike routes, as summarized in Figure B-4. Figures B-7 and B-8 present the LTS and BNA results for Benicia's existing bicycle network, respectively.



Figure B-3: Active Transportation Facilities in Benicia

# Sidewalk Network Inventory

	Existing Sidewalk Lane Miles	Roadway Network Lane Miles*
Benicia	142	250
Priority Development Areas	8	36
Communities of Concern	0.04	0.47
Disadvantaged Communities	-	-
*Maximum potential sidewalk covera	ae	

# **Bicycle Network Inventory**



<b>Bicycle Facilities</b>	Miles
Multi-Use Paths (Class I)	8
Bicycle Lanes (Class II)	6
Bicycle Routes (Class III)	6
No Designated Facility	105
All Roadways	125



## Percent of Roadway Mileage

### Level of Traffic Stress (LTS)

**Bicycle Inventory** 



#### Figure B-4: Benicia Active Transportation Network Infographic



9





ω



SOLANO COUNTY ACTIVE TRANSPORTATION PLAN | BENICIA

# Safety Corridors

Real and perceived safety can strongly influence a person's decision to walk or bike. Collision analyses are one way to assess traffic safety in a community and can help identify key areas for infrastructure or programmatic changes that improve safety and comfort for people walking and bicycling. This section summarizes the pedestrian- and bicycle-involved collision trends and high-risk locations in Benicia. The raw collision data was retrieved from the Statewide Integrated Traffic Records System (SWITRS) for the most recent five years (2012 - 2017) for which collision data were available.

The collision analysis followed a systemic safety approach and used the Equivalent Property Damage Only (EPDO) method to assess crashes. The EPDO method weights crashes by severity so that when EPDO scores are calculated, they reflect both frequency *and* severity of collisions. Collisions resulting in a greater injury severity (e.g., fatal or severe) are weighted much heavier than collisions resulting in a minor injury, or no injury at all. For more information about the collision analysis methodology and a more detailed discussion of the results, refer to *Appendix B: Technical Analysis and Summary Memorandums*. When interpreting the results, note that no volume data was used in this analysis, so it is unclear how the numbers of people walking, bicycling, and driving are influencing collision trends.

#### **Summary of Results**

During the five-year analysis period there were 556 traffic collisions in Benicia. Of these collisions, 6% (35) were pedestrian collisions and 5% (28) were bicycle collisions; this is a much higher share of bicycle and pedestrian collisions than all other jurisdictions in the county.

In Benicia, the EPDO scores for segments are slightly higher than for intersections among pedestrian collisions, whereas the opposite trend is true for bicycle collisions. Among pedestrian collisions, the EPDO score is highest for collisions during daylight, however, there is a notable EPDO score for collisions occurring under dark conditions with street lights. This same trend is not evident among bicycle collisions, nearly all of which occurred in daylight.

The Project Team analyzed the geographic distribution of EPDO scores and identified priority safety corridors and intersections for pedestrian and bicycle collisions in Benicia (see Figures B-9 and B-10). The analysis identified the street segments below as warranting further investigation.

#### Pedestrian collision hotspots:

- E 5<sup>th</sup> Street from Military E to Vecino Street
- Military E from E 5<sup>th</sup> Street to W 3<sup>rd</sup> Street
- 1<sup>st</sup> Street from Military E to W J Street

#### **Bicycle collision hotspots:**

- E 5<sup>th</sup> St from E 0 St to E J Street
- Military E from Hospital Road to Denfield Avenue
- 1st Street from W C Street to W K Street

Table B-1 presents a list of identified safety projects from the 2018 Solano Travel Safety Plan that overlap with the identified hotspots.

#### Table B-1: Identified Safety Projects in Benicia

Location	Project
Military at 5th St E	Install curb extensions
E 2nd St at Military East	Pedestrian crossing safety
Military West at W 2nd St	Pedestrian crossing safety









# **Community Engagement**

Throughout each stage of the Plan development, residents and stakeholders from Benicia were asked to provide insights on where improvements to walking, bicycling, and access to transit could be improved and prioritized. A City of Benicia staff member was part of the Plan Development Team. Benicia residents were engaged through in-person and online outreach efforts which occurred over four phases during the 18-month project.

# Phase I: Data Collection and Initial Outreach

The goal of the first phase of public outreach was to increase awareness about the Plan and find out where people feel comfortable and uncomfortable walking and bicycling in each jurisdiction. As part of the first phase of public outreach, the Plan Development Team (PDT) held a pop-up event at the Benicia Farmers' Market downtown and conducted online outreach through interactive Wikimaps The online and in-person feedback was combined to highlight where all participants had positive or negative input about existing infrastructure throughout Benicia. Positive comments identified where people currently like to walk or bicycle. Negative comments mostly highlight areas where people feel it is unsafe or uncomfortable walking or bicycling. In total, 1,080 individual line and point comments were collected across Solano County, with 483 comments from in-person events and 597 comments from the project website. Figure B-11 shows the positive and negative comments about walking and bicycling in Benicia from the online map. For larger versions of the comment maps, refer to Appendix B: Technical Analysis and Summary Memorandums.



Figure B-11: Online Map Positive and Negative Walking and Bicycling Comments for Benicia

# Phase II: Countywide Needs and Recommendations

The goal of Phase 2 was to develop the countywide backbone network priority projects to create a countywide all ages and abilities network. Refer to Page 4 of the main body of the Plan for a description of an all ages and abilities network. This phase consisted primarily of technical analysis conducted by the consultant team and review of

# Phase III: Jurisdiction Needs and Recommendations

The third phase of outreach occurred in late Summer/ early Fall 2019. The Project Team met with each jurisdiction individually to hold a coordination meeting with jurisdiction staff. During these meetings, the Project Team shared what it learned during Phase 1 outreach and subsequent analyses in Phase II. Benicia held a bicycle tour and coordination meeting on July 26, 2019 starting at the Benicia Community Center to review initial proposed recommendations and visit key sites to refine or develop additional recommendations. The outcome of this meeting and walking tour resulted in updated project lists and maps that were presented to the public during Phase IV.

major deliverables by the Plan Development Team including representatives from the City of Benicia. As a result, the team developed a regional priority bikeway network, regional priority pedestrian project recommendations, and regional trails network.



Figure B-12: Walk Audit in Benicia



# **Phase IV: Implementation Strategy and Draft Plan**

The fourth phase of outreach occurred in late Fall 2019 and focused on educating the public about different types of bicycle and pedestrian infrastructure and obtaining input on how to prioritize recommendations. The PDT invited the public and interested stakeholders to participate in a presentation and workshop at the Benicia Traffic, Pedestrian, and Bicycle Safety Committee Meeting at City Hall on October 17, 2019. Participants identified their top five bikeway facilities that should be prioritized in the next five years in an activity called "5 in 5", as shown in Figure B-13. This activity is intended to help Benicia focus on which facilities the public is most likely to use in the near-term to build out a connected network of all ages and abilities facilities. Based on public feedback, the PDT also reviewed pedestrian recommendations and revised them as necessary.

# Network Development

The Benicia Active Transportation Backbone Network is a network of facilities suitable for people of all ages and abilities. The Project Development Team created the network by conducting a series of analyses to identify areas that have the highest propensity to produce walking and bicycling trips, and assessing whether all ages and abilities pedestrian and bicycle facilities already exist along the network. The PDT used the analysis results to develop the countywide and local active transportation backbone networks. Benicia's backbone network is shown in Figure B-17.

# **Backbone Network Development**

The consultant team used an attractors and generators analysis to develop the backbone network.

The consultant team developed two levels of backbone networks:

- A countywide backbone network that links the top 25 highest composite demand areas throughout Solano (except for Dixon and Rio Vista), which include some routes identified in Benicia; and,
- A local backbone network that links the top 10 highest composite demand areas within each City.

Within each jurisdiction, the consultant team overlapped the countywide backbone network routes with the local

backbone network routes where feasible. For more information on the analyses used to develop the backbone network refer, to *Appendix B: Technical Analysis and Summary*.

# Complete Networks and Citywide Recommendations

Once the backbone network routes were identified, the complete citywide networks were assessed using both technical analysis from the Existing Conditions Report and public input from the first phase of outreach. Recommendations were developed to promote crosstown connectivity to priority destinations and to maximize available curb to curb right-of-way to keep costs as low as possible. Where feasible, all ages and abilities facility recommendations were proposed. Recommendations that did not meet that criteria are still important and play a large role in improving connectivity by closing gaps or addressing safety. Figure B-14 below shows the network development steps and how analyses or public input was intregated into the process.

# Countywide Backbone

- Countywide Demand Analysis
- Safety Analysis
- Gaps to regional parks, transit, and intercity connections

#### Draft Local Networks

- Countywide Backbone facilities
- Local Demand Analysis
- Community identified
  routes
- Jurisdiction identified CIP & proposed projects

#### Jurisdiction Network Review

- Draft networks sent to jurisdiction staff
- Jurisdiction staff review for political and design feasibility
- Consultant team conducts walking audits
- Jurisdiction staff select prioritization criteria

#### Public Outreach Phase II

- Networks and pedestrian projects revised based on jurisdiction input
- Networks presented to the public at in-person pop-up events and online
- Public votes on priority facilities

Figure B-14: Active Transportation Network and Project Development Process

# **Benicia Attractors/Generators Analysis**

### **Overview**

The goal of an attractors/generators analysis is to develop an understanding of the most likely network of bicycling and walking activity. The result is a conceptual network linking regional activity centers.

### Process

B

1 Generators -Generator factors are demographic indicators that represent where the ninin AAAA (%) population or people more likely to walk or bicycle are located. Factors are measured at the census block or block group level. population total low-income zero-car population population population over 65 **2** Attractors Attractor factors are trip destinations and consist of factors that (0000) attract demand. Factors are scored on how many trips they are 開っ likely to attract based on Institute of Transportation Engineers guidelines for trip rates. employment higher transit regional centers density education parks Attractor Generator Pairs and Composite Trip Demand The composite trip demand between the activity centers is determined by adding the attractor trips and generator score, and multiplying the demand of each activity center by the distance downtown public input decay factor between the zones. This total represents the number points of trips that will occur between the two areas.

#### A High Demand Routes

The high demand routes are developed between the top 10 pairs. These pairs are identified below, including a generalized land use category.

#### **Top 10 Composite Demand Areas**

Only the Top 10 attractors and generators are listed in the table above but the Top 25 lines were used to generate Origin-Destination lines.

Factors

Ref	Activity Center 1	Activity Center 2	Composite Trip Demand	Description
1	Downtown	Downtown	4,374,219	Downtown near 1st and East H Street to Military East and East 3rd Street
2	Downtown	Downtown	3,468,774	Downtown near 1st and East H Street to Military East and East 5th Street
3	Commercial	Downtown	3,380,387	Downtown near 1st and East H Street to Safeway on Military East
4	Residential/ Commercial	Downtown	3,121,861	Downtown near 1st and East H Street to Riverhill Drive and Benicia City Cemetery
5	Downtown	Residential/ commercial	3,043,009	Downtown near 1st and East H Street to Southhampton Shopping Center
6	Downtown	Residential/ School	2,780,564	Downtown near 1st and East H Street to Benicia High School
7	Industrial	Downtown	1,770,253	Downtown near 1st and East H Street Industrial Way and Lake Herman Road
8	Commercial	Downtown	1,712,542	Downtown near 1st and East H Street to Parkway Plaza
9	Industrial/ Employment	Downtown	1,600,070	Downtown near 1st and East H Street to East 3nd street and Lake Herman Road
10	Downtown	Downtown	1,030,869	Downtown near East 3rd Street to downtown near East 5th Street





All the pairs start or end in downtown, linking downtown to residential, commercial, and industrial/employment areas around the city.

The total demand in each hexagon is multiplied by a distance decay function, which takes into account that the likelihood of traveling to a destination decreases as distance increases. This composite score between each hexagon pair is then ranked to determine the top ten pairs.

	(		
Trips	5,845	518	6,363
Total Demand	Attractors*	Generators	TOTAL TRIPS

\* Attractors score was adjusted based on public outreach. The public was asked to rank which types of destinations they wanted to bike or walk to. The trip totals for the top three destinations were increased by 20%, and the trip totals for the bottom three destinations were reduced by 20%. The remaining destinations were not changed..

9

3

9





directness, and other key destinations nearby. Routes were created using discretion regarding the context of the area and facilities and land uses within or The high demand routes are created by identifying routes along the street network, taking into consideration existing facilities, street classification, route around the hexagon to maximize the demand that each route accesses.

# **Recommended Vision Bike Network**

After developing the countywide and local backbone networks and conducting outreach with key stakeholders, a series of bicycle projects were identified to help build Benicia's full built-out vision bicycle network into one that is more comfortable for people of all ages and abilities. The vision bicycle network represents an unconstrained project list. The Solano Transportation Authority will continue to partner with the City of Benicia to identify relevant funding sources for network build out over time. This Plan proposes adding or upgrading a total of 35 miles of bikeways to Benicia's existing bikeway network. Table B-2 presents the existing and proposed bikeway mileage by facility type, along with the costs associated with installing each facility type. Facility installation costs will vary depending on the materials used; for more information about the assumptions included in the cost estimates see *Appendix B: Technical Analyses and Summary Memorandums*. Figure B-17 shows the recommended bike network, with existing and proposed projects shown with solid and dotted lines, respectively. Table B-3 lists details for all of the recommended bikeway projects in Benicia. Figure B-18 depicts which bikeway facilities meet the AASHTO all ages and abilities bikeway facility selection criteria. Approximately 70 percent of recommended bikeways meet the all ages and abilities criteria (see Figure B-16). The classification of various bicycle routes should be further evaluated for feasibility, impacts to on-street parking and integration with existing trails.

Facility Type	Existing Mileage (approximate)	Proposed Mileage (approximate)	Estimated Cost per mile	Total Estimated Cost
Class I Multi-use Path	8	8.8	\$1,610,000	\$14,232,400
Class II Bicycle Lane	6	2.4	\$270,000	\$645,300
Class II Buffered Bicycle Lane	0	3.4	\$310,000	\$1,063,300
Class III Bicycle Route	6	3.9	\$1,390,000	\$3,614,000
Class III Bicycle Boulevard	0	9.9	\$220,000	\$2,024,000
Class IV Separated Bikeway	0	6.8	\$370,000	\$2,516,000
Total	20	35.2	-	\$24,095,000

#### Table B-2: Proposed Benicia Bicycle Network Mileage

\*Costs presented in 2020 dollars









ID	Corridor Name	From	То	Recommendation	Network	Length (mi)	Cost	Prioritization Rank
143A	Military West	Bay Trail	Southampton Rd	Class IV Separated Bikeway	All Ages & Abilities	0.13	\$47,890	High
143B	Military West	Southampton Rd	W 13th St	Class IV Separated Bikeway	All Ages & Abilities	0.08	\$31,017	High
143C	Military West	W 13th St	Plaza de Oro	Class II Buffered Bicycle Lane	Connectivity & Gap Closure	0.13	\$48,043	High
143D	Military West	Plaza de Oro	Drolette Way	Class IV Separated Bikeway	All Ages & Abilities	0.48	\$179,245	High
143E	Military West	Drolette Way	W 5th St	Class IV Separated Bikeway	All Ages & Abilities	0.42	\$156,347	High
143F	Military West	W 5th St	W 2nd St	Class IV Separated Bikeway	All Ages & Abilities	0.39	\$142,835	High
143H	Military West	W 2nd St	1st St	Class IV Separated Bikeway	All Ages & Abilities	0.13	\$48,016	High
121A	K St/I St/J St Bike Boulevard	Military West	W 1st St	Class III Bicycle Boulevard	All Ages & Abilities	2.44	\$536,800	High
136A	Southampton Rd/W 7th St	Chelsea Hills Dr	I-780 Eastbound On/Off-ramp	Class IV Separated Bikeway	All Ages & Abilities	0.18	\$67,032	High
136B	Southampton Rd/W 7th St	I-780 Eastbound On/Off-ramp	Military West	Class IV Separated Bikeway	All Ages & Abilities	0.35	\$127,785	High
120A	1st St	Bay Trail	E B St	Class III Bicycle Boulevard	All Ages & Abilities	0.20	\$44,164	High
120B	1st St	E B St	E H St	Class IV Separated Bikeway	All Ages & Abilities	0.40	\$147,334	High
120C	1st St	E H St	Military East	Class IV Separated Bikeway	All Ages & Abilities	0.26	\$98,046	High
144A	Military East	1st St	E 2nd St	Class IV Separated Bikeway	All Ages & Abilities	0.14	\$52,035	High
144B	Military East	E 2nd St	E 5th St	Class II Buffered Bicycle Lane	All Ages & Abilities	0.39	\$119,762	High
144C	Military East	E 5th St	Grant St	Class II Bicycle Lane	All Ages & Abilities	0.44	\$118,879	High
153A	City Center Bike Boulevard	1st St	E 5th St	Class III Bicycle Boulevard	All Ages & Abilities	0.63	\$139,633	High
145A	Columbus Pkwy	Bay Trail	Benicia Rd	Class IV Separated Bikeway	All Ages & Abilities	0.20	\$74,914	High
128A	E H St	1st St	E 4th St	Class II Bicycle Lane	All Ages & Abilities	0.39	\$104,956	High
128B	E H St	E 4th St	E 5th St	Class III Bicycle Boulevard	All Ages & Abilities	0.12	\$27,237	High
148A	Proposed Trail	Kearney St	E 2nd St	Class I Multi-Use Path	All Ages & Abilities	0.04	\$64,400	High
117A	E 2nd St	Military East	Riverhill Dr	Class IV Separated Bikeway	All Ages & Abilities	0.19	\$70,683	High

#### Table B-3: Benicia Recommended Bikeway Project List

ID	Corridor Name	From	То	Recommendation	Network	Length (mi)	Cost	Prioritization Rank
117B	E 2nd St	Riverhill Dr	Tennys Dr/ Benicia Highlands Trail	Class IV Separated Bikeway	All Ages & Abilities	0.57	\$210,613	High
117C	E 2nd St	Tennys Dr/ Benicia Highlands Trail	Rose Dr	Class IV Separated Bikeway	All Ages & Abilities	0.98	\$361,983	High
117D	E 2nd St	Rose Dr	Park Rd	Class IV Separated Bikeway / Class I Multi-Use Path	All Ages & Abilities	1.47	\$543,786	High
117E	E 2nd St	Park Rd	Lake Herman Rd	Class IV Separated Bikeway / Class I Multi-Use Path	All Ages & Abilities	0.04	\$14,595	High
114A	Southampton Rd	Military West	l-780 Underpass	Class IV Separated Bikeway	All Ages & Abilities	0.14	\$52,951	High
114B	Southampton Rd	l-780 Underpass	Chelsea Hills Dr	Class IV Separated Bikeway	All Ages & Abilities	1.02	\$377,242	High
132A	Park Rd	Oak Rd	Bayshore Rd	Class II Buffered Bicycle Lane	All Ages & Abilities	1.14	\$354,623	High
132B	Park Rd	Bayshore Rd	Industrial Way	Class IV Separated Bikeway	All Ages & Abilities	0.30	\$111,226	High
132C	Park Rd	Industrial Way	E 2nd St	Class I Multi-Use Path	All Ages & Abilities	1.05	\$1,691,683	High
110A	Benicia Highlands Trail (East)	Perth Way	Park Rd	Class I Multi-Use Path	All Ages & Abilities	1.64	\$2,648,093	High
101A	Rose Dr	Columbus Pkwy	Palace Ct	Class II Bicycle Lane	All Ages & Abilities	0.37	\$99,566	High
101B	Rose Dr	Hastings Dr	E 2nd St	Class II Buffered Bicycle Lane	Connectivity & Gap Closure	1.59	\$493,512	High
101C	Rose Dr	Palace Ct	Hastings Dr	Class III Bicycle Boulevard	Connectivity & Gap Closure	1.56	\$2,165,616	High
131A	Adams St	Grant St	Park Rd	Class III Bicycle Boulevard	All Ages & Abilities	0.11	\$24,447	High
112A	Warwick Dr	Chelsea Hills Dr	Havenhill Dr	Class IV Separated Bikeway	All Ages & Abilities	0.45	\$166,137	High
113A	Benicia Highlands Trail (West)	Warwick Dr	Proposed Trail	Class I Multi-Use Path	All Ages & Abilities	0.40	\$641,823	High
154A	W G St	W 2nd St	SF Bay Trail	Class III Bicycle Route	All Ages & Abilities	0.14	\$188,755	High
155A	Bay Trail	Semple Crossing	W H St	Class I Multi-Use Path	All Ages & Abilities	0.15	\$234,792	High
156A	W H St	W 3rd St	SF Bay Trail	Class III Bicycle Boulevard	All Ages & Abilities	0.07	\$14,417	High
157A	W E St	1st St	SF Bay Trail	Class III Bicycle Route	All Ages & Abilities	0.07	\$93,983	High

#### Table B-3: Benicia Recommended Bikeway Project List

ID	Corridor Name	From	То	Recommendation	Network	Length (mi)	Cost	Prioritization Rank
100A	Dillon Point Rd	Regatta Dr	Rose Dr	Class I Multi-Use Path	All Ages & Abilities	1.19	\$1,910,218	High
118B	SF Bay Trail	E 5th St	SF Bay Trail	Class I Multi-Use Path	All Ages & Abilities	0.13	\$202,105	Medium
146A	Industrial Way	Park Rd	Lake Herman Rd	Class I Multi-Use Path	Connectivity & Gap Closure	1.77	\$2,843,714	Medium
151A	Cambridge Dr	Proposed trail	Rose Dr	Class III Bicycle Boulevard	All Ages & Abilities	0.22	\$48,090	Medium
104A	Hastings Dr	Southampton Rd	London Dr	Class II Buffered Bicycle Lane	All Ages & Abilities	0.18	\$55,656	Medium
104B	Hastings Dr	London Dr	Brentwood Dr	Class III Bicycle Boulevard	Connectivity & Gap Closure	1.08	\$237,600	Medium
104C	Hastings Dr	Brentwood Dr	Rose Dr	Class III Bicycle Boulevard	Connectivity & Gap Closure	0.56	\$123,200	Medium
150A	London Cir/ London Dr	Proposed trail	Hastings Dr	Class III Bicycle Boulevard	All Ages & Abilities	0.30	\$66,777	Medium
149A	Proposed Trail	London Cir	Cambridge Dr	Class I Multi-Use Path	All Ages & Abilities	1.11	\$1,780,263	Medium
103A	Vallejo Bike Path Connections - Palace Ct	Vallejo Bike Path	Rose Dr	Class III Bicycle Boulevard	All Ages & Abilities	0.09	\$20,746	Medium
103B	Vallejo Bike Path Connections - Camellia Ct	Vallejo Bike Path	Vallejo Bike Path	Class III Bicycle Boulevard	All Ages & Abilities	0.05	\$11,023	Medium
105A	Panorama Dr	Southampton Rd	Drake Ct	Class II Bicycle Lane	All Ages & Abilities	0.40	\$107,340	Medium
105B	Panorama Dr	Drake Ct	Rose Dr	Class III Bicycle Boulevard	All Ages & Abilities	0.99	\$217,930	Medium
119A	E 5th St	Bay Trail	E H St	Class II Bicycle Lane	All Ages & Abilities	0.21	\$57,070	Medium
106A	Chelsea Hill Bike Boulevard	Perth Way	Panorama Dr	Class III Bicycle Boulevard	All Ages & Abilities	0.54	\$117,946	Medium
126A	W 3rd St	W H St	W J St	Class III Bicycle Boulevard	All Ages & Abilities	0.07	\$14,302	Medium
152A	Havenhill Dr	Proposed trail	Warwick Dr	Class III Bicycle Boulevard	All Ages & Abilities	0.22	\$47,394	Medium
111A	Chelsea Hills Dr	Southampton Rd	Warwick Dr	Class II Bicycle Lane	All Ages & Abilities	0.06	\$17,264	Medium
115A	Lake Herman Rd	City Limit	Northgate Church Rd	Class III Bicycle Route	Connectivity & Gap Closure	1.74	\$2,424,611	Low
158A	E 5th St	I-780	North end of St	Class III Bicycle Route	Connectivity & Gap Closure	0.48	\$667,200	Low

Table B-3: Benicia Recommended Bikeway Project List

ID	Corridor Name	From	То	Recommendation	Network	Length (mi)	Cost	Prioritization Rank
115B	Lake Herman Rd	Northgate Church Rd	Industrial Way	Class II Bicycle Lane	All Ages & Abilities	0.52	\$141,009	Low
159A	Hillcrest Ave	E 2nd St	Francesca Terrace Park	Class III Bicycle Boulevard	All Ages & Abilities	0.62	\$136,400	Low
160A	Proposed Trail	Reservoir Rd	Lake Herman Rd	Class I Multi-Use Path	All Ages & Abilities	1.36	\$2,189,600	Low
161A	Chelsea Hills Dr	Banbury	Warwick	Class III Bicycle Route	Connectivity & Gap Closure	0.57	\$789,773	Low
147A	Reservoir Rd	E 2nd St	Lake Herman Rd	Class III Bicycle Route	Connectivity & Gap Closure	0.85	\$1,176,019	Low
163A	E 4th St	Military East	L St	Class III Bicycle Boulevard	All Ages & Abilities	0.06	\$13,200	-
152B	E 5th St	0 St	I-780	Class II Bicycle Lane	Connectivity & Gap Closure	0.12	\$32,400	-
162A	Seaview Ave	Havehill St	2nd St	Class III Bicycle Route	Connectivity & Gap Closure	0.56	\$123,200	-
164A	Solano Dr	Panorama Dr	Rose Dr	Class III Bicycle Route	Connectivity & Gap Closure	1.23	\$270,600	-

Table B-3: Benicia Recommended Bikeway Project List

Implementation Note: All recommended proposed projects may need further evaluation at the local level including potential parking, traffic operations, design, and/or feasibility studies. Additionally, projects that may require multiple studies could be assessed with a Complete Streets Corridor Study and include additional public engagement.

Projects 117D and 117E could be either Class I Multi-use paths or Class IV Separated Bikeways; cost shown in Table B-3 assume Class IV separated bikeway.

# Near-Term Implementation Bike Network Action Plan

During the fourth phase of outreach, participants at each workshop or meeting were asked to identify their top five projects that Benicia should prioritize in the next five years. This activity is intended to help shed light on which projects receive public support and would be well-used in a complete, connected network. Research has shown that rapidly building out a connected, low-stress network provides the highest mode shift to bicycling. Given realistic funding constraints and staff capacity to implement all bikeway recommendations, the Solano Transportation Authority identified a focused list of projects to build out a simplified citywide network. The Solano Transportation Authority will partner with the City of Benicia to identify funding sources to implement the facilities over the next five years. While some projects may score lower on the prioritization list, they represent critical connections within the overall network and receive strong public support. Figure B-19 shows the results from the 5 in 5 outreach activity. Table B-4 and Figure B-20 identify the top corridors from the "5 in 5" activity with their associated prioritization rankings; these scores should be considered for near-term implementation to build out a connected network.

Corridor Name	Segment IDs	Total Project Cost	Safe Routes to Transit	Safe Routes to School	Supports Equity Goals
Military West	143A, 143B, 143C, 143D, 143E, 143F, 143H	\$653,392	$\checkmark$	$\checkmark$	$\checkmark$
Southampton Road/ West 7 <sup>th</sup> Street	136A, 136B, 114A, 114B	\$625,009	$\checkmark$	$\checkmark$	
Rose Drive	101A		$\checkmark$	$\checkmark$	
1 <sup>st</sup> Street	120B, 120C	\$245,379	$\checkmark$		$\checkmark$
East H Street	128A, 128B	\$132,192	$\checkmark$	$\checkmark$	$\checkmark$
Total Near-Term Cost		\$1,755,541			

#### Table B-4: Near-Term Implementation Bike Network Corridors

### **Action Plan Corridor Descriptions**

The following descriptions of the near-term action plan corridors should be used to help identify funding sources and apply for potential grant applications.

- 1. Military West (143A to 143H) Conduct a Complete Streets study and develop a design to implement lowcost Class IV separated bikeways with striped buffers and soft-tipped posts or another vertical barrier. This corridor closes a gap to transit on Military West including local SolTrans routes 15 and 17 and regional SolTrans routes Y, which connects to Vallejo and Walnut Creek. The route would establish safe routes to school bikeways for Benicia High School, Mary Farmar Elementary School, Happy Hearts Preschool, and the Kyle Hyland Center for Teen Support. Military West also connects to downtown services including City Hall and the Benicia Public Library. The route closes a gap in the San Francisco Bay Trail from the Benicia State Recreation Area to Downtown Benicia. This corridor also connects through one Metropolitan Transportation Commission Priority Development Area.
- 2. Southampton Road/W 7<sup>th</sup> Street (136A to 136B,

114A to 114B) – For the 7<sup>th</sup> Street section, conduct an operations assessment to identify necessary turn pockets and develop a design to implement low-cost Class IV separated bikeways. For the Southampton Road section, narrow travel lanes and remove the center turn lane where it is not needed to install striped buffers and soft-tipped posts to implement low-cost Class IV separated bikeways. This route closes the bikeway gap to Downtown Benicia for residents north of I-780 by providing an enhanced bikeway crossing under the freeway. The corridor also connects many high-density residential areas to local businesses and dining at the Southampton Shopping Center. This project establishes a safe route to school for Benicia Middle School from surrounding neighborhoods while providing a connection for recreational purposes to Military West and the SF Bay Trail through the Benicia State Recreation Area. These

improvements close gaps to transit by providing access to local SolTrans routes 15 and 17.

- 3. Rose Drive (101A) Implement Class II bicycle lanes by removing one-side of parking to and develop a protected intersection crossing treatment at Columbus Parkway. This enhanced crossing will reduce barriers to accessing the SF Bay Trail and connecting to Downtown Benicia. This corridor creates a connection for high density residential areas to local businesses and dining at the intersection at Parkway Plaza and Rose Center. The route provides access to local SolTrans route 15 and promotes recreational opportunities by closing a gap between the SF Bay Trail, Bay Area Ridge Trail, and the existing trail north of Cambridge Drive for cyclists. The corridor also establishes a safe route for northern Benicia neighborhoods to get to Benicia High School.
- 4. 1<sup>st</sup> St (120B to 120C) Conduct a Complete Streets study with additional outreach and alternative concept designs with the goal of implementing low-cost Class IV Separated Bikeways with additional bicycle parking in the near-term. This corridor provides access to downtown businesses and entertainment while closing a gap to the bikeway on E H Street. The route also promotes recreational opportunities by connecting to the SF Bay Trail and the Playground of Dreams at City Park. The route closes gaps to transit for downtown residents by providing access to local SolTrans routes 15 and 17 and regional SolTrans routes Y, which connects to Vallejo and Walnut Creek at the intersection with Military West. This corridor connects through one MTC Priority Development Area.
- 5. E H St (128A to 128B) Implement Class II bicycle lanes by narrowing travel lanes between 1<sup>st</sup> Street and East 4<sup>th</sup> Street. Add traffic calming and wayfinding between East 4<sup>th</sup> Street and East 5<sup>th</sup> Street. This route closes a gap to Downtown and acts as a bypass route for Military West to connect residents in southeast Benicia to Downtown. The corridor also establishes a safe route to St Dominic's School and promotes recreational opportunities by closing a gap to Fitzgerald and Maria Fields. Additionally, the route connects low-income and high-density residential areas to downtown and transit along Military West/East. This corridor connects through one MTC Priority Development Area.







# **Recommended Pedestrian Projects**

The PDT completed two types of analyses to identify pedestrian network recommendations. The first assessment identified sidewalk gaps along the local and countywide backbone networks that play a regionally significant role in the pedestrian realm. This analysis identified 8.5 miles of sidewalk gaps in Benicia along the backbone networks. Table B-5 presents the sidewalk gaps along the backbone networks along with a cost estimate for filling each gap. Figure B-21 shows the sidewalk network gaps and the backbone network. The second assessment identified pedestrian projects highlighted through the safety analysis, walk audits, community outreach, or previous transportation plans; or sidewalk gaps located in high-demand areas, such as along arterials in close proximity to transit stops or schools (see Table B-6). Note that there is some overlap in projects identified in each process for sidewalk gap closure projects as local priorities were evaluated. Figure B-22 shows the list of pedestrian projects identified using this second assessment. All of the projects identified through these two analyses will help improve Benicia's pedestrian network so that it is more comfortable for people of all ages and abilities.

Street / Facility Name	Extents	North or West Side of Street Distance (mi)	South or East Side of Street Distance (mi)	Total Distance (mi)	Cost
Columbus Pkwy	Benicia Rd to Rose Dr	0.08	0.19	0.27	\$267,300
Dillon Point Rd	SF Bay Trail Crossing to SF Bay Trail Trailhead	0.00	0.05	0.05	\$49,500
Military West St	W 5th St to W 3rd St	0.19	0.22	0.40	\$396,000
Military West St	W 3rd St to W 2nd St	0.01	0.11	0.12	\$118,800
Adams St	Military East St to Park Rd	0.00	0.05	0.05	\$49,500
Park Rd	Adams St to Oak Rd	0.01	0.27	0.28	\$277,200
Park Rd	Oak Rd to Industrial Way	1.37	1.36	2.73	\$2,702,700
Park Rd	Industrial Way to E 2nd St	1.05	1.05	2.10	\$2,702,700
E 2nd St	Park Rd to Lake Herman Rd	0.59	0.48	1.07	\$1,059,300
Lake Herman Rd	Northgate Church to Egret Ct	0.52	0.52	1.05	\$1,039,500
W 7th St	Military West St to Lori Dr	0.00	0.27	0.27	\$267,300
Southhampton Rd	Chelsea Hills Dr to EB I-780 Ramps	0.00	0.17	0.17	\$168,300
E H St	E 3rd St to E 4th St	0.02	0.00	0.02	\$19,800
E 5th St	E K St to E L St	0.00	0.02	0.02	\$19,800
E 5th St	E L St to Military East St	0.00	0.01	0.01	\$9,900
Military East St	E 3rd St to E 7th St	0.00	0.51		\$504,900
Total	-	3.85	4.75	8.61	\$8,523,900

#### Table B-5: Benicia Sidewalk Gaps along the Active Transportation Backbone Network





#### Table B-6: Proposed Priority Pedestrian Projects

Project ID	Location	Description	Project Type	Length*	Estimated Cost*
BE.WA.1	Bridgeview Park	Pedestrian Crossings	Walk Audit	-	-
BE.SA.1	Military Way bet. W 5th St and E 5th St	Pedestrian Crossings, ADA ramps, Sidewalk Gap Closure	Safety	0.4	\$396,000
BE.SA.2	Southampton Rd and Panorama to West 7th St and Military West; Mary Farmar, Robert Semple, Benicia Middle School, and Benicia High School	Pedestrian Crossings, ADA Ramps, Sidewalk Gap Closure	School Access	1.09	\$1,079,100
BE.SA.3	Sweetbrier Lane to Hastings; Solano Dr bet. Poppy Circle and Buckeye Ct; Joe Henderson, and Matthew Turner schools	Pedestrian Crossings, ADA Ramps, Sidewalk Gap Closure	School Access and Transit Access	0.05	\$49,500
BE.SA.4	I-780 Overcrossing and Path from Southampton Rd to Denfield Ave	Pedestrian Crossings and Sidewalk Gap Closure	Safety	0.31	\$306,900
BE.SA.5	E 5th st bet. O st and Vecino St	ADA Ramps	Safety	-	-
BE.SG.1	Benicia State Recreation Area to existing planned Bay trail along the waterfront to the Marina to East 5th St from East E St to Military East to Vecina St and to Park Rd at Adams	Sidewalk Gap Closure	School Access and Transit Access	1.15	\$1,138,500
BE.SG.2	State Park Rd to Columbus Pkwy (east side) bet. Benicia Rd and Rose Dr	Sidewalk Gap Closure	Transit Access	0.5	\$495,000
BE.SG.3	Adams St to Bayshore Rd to Park Rd to East 2nd St	Sidewalk Gap Closure	School Access and Transit Access	4.7	\$4,653,000
BE.SG.4	Industrial Way bet. Park Rd to Lake Herman Rd; Stone Rd bet. Park Rd and East 2nd St	Sidewalk Gap Closure	Transit Access	5.16	\$5,108,400
BE.SG.5	Rose Dr bet. E 2nd St and McAllister Dr	Sidewalk Gap Closure	Transit Access	0.31	\$306,900
Total	-	-	-	13.67	\$13,533,300

\*Lengths and costs listed only apply to sidewalk gap closures, additional analysis is needed to determine costs associated with projects other than sidewalk gap closure.

