DISTRICT 5

BIKEWAYS STRATEGY REPORT

March 2015

OCCOG

OCTA

KOA Corporation
KTU+A

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I. EXECUTIVE SUMMARY

This report summarizes the results of a collaborative effort to identify and prioritize potential regional bikeways throughout south Orange County (Supervisorial District 5). Through extensive facilitation efforts, nine regional bikeway corridors were identified and ranked. The rankings serve as the basis for a subsequent feasibility study for the top three corridors. The remaining six corridors may by assessed at a later date, as agencies work toward obtaining funding for the completion of each corridor.

While the Orange County Council of Governments (OCCOG) and the Orange County Transportation Authority (OCTA) have commissioned this report, implementation of bikeway corridors will be led by the agency's that have jurisdiction. In some cases, roadways are managed by Caltrans, such as portions of Pacific Coast Highway (State Route 1) or at freeway interchanges. While OCCOG and OCTA will promote the implementation of corridors recommended in this report, final design, construction, and maintenance of the corridors will be coordinated and conducted by the respective jurisdictions. Additionally, the cities or the County may need to coordinate with various landowners such as utility companies, rail operators, and OCTA for right-of-way acquisition.

The District 5 Bikeways Strategy aims to enhance community interaction and expand travel choices for residents and bicyclists of all skill levels throughout south Orange County. The integrated planning effort establishes bikeways that cross jurisdictional boundaries and serve major destinations and employment centers. The coordinated efforts by OCTA and member agencies support improved road safety, reduced automobile trips, reduced fuel consumption and air emissions, and improved community health outcomes within District 5. The feasibility study will include an assessment of what is needed to complete or enhance the corridors, recommended designs, preliminary drawings, and cost estimates. These assessments and recommendations are intended to help advance local project implementation and provide the basis to apply for state and federal grants.

I.1 Background

The District 5 Bikeways Strategy was developed as part of OCTA's regional bikeways planning process, which involves OCTA, local jurisdictions, and public stakeholders. This process began in 2011 with a pilot effort for Supervisorial District 4 in northern Orange County, then for Supervisorial Districts 1 & 2 in central and western Orange County in 2012. It is funded by a federal grant received by OCCOG, with a 20% local match provided by OCTA. There are two phases of the regional bikeways planning process. Phase 1 is this bikeways strategy, which identifies the regional "backbone" bikeway corridors that connect to major activity centers. The regional bikeway corridors are identified based on community and agency input and ranked based on criteria consistent with regional transportation goals and objectives (see Table ES.1 and Chapter 3). In Phase 2, the top-ranking corridors are studied in more detail with the development of a feasibility study, which provide planning-level design recommendations to the local jurisdictions.

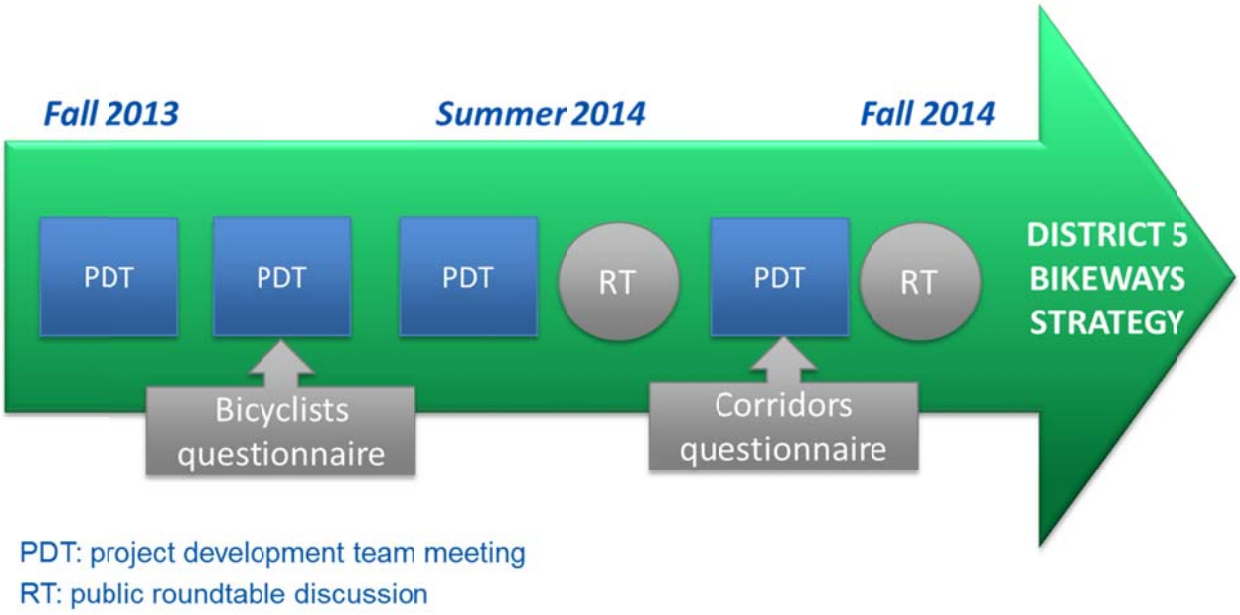
Regional bikeway planning supports the goals contained in existing countywide transportation plans, such as the Long Range Transportation Plan, OCTA Commuter Bikeways Strategic Plan (CBSP), and the Orange County Sustainable Communities Strategy. These goals are interrelated and include expanding travel choices, improving safety, and supporting the viability of bicycle transportation.

Building on these broad goals, a set of goals, objectives, and strategies were developed by the project team for District 5. These goals and objectives recognize the physical challenges facing District 5, which include high speed and high volume arterial roadways, large intersections, flood control channels, railroads, and freeways, and hilly terrains. There are four main goals established in accordance with the District 5 local context:

- Goal #1: Increase the use of bicycles as a viable alternative to the automobile
- Goal #2: Coordinate regional bikeways planning and construction among individual cities
- Goal #3: Build a bicycle transportation network by planning, designing, and maintaining transportation facilities that will meet the needs for all types of bicyclists
- Goal #4: Improve bicycling safety in the district

I.II Facilitation Efforts

Preparation of this report was a collaborative effort between OCTA, local agencies, bicycle advocates, and the general public. The process for facilitating discussions between the various stakeholders including the project development team and the bicycling community is detailed below:



The following summarizes the process for facilitating the regional bikeway discussion in preparing the Strategy:

- A project development team (PDT) was organized with planning and engineering representatives from each local jurisdiction (county and city) within Supervisorial District 5. These include the County of Orange and the cities of Aliso Viejo, Dana Point, Irvine, Laguna Beach, Laguna Hills, Laguna Niguel, Laguna Woods, Lake Forest, Mission Viejo, Rancho Santa Margarita, San Clemente, San Juan Capistrano, and Caltrans District 12. OCTA staff and the project consultant team participated on the PDT. The PDT met on multiple occasions to discuss project goals and objectives, opportunities and constraints, preliminary corridor alignments, and draft ranking criteria.

- Focus group meetings were conducted with smaller working groups of PDT representatives. During the focus group meetings, large-format boards were printed for brainstorming potential bikeways corridors. The boards presented information to help frame bikeways demand, needs, and opportunities. This included the identification of flood control channels and rail corridors, the transportation network, existing and proposed bikeways, major destinations, and other key features for consideration and collaborative brainstorming.

- Two community roundtable discussions were held to provide an opportunity for public input on the project. The first roundtable occurred in May 2014 during National Bike Month. A presentation on the draft regional bikeway corridors was made and public input was requested on corridor concepts, ranking evaluation criteria, and their top three desired corridors. Approximately 30 attendees included public stakeholders from the bicycle advocacy, health, safety, and social justice sectors, bicycle shop owners, as well as elected officials and community residents. Presentations describing the planning process and large-format boards displaying the proposed corridors were provided. The second roundtable occurred in September 2014 and was attended by approximately 50 people with boards showing the top three ranked regional bikeway corridors. A presentation described the nine corridors and key changes since the first roundtable with a focus on prioritizing the top three corridors. Attendees at the roundtable discussed the ranking analysis results and provided feedback on the recommended top three corridors. Promotion of the

roundtables was conducted by means of direct emails to over 1,000 stakeholders, advertisements on OCTA and city websites, OCTA's "On the Move" blog, and social media.

- A project webpage was created on OCTA's website (www.octa.net/Share-the-Ride/Bike/District-5-Bikeways-Roundtable). It included a project overview that was updated regularly with project materials, including meeting materials, meeting dates, and contact information.
- An online questionnaire was promoted online and distributed at the first public roundtable asking respondents to gauge attendees' level of bicycling comfort and gather input about their bicycling preferences and frequency. Almost 200 questionnaires were completed.
- A second questionnaire was distributed online and at the second roundtable to solicit feedback on the proposed corridors. It included a map of the proposed corridors. Participants were asked to rank the top three corridors. There were 150 questionnaires completed.

I.III Regional Corridors

As shown in Figure ES.1, a total of nine regional bikeway corridors are proposed to help improve the viability of bicycling and cross-jurisdictional bikeway connectivity throughout south Orange County. The proposed corridors provide connections to other regional bikeway corridors established in neighboring supervisorial districts and between major points of interest. These corridors are comprised of both existing bikeway facilities and new proposed segments. The exact corridor alignments may change upon more detailed analysis during the feasibility study phase. For example, corridors may be realigned to use parallel or adjacent streets that provide a more feasible route. The proposed corridors and corridor alignments evaluated in this Strategy are the following:

- **Corridor A – Pacific Coast Highway (PCH)** – This 20-mile north-south corridor runs south along PCH from the southern Newport Beach city boundary, along Del Prado to Golden Lantern Street, down to Dana Point Harbor Drive, along Park Lantern to Coast Highway, and finally along El Camino Real to the southern San Juan Capistrano city limit.

- **Corridor B – Laguna Canyon** – This 8.8-mile north-south corridor runs along Laguna Canyon Road from the Supervisorial District 5 boundary in Irvine at the I-405 Freeway and continues to PCH.

- **Corridor C – El Toro/Alicia/Laguna Canyon** – This 15.3-mile corridor extends along Alicia Parkway from Santa Margarita, onto Paseo de Valencia, to El Toro Road, then along Laguna Canyon Road (State Route 133) to Broadway Street, and ending at PCH in Laguna Beach.

- **Corridor D – Portola/Santa Margarita** – This 6.7-mile corridor extends along Portola Parkway from the Supervisorial District 5 boundary at the western city limit of Lake Forest, west of Paloma, and continues along Santa Margarita Parkway to Avenida Empresa, ending at Antonio Parkway.

- **Corridor E – Aliso Creek** – This 20.3-mile corridor runs along Santiago Canyon Road from the Supervisorial District 5 boundary in Modjeska Canyon at approximately Bolero Lookout Road, to El Toro Road at Ridgeline Road, continues along the Class I Aliso Creek bike path parallel to El Toro Road and ends at PCH.

- **Corridor F – Muirlands/Cabot/Camino Capistrano**– This 18-mile corridor runs along Muirlands Boulevard from the Supervisorial District 5 boundary east of Bake Parkway, then along the Aliso Creek Bike Path at Los Alisos Boulevard. It continues along the bike path parallel to Paseo de Valencia, then on Paseo de Valencia at Laguna Hills Drive, and onto Cabot Road and the Cabot-Forbes bike path at Rapid Falls Road. From there, it extends along Forbes Road to the Laguna Niguel Metrolink Station, crossing over to Camino Capistrano, continuing to La Zanja Street, then onto Avenida De La Vista. It picks up from there on the Trabuco Creek Trail, to the San Juan Creek Trail along Camino Capistrano to access San Juan Creek Road, then along a proposed bikeway currently in development that would connect to Avenida California, continue along Via California and Via Fortuna to Via Sacramento, then along Camino Capistrano to Palisades Drive and down to PCH.

- **Corridor G – Oso Parkway** – This 8.9-mile corridor runs along Pacific Park Drive from Woodfield and continues along Oso Parkway to its eastern end at Bend Road/Coto De Caza Drive.

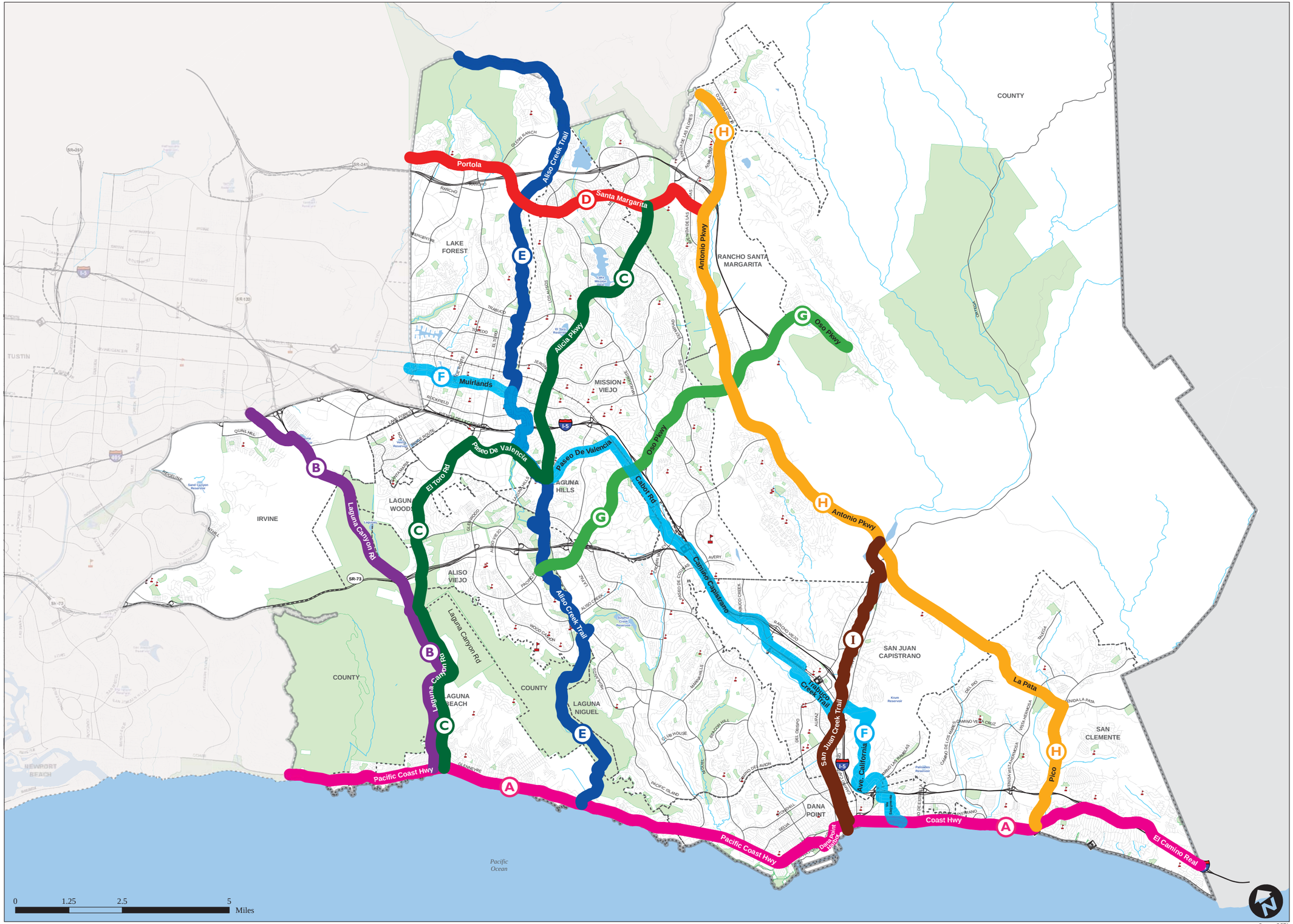
- **Corridor H – Antonio/La Pata/Pico** – This 18-mile corridor runs along Antonio Parkway from Avenida De Las Flores and continues along La Pata Avenue, then onto Avenida Pico down to El Camino Real.

- **Corridor I – San Juan Creek** – This 8.6-mile corridor extends along San Juan Creek Trail from Antonio Parkway down to PCH.

PROJECT CORRIDOR OVERVIEW

OCTA District 5 Bikeways Collaborative

KOA CORPORATION PLANNING & ENGINEERING



Source: OCTA

BIKEWAY CORRIDORS

- A — Pacific Coast Highway Corridor
- B — Laguna Canyon Corridor
- C — El Toro/Alicia Corridor
- D — Portola/Santa Margarita Corridor
- E — Aliso Creek Corridor
- F — Muirlands/Cabot Corridor/ Camino Capistrano
- G — Oso Parkway Corridor
- H — Antonio/La Pata/Pico Corridor
- I — San Juan Creek Corridor

LEGEND

- Transportation Center
- Rail
- Schools
- Colleges
- Parks / Open Space
- Waterbody
- City Boundary
- Supervisorial District 5

Figure ES-1

Each corridor was evaluated using criteria consistent with District 5 goals and objectives and building from criteria specified in OCTA's 2009 CBSP and District 1, 2 and 4 Bikeways Collaboratives. The criteria consider a range of opportunities, constraints, and other factors affecting demand and feasibility. The evaluation criteria include the following categories:

- Trip Demand
- Level of Traffic Stress (LTS)
- Reported Collisions
- Public Support
- Physical Constraints
- Completes the Corridor
- Completes the Network
- Economic Efficiency

Table ES.1 summarizes the ranking evaluation, with raw and weighted scores shown. Raw scores for each category were calculated using a methodology described in Chapter 3.2. The weighted scores account for normalizing between 0 and 100 and the weighting of each criterion.

The regional corridors were ranked to help guide implementing agencies in prioritizing bikeway improvements. The evaluation process determined which corridors would provide the greatest relative potential benefit to bicyclists in terms of regional connectivity, access to key destinations, and improved safety, while also possessing significant public support and limited physical constraints that could hinder implementation. The following top ranked corridors will be further studied for feasibility in the second phase of the District 5 Bikeways Strategy:

- **Corridor A:** Pacific Coast Highway
- **Corridor C:** El Toro/Alicia/Laguna Canyon
- **Corridor F:** Muirlands/Cabot/Camino Capistrano

Each of the District 5 cities, the County of Orange, and Caltrans have jurisdiction over portions of at least one of these three corridors. While feasibility review is not immediately being provided for all of the other six corridors, cities may advance the study of any corridor where there is interest in continuing the efforts of the Strategy.

Table ES.2 summarizes criteria ranking results for the nine proposed corridors within District 5 and shows the distance of each corridor and range of cost.

Table ES.1: Corridor Scoring

Criteria		Score	Level of Traffic Stress		Reported Collisions		Economic Efficiency		Trip Demand		Public Input		Completes the Network		Physical Constraints		Completes the Corridor	
Best Possible Score		Tot.	RS	WS	RS	WS	RS	WS	RS	WS	RS	WS	RS	WS	RS	WS	RS	WS
		100	4.0	20	3.0	20	6.4	15	343.6	15	96	10	1.7	5	3	10	0%	5
A	PCH Corridor	70	4	19	3	20	1	2	280	12	96	10	1	3	12	2	0	1
B	Laguna Canyon	54	4	20	1	9	0	1	209	9	62	6	1	2	29	1	0	5
C	El Toro/Alicia/ Laguna Canyon	65	4	20	2	16	2	4	289	13	21	2	1	4	20	1	0	5
D	Portola/Santa Margarita	59	4	20	1	7	1	1	317	14	19	2	2	5	6	5	0	5
E	Aliso Creek	50	1	6	0	1	5	11	261	11	58	6	1	4	3	10	0	1
F	Muirlands/Cabot / Camino Capistrano	60	2	12	1	8	6	15	344	15	47	5	1	3	21	1	0	1
G	Oso Parkway	48	4	19	0	3	1	2	277	12	13	1	1	4	16	2	0	5
H	Antonio/La Pata/Pico	44	3	17	1	7	1	1	245	11	23	2	1	2	20	1	0	2
I	San Juan Creek	38	1	3	0	0	5	12	313	14	22	2	1	3	11	2	0	1

Note: RS = Raw Score; WS = Weighted Score

Table ES.2: Corridor Ranking

Corridor ID	Corridor Name	Rank	Weighted Score	Length (miles)	Cost Range (millions)
A	PCH	1	70	19.0	$11.5 – $14.1
C	El Toro/Alicia/Laguna Canyon	2	65	15.3	$12.2 – $15.0
F	Muirlands/Cabot/Camino Capistrano	3	60	17.9	$7.4 – $9.0
D	Portola/Santa Margarita	4	59	6.7	$6.5 – $8.0
B	Laguna Canyon	5	54	8.8	$8.4 – $10.3
E	Aliso Creek	6	50	20.3	$8.2 – $10.0
G	Oso Parkway	7	48	8.9	$5.5 – $6.8
H	Antonio/La Pata/Pico	8	44	18.0	$11.1 – $13.5
I	San Juan Creek	9	38	8.6	$3.8 – $4.6
TOTAL				**123.5**	**$74.6 – $91.3**

I.IV Near-Term Action Plan

In an effort to build momentum to complete the regional bikeway network, the District 5 Bikeways Strategy recommends potential near-term projects. These potential near-term projects along the proposed corridors can be implemented requiring minimal construction costs, low right-of-way acquisition, and minimal environmental review as funds become available. Examples of near-term projects may include restriping a street to implement a Class II bike lane or providing signage along a street to designate it as a Class III bike route.

Each jurisdiction will lead funding and implementation efforts for projects in their respective areas. OCTA can provide support to these jurisdictions through efforts such as providing grant notifications, grant application guidance, and design solutions. Coordination between jurisdictions is highly encouraged to implement linkages simultaneously.

I.V Funding Strategies

Funding assistance can be provided through federal, state, and local government agency programs aimed at improving bicycle infrastructure. It is important that communities are made aware of funding sources and that the proper procedures are followed in applying for the grants. Because only a portion of public transportation funding is allocated toward bicycle policy development and infrastructure, there is strong competition between jurisdictions to successfully secure funding.

Most federal funding requires that funds be matched by state and/or local municipalities. State funding often requires similar funding matches from local agencies. To facilitate the acquisition and coordination of funding, a full-time bicycle coordinator with extensive knowledge of funding sources is often appointed. Bicycle coordinators should also have a strong capability to develop a competitive proposal, specifying the project details and jurisdictional needs and opportunities for bicycle improvements.

A summary table by source type has been provided with details regarding eligibility, use, and requirements associated with funding sources, to support agency efforts in finding outside funding sources to implement improvements along the proposed corridors (Chapter 6).

I.VI Programs

Non-infrastructure bicycle programs, such as education, encouragement (public outreach), enforcement, and evaluation (four of the "Five Es" of bicycle planning - with the fifth being engineering), work together through policy development and engineering implementation to enhance the bicycle network for all users. Based on community input and coordination with agency staff, programmatic recommendations are provided in this Strategy to complement the infrastructure recommendations associated with the proposed corridors.

1.0 INTRODUCTION

This document summarizes the recommendations and near-term action plan for the implementation of regional bikeways throughout south Orange County. The objective of the District 5 Bikeways Strategy ("the Strategy") is to coordinate planning and funding efforts between the various entities for implementing regionally-beneficial bikeways. The recommendations are the result of a collaborative effort between the local agencies and community stakeholders. The Strategy focuses on identifying potential regional bikeways that could best serve bicyclists of varying skill levels. A near-term action plan was established to outline potential next steps for completing the regional bikeway network.

1.1 Background

The District 5 Bikeways Strategy was developed as part of OCTA's regional bikeways planning process: involving OCTA, local jurisdictions, and public stakeholders. The County of Orange, Caltrans, and the cities of Aliso Viejo, Dana Point, Irvine, Laguna Beach, Laguna Hills, Laguna Niguel, Laguna Woods, Lake Forest, Mission Viejo, Rancho Santa Margarita, San Clemente, and San Juan Capistrano were involved. This process began in 2011 with a pilot effort for Supervisorial District 4 in northern Orange County, then for Supervisorial Districts 1 & 2 in west central Orange County in 2012. It is funded by a federal grant received by the Orange County Council of Governments (OCCOG), with a 20% local match provided by the Orange County Transportation Authority (OCTA). Figure 1.1 illustrates the Supervisorial District 5 boundaries.

Regional bikeway planning efforts support the goals contained in existing countywide transportation plans, such as the Long Range Transportation Plan and the Orange County Sustainable Communities Strategy. These goals include expanding travel choices, improving safety, and supporting sustainability. They also build on the 2009 Commuter Bikeways Strategic Plan (CBSP) which outlines OCTA's roles in bikeways planning, as follows:

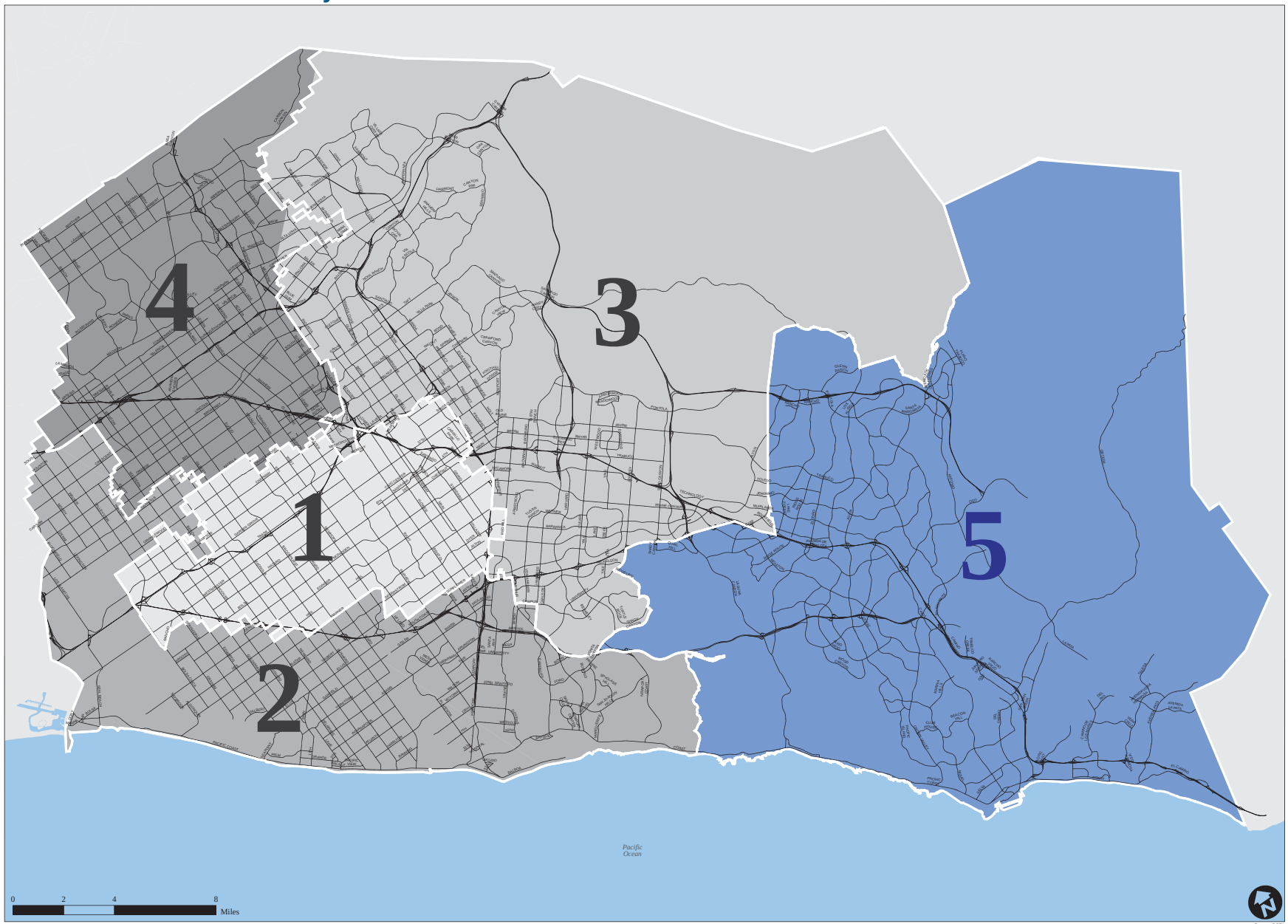
- Suggesting regional priorities for optimal use by local jurisdictions;
- Assisting in coordinating plans between jurisdictions;
- Providing planning and design guidelines; and
- Participating in outreach efforts to encourage bicycle commuting.

The CBSP outlines "regional priority locations", including colleges and universities, transportation centers, and major employment areas. These regional priorities served as the basis for developing the potential District 5 regional bikeway corridors. While this planning process has been initiated and coordinated by OCTA, local jurisdictions will bring projects from concept to construction, through coordination with Caltrans and OCTA as needed.

ORANGE COUNTY SUPERVISORIAL DISTRICTS

OCTA District 5 Bikeways Collaborative

KOA Corporation Planning & Engineering



DISTRICT INFORMATION

DISTRICT 1

Fountain Valley (Portions of)
Garden Grove
Santa Ana
Westminster

DISTRICT 2

Buena Park (Portions of)
Costa Mesa
Cypress
Fountain Valley (Portions of)
Huntington Beach
La Palma
Los Alamitos
Newport Beach
Seal Beach
Stanton

DISTRICT 3

Anaheim (Portions of)
Irvine (Portions of)
Orange
Tustin
Villa Park
Yorba Linda

DISTRICT 4

Anaheim (Portions of)
Brea
Buena Park (Portions of)
ullerton
La Habra
Placentia

DISTRICT 5

Aliso Viejo
Dana Point
Irvine (Portions of)
Laguna Beach
Laguna Hills
Laguna Niguel
Laguna Woods
Lake Forest
Mission Viejo
Rancho Santa Margarita
San Clemente
San Juan Capistrano

Figure 1-1

1.2 Strategy Overview

The Strategy identifies nine regional corridors to serve as the backbone bikeway network for cities and unincorporated areas within south Orange County. These corridors and the rationale for their alignments are described in Chapter 3. The report includes an overview of current conditions, highlights of attractions along the corridor, and the identification of opportunities (e.g. existing flood channel maintenance roads and available road right-of-way) and constraints (e.g. significant inclines/ declines and complex intersections).

The report describes each of the eight criteria used to assess and rank the regional corridors. These criteria are based on goals and objectives developed with input from the local agencies and the community. The top three corridors have been selected for a follow-up feasibility study that will include planning-level design recommendations for key sections of each corridor. The feasibility study will provide the information and data required for local jurisdictions to prepare grant applications for the design and construction of sections of each corridor.

In an effort to facilitate project implementation, a high-level near-term action plan for all nine of the corridors is outlined in this report. The plan recommends implementing items that are relatively low-cost and with few major constraints such as slope, environmental concerns, or lack of right-of-way. Local governmental agencies are already working on many of the items identified in the plan.

The Strategy also consists of a detailed discussion of the various types of bike facilities that could be used along these corridors in southern Orange County. Facilities covered in this section range from bike lanes and shared-use markings or "sharrows" to separated paths, cycle tracks, complex intersection treatments, signage, and street markings. Sections of the corridors where these facilities may be appropriate are identified.

The Strategy outlines educational approaches for bicyclists and motorists. Classes for children and adults as well as public outreach are reviewed.

Finally, the Strategy outlines funding strategies and points to a variety of public, as well as private, sources of funds for bike infrastructure and educational projects.

1.3 Bikeways Classifications

Throughout this report, reference is made to four classes or categories of bikeways. Until recently, the California Department of Transportation (Caltrans) used three categories for bikeways. However, a fourth category, separated bikeways or cycle tracks, has recently been added to the classification. California Streets and Highways Code (SHC) Section 890.4 defines the four bikeway. These bikeway classifications are illustrated in Figure 1.2 and summarized below:

- Class I – Off-Street Paved Bike Paths: facilities on a separate right-of-way from roadways, usually shared by bicyclists and pedestrians.
- Class II – On-Road Striped and Signed Bicycle Lanes: on-street facilities that use painted stripes and stencils to delineate the right-of-way assigned to bicyclists and motorists, and to provide for more predictable movements by each.
- Class III – On-Road Shared-Lane Signed Bicycle Routes: signed on-street facilities that accommodate vehicles and bicycles in the same travel lane. Bicycles are permitted on most roadways; however, for safety purposes, signed bicycle routes are often found on streets with lower speeds and traffic volumes.
- Class IV Bikeways - Separated Bikeways (Cycle Tracks): exclusive bike facilities that combine the user experience of a separated path with the on-street infrastructure of conventional bike lanes.

A more detailed description is in Chapter 5 (Bicycle Facility Toolkit).

1.4 Jurisdictional Governance

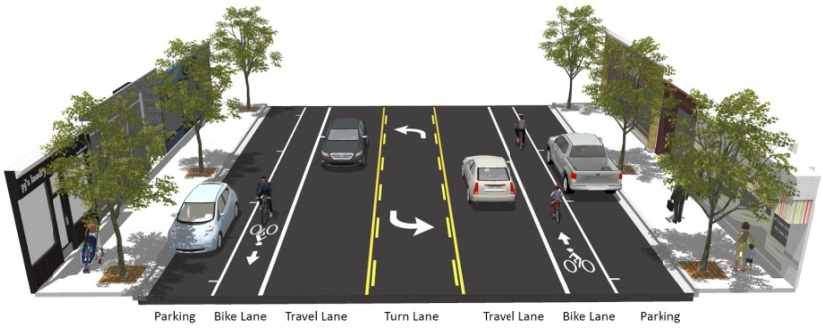
While OCCOG and OCTA commissioned this report, the implementation of bikeway corridors will be led by the cities or the County of Orange, whomever has jurisdiction. In some cases, roadways are managed by Caltrans, such as portions of Pacific Coast Highway (State Route 1), or at freeway interchanges.

While OCCOG and OCTA promote the implementation of corridors recommended in this report, final design, construction, and maintenance of the corridor would ultimately need to be accepted by the respective jurisdictions as outlined above. Additionally, the cities or the County of Orange may need to coordinate with various landowners such as utility companies, rail operators, and OCTA for right-of-way acquisition.

Figure 1.2: Caltrans Bikeway Classifications

Class I: Shared-Use Path/Trail

Class II: Bike Lane



Class III: Bike Route

Class IV: Cycle Track or Separated Lane

2.0 EXISTING CONDITIONS

2.1 Context

The 2009 OCTA CBSP notes that much of south Orange County was developed as planned communities over the last 30 years. The roadway networks are generally wider and more circuitous than in Central County. The advantage to these roads is that many of them were designed with bike lanes along the shoulders. However, these roads typically have higher speed limits, more elevation change, and alignments through low-density communities with housing separated from work and shopping centers. This layout often results in longer trips, and the lower densities consequently result in fewer job opportunities near the residential communities. The higher speed limits and wider roads result in more challenges for bicyclists desiring to share and cross the roadways. Nonetheless, many opportunities still exist, such as providing improved access and facilities at transit stations.

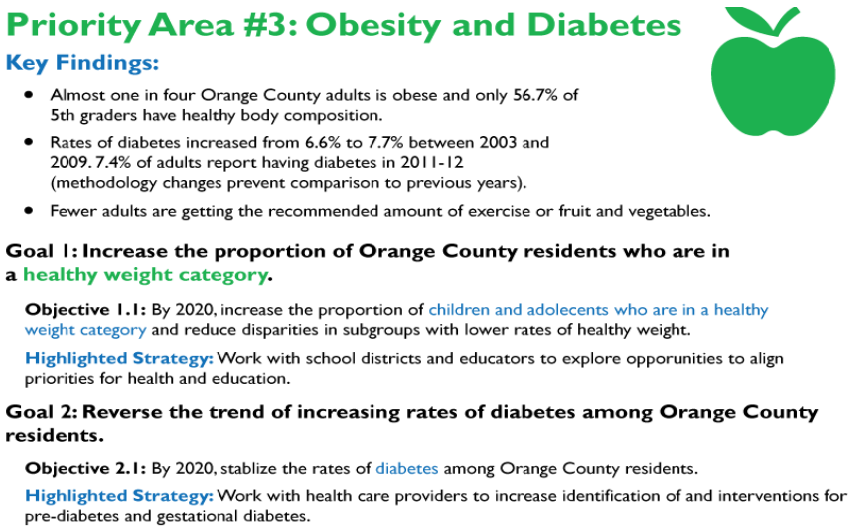
According to the 2013 American Community Survey (U.S. Census Bureau), less than 1 percent of Orange County's population commutes by bicycle. The vast majority of commuters commute to work by driving alone. This shows how automobile-dependent Orange County currently is and why many of the streets and freeways are at, or close to, maximum capacity. The Orange County Projections, produced by the Center for Demographic Research (out of California State University, Fullerton), estimates Orange County's 2013 population of 3.114 million to grow by nearly 600,000, more than 19 percent, by 2035, which will only put more demand on transportation infrastructure. See 2014 Long Range Transportation Plan (www.octa.net/LRTP/).

2.2 Rationale

Implementing bikeway facilities can result in decreased levels of traffic congestion, fuel consumption, and air pollutions, and improved air quality and health. Biking is a viable transportation option for short trips. It solves first mile/last mile issues for transit riders. A bicycle commuter who rides four miles to work, five days a week, avoids 2,000 miles of driving and (in the U.S.) about 2,000 pounds of carbon dioxide emissions each year, which is approximately 5% of the average American's carbon footprint (www.data.worldbank.org).

Serious obesity and diabetes issues exist in the US. Orange County is not immune. The overall obesity rate in the County is over 33%, with most cities in southern Orange County having rates in the low to mid 20's (www.publichealthadvocacy.org). As the graphic on the following page shows, over 7% of people in Orange County suffer from diabetes, with an increasing number of them being children (from the Orange County Health Care Agency, 2014-2016 OC Health Improvement Plan). Encouraging bicycling and other physical activities may help reduce diabetes. According to the Centers for Disease Control and Prevention, children 6 to 17 years of age should get one hour of exercise per day and adults about 30 minutes per day. Bicycling can provide much of this beneficial exercise.

However, to increase the number of people who bike on a regular basis, bicyclists need to feel safe on the roads and bikeways. According to pedbikeinfo.org, "Bicycle trips account for only 1% of trips in the United States. In 2012, there were 726 bicyclist fatalities and 49,000 bicyclist injuries. This data represents 2.2% of all traffic fatalities during the year. Sixty-nine percent of the bicyclist fatalities occurred in urban areas. In California, there were 124 bicyclist fatalities, representing 4.3% of the total 2,857 traffic fatalities in 2012". (National Highway Traffic Safety Administration Traffic Safety Facts 2012 Data, published in April 2014). Bike safety has become an increasing concern over the years.



Priority Area #3: Obesity and Diabetes

Key Findings:

- Almost one in four Orange County adults is obese and only 56.7% of 5th graders have healthy body composition.
- Rates of diabetes increased from 6.6% to 7.7% between 2003 and 2009. 7.4% of adults report having diabetes in 2011-12 (methodology changes prevent comparison to previous years).
- Fewer adults are getting the recommended amount of exercise or fruit and vegetables.

Goal 1: Increase the proportion of Orange County residents who are in a healthy weight category.

Objective 1.1: By 2020, increase the proportion of children and adolecents who are in a healthy weight category and reduce disparities in subgroups with lower rates of healthy weight.

Highlighted Strategy: Work with school districts and educators to explore opporunities to align priorities for health and education.

Goal 2: Reverse the trend of increasing rates of diabetes among Orange County residents.

Objective 2.1: By 2020, stablize the rates of diabetes among Orange County residents.

Highlighted Strategy: Work with health care providers to increase identification of and interventions for pre-diabetes and gestational diabetes.

Orange County Heath Care Agency,
2014-2016 OC Health Improvement Plan

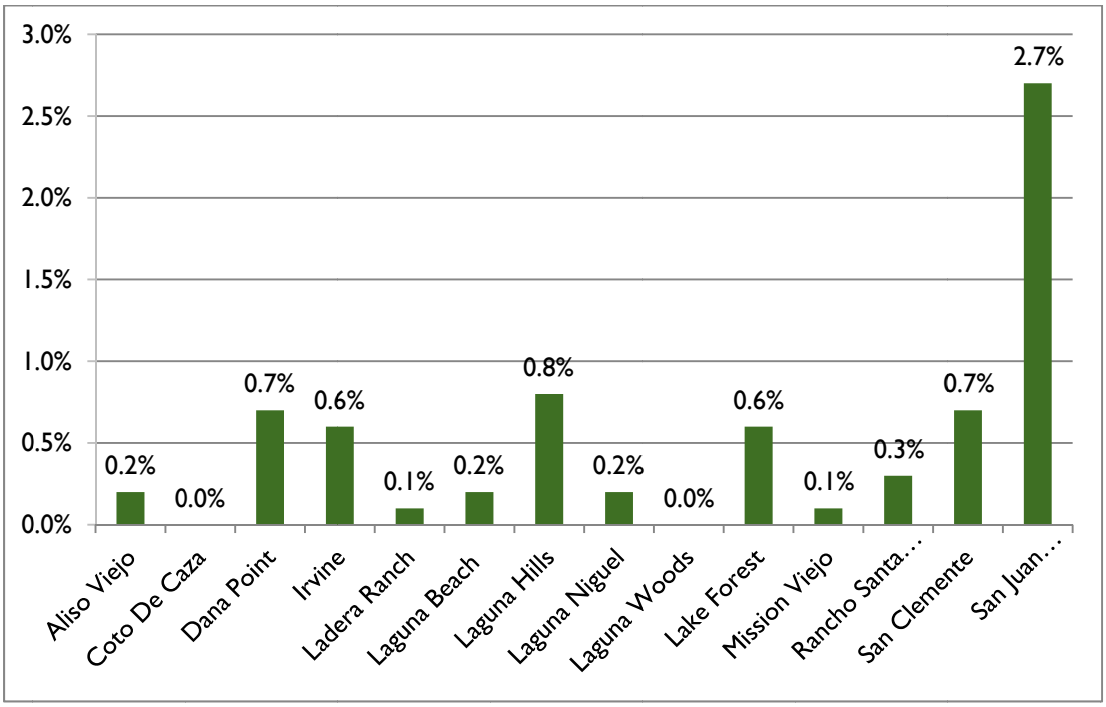
The Strategy identifies corridors that touch all portions of south Orange County's 5th District. They are intended to be designed for and used by bicyclists of all skill levels and help improve health, environmental, social, safety, and economic conditions. The corridors will connect neighboring cities and districts; within those boundaries, connect major points of interest, including employment and retail centers. This effort will require coordination among associated entities to implement.

2.3 Activity Levels and Collision Analysis

2.3.1 Bicycle Commute Mode Share by City

Bicycle commute mode share by city is determined using American Community Survey (ACS) data from the US Census Bureau. Figure 2.1 illustrates that the bicycle mode share for all work trips ranges between 0% and 2.7% within the District 5 cities. The state and county average is 1.0%, while the national average is 0.6%.

Figure 2.1: Bicycle Commute Mode Share by City[1]



1: US Census Bureau: 2009-2013 American Community Survey, 5-Year Estimates
Note: Only the tracts within Supervisorial District 5 of Irvine (mix of land uses)

2.3.2 Estimated Commuter and Utilitarian Bicyclists

In order to recognize the multiple benefits of these regional bikeway corridors, including improved health, less traffic congestion, and maintenance of ambient air quality levels, the number of bicyclists needs to be maximized. A better understanding of the number of existing bicycle trips is needed to achieve these goals of the Strategy. The U.S. Census' ACS provides useful data for understanding bicycling rates across different populations and geographies, as shown in Figure 2.1, but they only report the modes which residents use for commuting to and from work.

The following estimates include additional utilitarian trips, such as those trips made for daily activity by populations other than adults commuting to work. As shown in Table 2.1, there are about 25,000 daily trips by bicycle estimated in District 5. It is important to note that this is simply an order-of-magnitude estimate, based on available data and does not include recreational trips.

Table 2.1: Bicycle Trends in District 5

Variable	Value	Source
Existing Employed Population	290,934	2009-2013 ACS, B08101 5-Year Estimates
Existing Bike-to-Work Mode Share	0.8%	2009-2013 ACS, B08101 5-Year Estimates
Existing Number of Bike-to-Work Commuters	**1,460**	(Existing Employed Population) x (Existing Bike-to-Work Mode Share)
Existing Work-at-Home Mode Share	8.7%	2009-2013 ACS, B08101 5-Year Estimates
Existing Number of Work-at-Home Population	25,288	(Existing Employed Population) x (Existing Work-at-Home Mode Share)
Existing Number of Work-at-Home Bicyclists	**1,264**	Assumes 5% of population working at home makes at least one daily bicycle trip
Existing Transit-to-Work Mode Share	1.1%	2009-2013 ACS, B08101 5-Year Estimates
Existing Transit-to-Work Commuters	3,335	(Existing Employed Population) x (Existing Transit-to-Work Mode Share)
Existing Transit Bicycle Commuters	**67**	Assumes 2% of transit riders access transit by bicycle
Existing School Children, Ages 5-14 (Grades K-8)	41,405	2009-2013 ACS, B01001 5-Year Estimates
Existing School Children Bike Mode Share	2.0%	National Safe Routes to Schools surveys, 2010
Existing School Children Bike Commuters	828	(Existing School Children) x (Existing School Children Bicycling Mode Share)
Existing Number of College Students	35,137	2009-2013 ACS, B14001 5-Year Estimates
Existing College Bicycling Mode Share	25.0%	National Bicycling & Walking Study, FHWA, Case Study No. 1, 1995).
Existing College Bike Commuters	**8,784**	(Existing Number of College Students) x (Estimated College Bicycling Mode Share)
Existing Total Number of Bike Commuters	**12,403**	Total bike-to-work, school, college and utilitarian trips. Does not include recreation
Total Daily Bicycling Trips	***24,807***	Total bicycle commuters x 2 (for round trips)

2.3.3 Impact of E-Bike Technology

E-bikes are gaining popularity in the US with sales expected to double over the next 5 years. In hilly areas such as much of southern Orange County, e-bikes will make it easier for people to make short trips by bike versus car as well as use a bike for exercise and recreation.

A recent survey based study titled "Electric Bikes (E-Bikes) in the United States" by John MacArthur at Portland State University suggests that people who are likely to use e-bikes include those who (1) are older, (2) those commute over 5 miles, (3) live in hilly areas, (4) have physical limitations that makes bicycling difficult, (5) people who don't want to sweat or wear special clothes to commute, and (6) people who need to carry or haul items. http://ppms.otrec.us/media/project_files/E-bikes_in_North_America.pdf

> *"I live in a hilly town and would never commute to work on a standard bike –I wouldn't be able to make it up the hills. My electric assist bike makes commuting by bike possible."* –Survey Respondent

According to the survey the major reasons people bought e-bikes or converted a standard bike were (1) to replace some car trips, (2) health - to increase physical fitness, (3) live or work in a hilly area and (4) ride with less effort. The study also showed that the biggest uses for e-bikes were commuting to work/school and for local trips. The third largest use was for recreation.

The study shows that of the survey respondents 55% rode their standard bike weekly or daily prior to the e-bike purchase; this went to up to 93% after purchase.

The increased popularity of e-bikes will help drive the number of people who use bike facilities in Southern Orange County. As shown by the Portland State University Survey the e-bikes will likely be used largely for commuting and for short trips to local stores and restaurants. This will further increase the demand for bike facilities where all levels of bicyclists feel comfortable.

At the present time in the State of California anyone operating an electric bike is subject to all of the rules and regulations governing operation of a bicycle as outlined in California Vehicle Code Sections 21200-21212. In addition all users must be at least 16 years of age and wear a helmet (California Vehicle Code 24016). At the present time electric bikes cannot be operated on bicycle paths or trails, bikeways, equestrian trails, or hiking or recreational trails, unless it is within or adjacent to a roadway or unless the local authority or governing body of a public agency having jurisdiction over such paths or trails permits, by ordinance, such operation (California Vehicle Code section 21207.5). The laws governing the use of electric bikes are currently being reassessed. Therefore, review of the latest laws governing the use of electric bikes as outlined in the California Vehicle Code must be conducted.

2.3.4 Collision Analysis

Personal safety is a main concern for all new and existing bicyclists. A bikeway perceived as too dangerous or too close to heavy vehicular traffic will discourage the majority of cyclists from using that facility.

In Orange County, between June of 2013 and May of 2014, 17 bicyclists were struck and killed (California State Wide Integrated Traffic Records System). Part of this study is identifying potential improvements that will help prevent or minimize these collisions and resulting fatalities.

The Strategy has assessed the corridors for physical constraints, including freeways, channels, railroads, curb parking, slope, and roadway right-of-way to help identify the routes that would be most useful and enjoyable to the rider, while minimizing threats to their safety.

The analysis of bicyclist-involved crash data in District 5 from 2007-2011, obtained from the California Statewide Integrated Traffic Records System (SWITRS) shows there were 428 total crashes in the study area in the five-year period. Table 2.2 presents the total crashes in District 5 by violation category and party at fault. As shown in Figure 2.2, excluding "unknown causes", over two-thirds of the crashes were the result of four major causes listed below.

1. Right-of-way violation represents nearly one quarter of all crashes. A good example would be a car pulling out in front of a bicyclist.
2. Riding or driving on the wrong side of the road represents 18% of all crashes. Statewide, this is the number one cause of bicyclist-caused crashes and fatalities. This is an area where the education of bicyclists can make a major difference in their safety.
3. The third is improper turning, which accounts for 14% of all crashes. An example of this is when a motor vehicle driver or a bicyclist turns in front of the other.
4. The fourth is unsafe speed, accounting for 12% of all crashes.

Many people assume that running stop signs and stop lights is a cause of bike-related crashes. In District 5, this is the cause of less than 10% of all crashes. In this category motor vehicle drivers and bicyclists are almost equally at fault.

As shown in Figure 2.3, bicyclist-involved crashes per year ranged from 74 in 2007 to 100 in 2011, the most recent year for which complete data are available. As seen statewide, this upward trend in crashes coincides with an increase in the number of people riding bikes. Thus while the number of crashes is increasing, the overall rate of crashes may in fact be declining although at the present time those data are not available.

Table 2.2: Bicycle Collisions in District 5, 2007-2011

Violation Category	Bicycle	Vehicle	Pedestrian	Total	% Excluding unknown
Automobile ROW[1]	37	50		87	24%
Wrong Side of Road	33	32		65	18%
Unknown	34	21		58	
Improper Turning[2]	30	23		53	14%
Unsafe Speed	34	10		44	12%
Traffic Signals and Signs	17	14		31	8%
Other Improper Driving	15	10		25	7%
Other Hazardous Violation	6	12		18	5%
Other Than Driver	11	1		12	3%
Under the Influence	5	6		11	3%
Unsafe Lane Change[3]	4	3		7	2%
Unsafe Starting or Backing	2	2		4	1%
Improper Passing	3	1		4	1%
Pedestrian ROW	2			2	<1%
Lights	2			2	<1%
Pedestrian Violation			2	2	<1%
Following Too Closely	1			1	<1%
Impeding Traffic		1		1	<1%
Other Equipment	1			1	<1%
Total	240	186	2	428	

[1] http://www.nolo.com/legal-encyclopedia/free-books/beat-ticket-book/chapter7-5.html

[2] http://www.nolo.com/legal-encyclopedia/free-books/beat-ticket-book/chapter7-4.html

[3] http://www.nolo.com/legal-encyclopedia/free-books/beat-ticket-book/chapter7-8.html

Figure 2.2: Causes of Bicyclist-Involved Crashes by Year

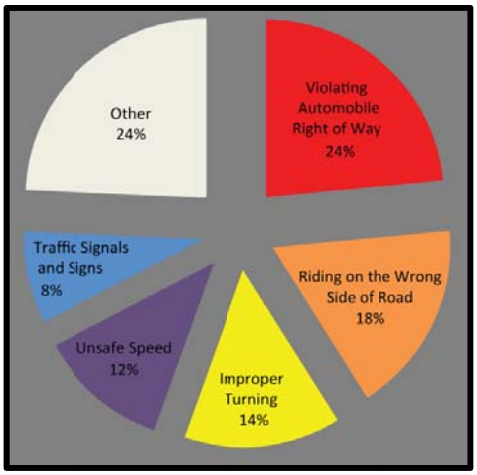
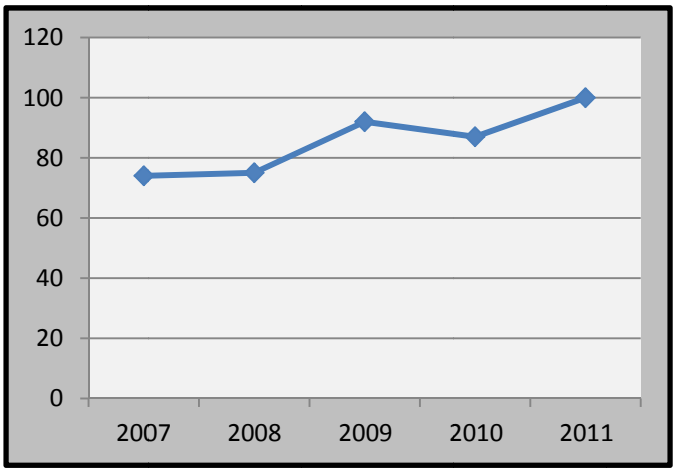


Figure 2.3: Bicyclist-Involved Crashes by Year



2.3.5 Recent Agency Efforts to Improve Bicycle Planning & Infrastructure

Within the 5th District, there are many planning and engineering efforts currently led by the cities to improve bicyclist safety, enhance infrastructure, and support increased bicycling within Orange County. The planning of bicycle infrastructure through general plan updates or bicycle master planning has occurred in San Clemente, Dana Point, Irvine, Laguna Beach, Rancho Santa Margarita, and the adjacent communities in Newport Beach. Many cities have applied for or obtained ATP Cycle 1 grant funds to implement new or improved bicycle facilities. Lower-cost bike facilities such as Class II bike lane striping have been implemented by many cities.

Major bike design and construction projects are currently in progress by cities such as San Clemente and Dana Point. For example, the City of San Clemente is currently in the design stages of improving the existing Class II bike lanes and constructing a Class I bike path along El Camino Real from Camino Capistrano to Avenida Estacion. In Dana Point, the city is in the planning stage to provide roadway and signal improvements, along with providing Class I and II facilities along Pacific Coast Highway, including Del Prado, from the northerly city limits to Camino Capistrano. The City of Laguna Beach has developed an assessment report for Laguna Canyon Road between El Toro Road to Canyon Acres Drive to improve mobility for all uses. The Rancho Mission Viejo development plan has adopted sustainable circulation to address bicycle and neighborhood electric vehicle components.

3.0 REGIONAL BIKEWAY CORRIDORS

As shown in Figure 3.1, the following nine regional bikeway corridors are proposed for District 5. The corridors connect to one another and to bike facilities to the north in OCTA Supervisorial Districts 2 and 3, as well as to the south in San Diego County. They provide key connections to popular attractions such as beaches, parks, schools, shopping, employment, and transit centers.

3.1 Regional Corridors

Regional corridors were developed through a series of focus group meetings and PDT meetings. At PDT Meeting #2, the team agreed to split the region into three focused areas: central cities, coastal cities, and northern area cities. Each focus group identified its own preferred corridors. OCTA and the consultant then consolidated the corridors identified by the three groups. At PDT Meeting #3, the draft regional corridors were presented and modified based on the collaborative input. In addition, the public input through online surveys or local events were obtained and the results and comments were presented at the PDT meetings.

The following provides a detailed discussion of each regional corridor within District 5. The corridors are labeled in no particular order. The ranking analysis of the nine corridors, using specific criteria, is presented in Section 3.2 for prioritization.

Efforts have been made to identify conceptual alignments of each corridor; however, refinements are expected as feasibility studies are conducted to provide an improved analysis and review of the constraints and opportunities of each corridor. Therefore, flexibility in the alignment of each corridor should be expected to help achieve regional connectivity and continuous linkage.

SOUTH OC REGIONAL BIKEWAY CORRIDORS

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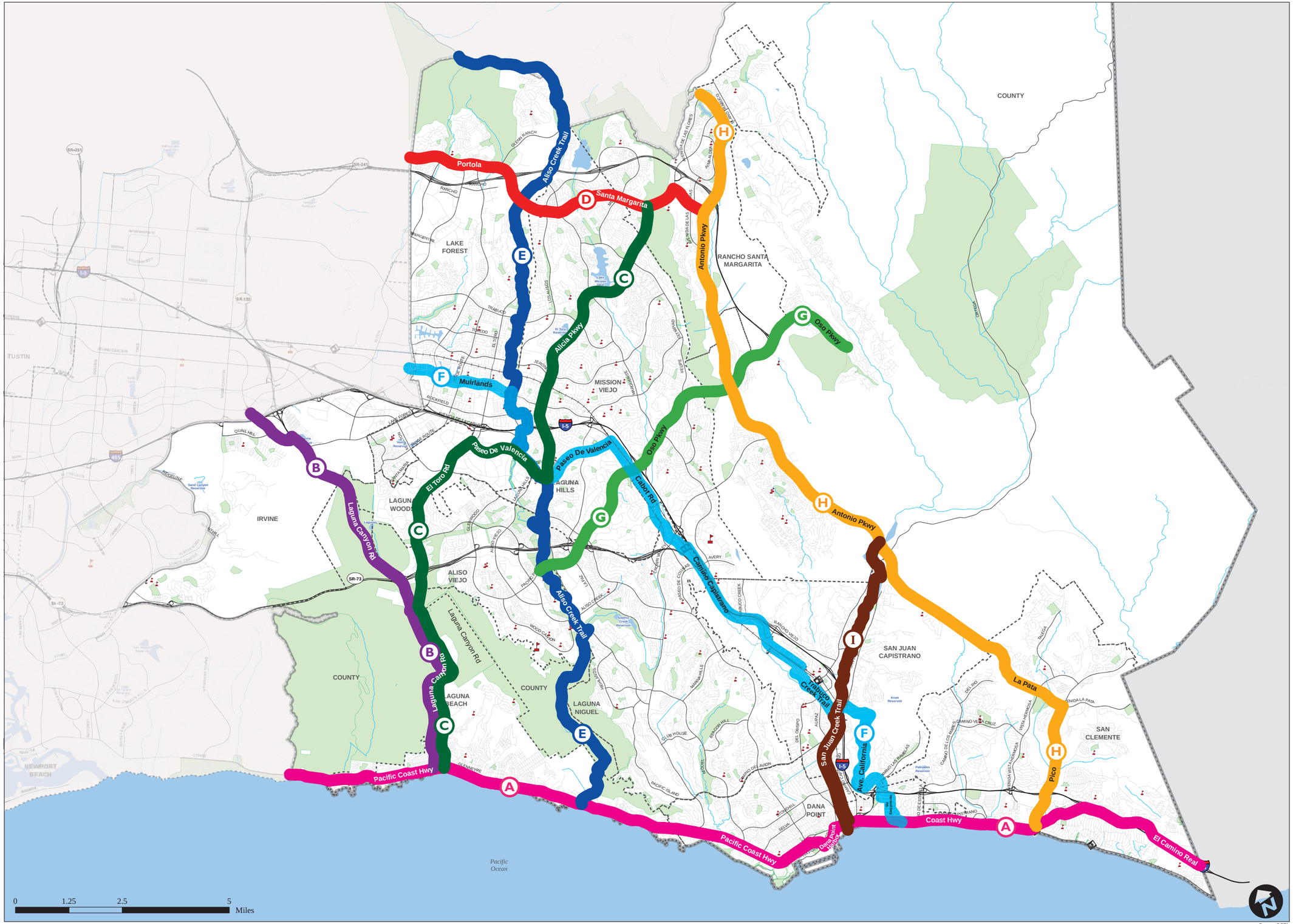

Source: OCTA

BIKEWAY CORRIDORS

- A — Pacific Coast Highway Corridor
- B — Laguna Canyon Corridor
- C — El Toro/Alicia Corridor
- D — Portola/Santa Margarita Corridor
- E — Aliso Creek Corridor
- F — Muirlands/Cabot Corridor/ Camino Capistrano
- G — Oso Parkway Corridor
- H — Antonio/La Pata/Pico Corridor
- I — San Juan Creek Corridor

LEGEND

- Transportation Center
- Rail
- Schools
- Colleges
- Parks / Open Space
- Waterbody
- City Boundary
- Supervisorial District 5

Figure 3-1

3.1.1 Corridor A: Pacific Coast Highway

Overview

Jurisdictions:	• County of Orange • Laguna Beach • Dana Point • San Clemente
Attractions:	• Beach cities • Museums, theaters, parks, shopping • Dana Cove • San Clemente Metrolink • Beach resorts
Cost:	$11.5-$14.1 million

The Pacific Coast Highway Corridor runs along Pacific Coast Highway through a combination of on- and off-street bike facilities. The corridor is approximately 19 miles[1] long, with 14.1 miles of existing bike facilities and 6.9 miles of proposed bike facilities.

The corridor directly connects to OCTA District 2 and passes through the following jurisdictions: County of Orange, Laguna Beach, Dana Point, and San Clemente. It also includes or intersects the following Caltrans facilities: Coast Highway 1, State Route 133, and Interstate 5 Freeway. The corridor has direct links to other regional bikeway corridors including Laguna Canyon, Aliso Creek, Muirlands/Cabot/Camino Capistrano, San Juan Creek, and Antonio/La Pata/Pico. Figure 3.2 illustrates Corridor A.

Length of Bikeway Facilities (Miles)		
Class I	**Existing**	1.6
	Proposed	0.8
Class II	**Existing**	4.6
	Proposed	5.7
Class III	**Existing**	7.9
	Proposed	0.4
Total Bikeway Miles		21.0
Corridor Length (miles)		***19.0***

Opportunities, Constraints, and Estimated Costs

The majority of the Pacific Coast Highway Corridor is located in coastal beach cities and attracts avid and social bicyclists of all levels of experience. With some notable exceptions, its relatively flat terrain makes the corridor easily accessible and ride-able. The corridor provides key regional connectivity, linking to five other regional bikeway corridors. At major junction points along the corridor, such as at the Interstate 5 Freeway, the bike facility is separated from automobile traffic.

A major challenge to completing the corridor involves installing Class II and III on-street bikeways, as the interaction between automobiles and bicyclists may deter novice cyclists from using the facility. The high number of street intersections and segments having limited right-of-way or on-street parking pose increased risks to cyclists using the corridor.

Estimated construction costs for the Pacific Coast Highway corridor including new and updated Class II bike lanes, a new Class I bike path along PCH in the City of Dana Point, one bridge crossing, and eight major intersection crossings, range from $11.5 to $14.1 million. Adjacent streets can be used, such as Cliff Drive and Glenneyre Street, as alternative routes to using PCH.

Major Regional Destinations

Aside from San Juan Creek, parks, and beaches along the corridor, the Pacific Coast Highway Corridor would also link to the Laguna Art Museum and South Coast Theatre, Dana Cove, San Clemente Metrolink Station, and beach resorts.

[1] *Corridor length and total miles of bikeway facilities along a corridor often differ as segments of the corridor may have more than one type of facility, such as both a class I off road facility and class II bike lanes. Total corridor length is measured in center line miles.*

CORRIDOR A: PACIFIC COAST HIGHWAY

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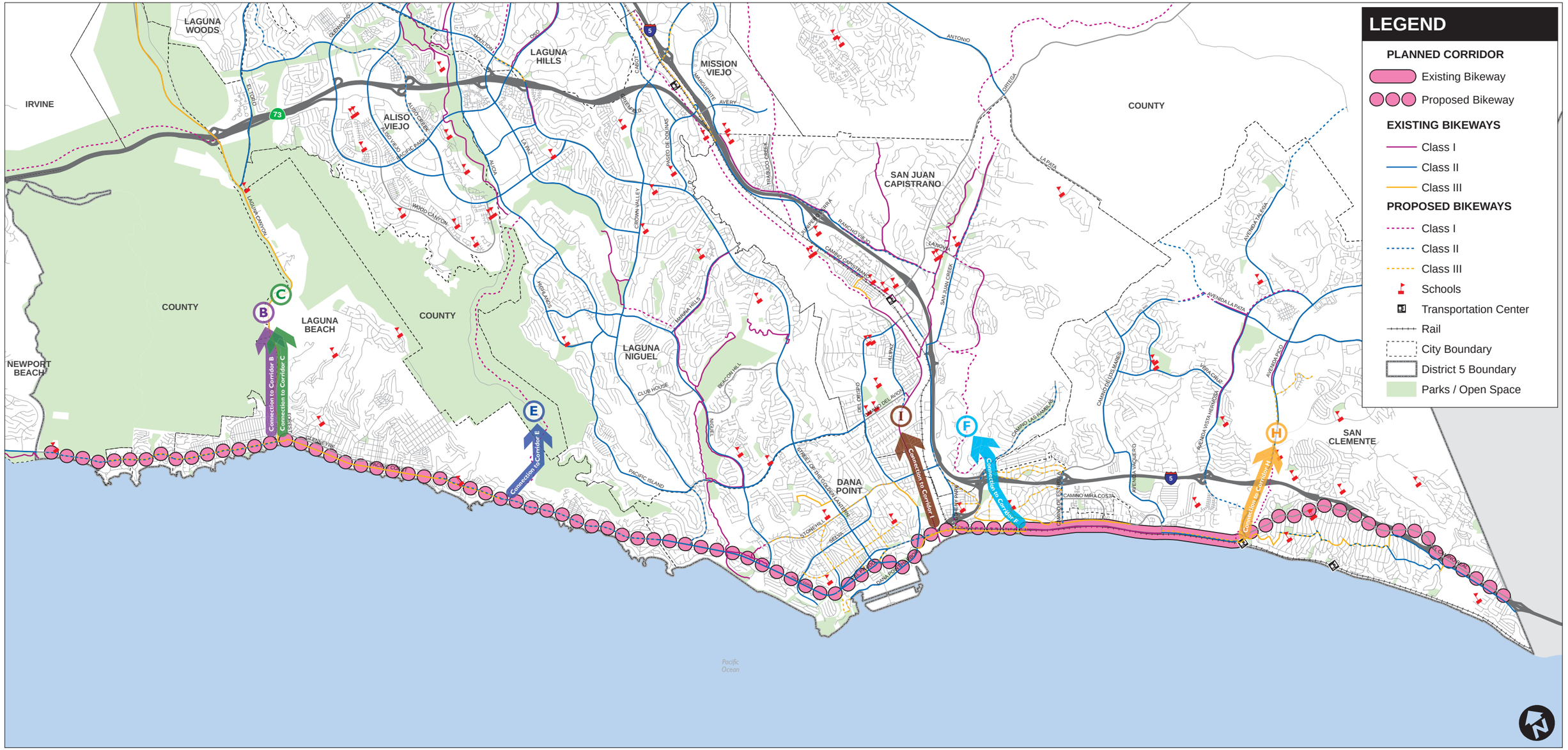

Source: OCTA

Corridor A
Bikeway Corridor Details

- 1.6 miles of existing Class I
- 4.6 miles of existing Class II
- 7.9 miles of existing Class III

9
Schools within 1/4-mile Served

35
Parks within 1/4-mile Served

53K
People within 1/4-mile Served (approx.)

19 miles
Of Total Corridor Length

$11.5-14.1 million
Estimated Project Cost

Figure 3-2

3.1.2 Corridor B: Laguna Canyon

Overview

Jurisdictions:	• Irvine • County of Orange • Laguna Beach
Attractions:	• Bommer and Shady Canyons Park • Laguna Coast Wilderness Park • Laguna College of Art and Design • Downtown Laguna Beach
Cost:	$8.4-$10.3 million

The Laguna Canyon Corridor runs north-south near the west boundary of District 5, with the majority of the corridor running along State Route 133 (Laguna Canyon Road). The corridor is approximately 8.8 miles long, comprised of mostly existing Class III bike facilities.

The corridor directly connects to OCTA District 3, and runs within the following jurisdictions: Irvine, County of Orange, and Laguna Beach. It also intersects the following Caltrans facilities: Interstate 405 Freeway, State Route 73, State Route 133, and Coast Highway 1. The corridor has direct links to other regional bikeway corridors including the El Toro/Alicia and Pacific Coast Highway corridors. Figure 3.3 illustrates Corridor B.

Length of Bikeway Facilities (Miles)		
Class I	**Existing**	0.0
	Proposed	0.0
Class II	**Existing**	1.0
	Proposed	6.8
Class III	**Existing**	7.8
	Proposed	0.0
Total Bikeway Miles		15.6
Corridor Length (miles)		***8.8***

Opportunities, Constraints, and Estimated Costs

The majority of the Laguna Canyon Corridor provides a scenic and largely uninterrupted riding experience for bicyclists wanting to travel long distances. The corridor has Class III bike facilities along its full length. To upgrade to a Class II bike facility would require major improvements such as roadway widening and construction of new sidewalks, curb, and gutter, and signing and striping. At major junction points, such as at State Route 73, there exists adequate right-of-way to provide bike lanes.

A challenge for the Laguna Canyon Corridor are short segments with grades greater than 5%, which are considered more difficult to bicycle or walk. Also, the majority of the corridor being located on State Route 133 and having a posted speed limit of 50 MPH may pose additional auto-related risks to bicyclists.

Most of the cost associated with the Laguna Canyon Corridor is associated with installing Class II bikeways on the segment between Hwy 73 and Canyon Acres Drive, which requires widening some segments of the roadway. Estimated construction costs for the Laguna Canyon corridor, including street widening, range from $8.4 to $10.3 million.

Major Regional Destinations

The Laguna Canyon Corridor would link to state parks including Bommer and Shady Canyons Park, Laguna Coast Wilderness Park, Crystal Cove State Park, and the Laguna College of Art and Design.

CORRIDOR B: LAGUNA CANYON

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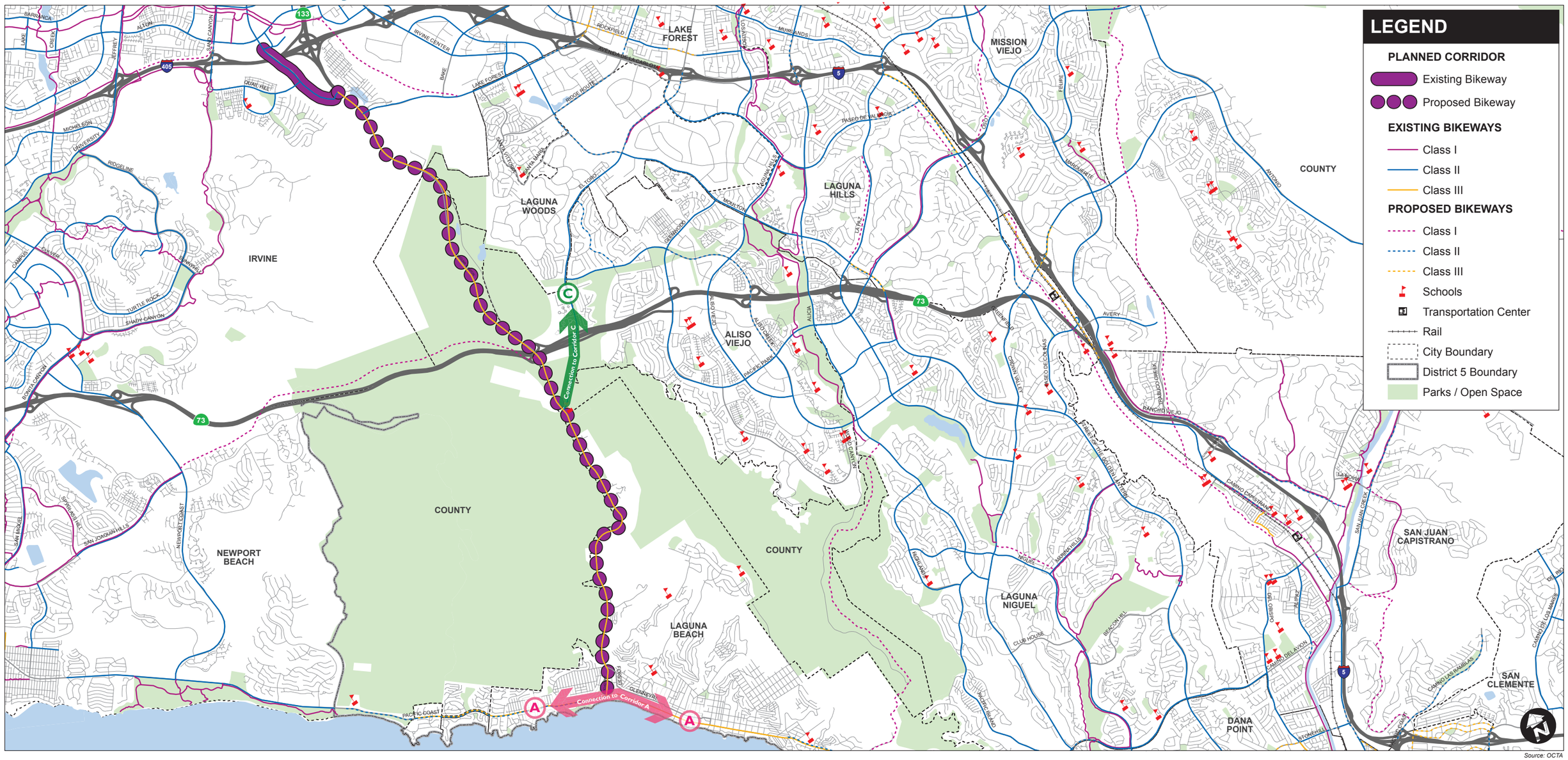

Source: OCTA

Corridor B
Bikeway Corridor Details

1 mile of existing Class II

7.8 miles of existing Class III

1
Schools within 1/4-mile Served

6
Parks within 1/4-mile Served

7.5K
People within 1/4-mile Served (approx.)

8.8 miles
Of Total Corridor Length

$8.4-10.3 million
Estimated Project Cost

Figure 3-3

3.1.3 Corridor C: El Toro/Alicia/Laguna Canyon

Overview

The El Toro/Alicia Corridor runs diagonally from near the north boundary of District 5 to Laguna Beach. The corridor is approximately 15.3 miles long, comprised of 0.5 miles of existing Class I, 10.5 miles of existing Class II bike facilities, and 4.3 miles of Class III. The corridor passes through the following jurisdictions: County of Orange, Mission Viejo, Laguna Hills, Laguna Woods, Aliso Viejo, and Laguna Beach. It also intersects the following Caltrans facilities: Interstate 5 and State Route 7, and part of the corridor is State Highway 133. The corridor has direct links to other regional bikeway corridors including the Portola/Santa Margarita, Aliso Creek, Muirlands/Cabot/Camino Capistrano, PCH, and Laguna Canyon. Figure 3.4 illustrates Corridor C.

Jurisdictions:	• County of Orange • Aliso Viejo • Laguna Beach • Laguna Woods • Laguna Hills • Mission Viejo • Rancho Santa Margarita
Attractions:	• Shopping centers • Saddleback Memorial Medical Center • Laguna Hills High School • Lake Mission Viejo • State and local parks and beaches
Cost:	$12.2-15.2 million

Length of Bikeway Facilities (Miles)		
Class I	**Existing**	0.5
	Proposed	0.0
Class II	**Existing**	10.5
	Proposed	1.4
Class III	**Existing**	4.3
	Proposed	0.0
Total Bikeway Miles		15.8
Corridor Length (miles)		*15.3*

Opportunities, Constraints, and Estimated Costs

The majority of the El Toro/Alicia/Laguna Canyon Corridor is located among residential and commercial uses that could appeal to avid and casual bicyclists. The majority of the corridor is already in place, making the corridor an established route that will only increase its ridership once improvements are made. The corridor intersects or overlaps with five other regional corridors, expanding its network.

The corridor crosses several major intersections; a large number of collisions have been recorded along the route. Due to this, enhanced bikeway features are recommended. The corridor crosses five major intersections and Interstate 5, and will require special treatments at these locations. The segment along Laguna Canyon is narrow with relatively high speed traffic. Currently improvements are planned for the northbound I-5 and eastbound Alicia Parkway on/off-ramp including widening the sidewalk from approximately four feet to eight feet and adding ADA curb ramps from the bridge to the adjacent Target driveway.

Estimated construction costs for the El Toro/Alicia/Laguna Canyon corridor including freeway and major intersection crossing improvements, range from $12.2 to $15.2 million.

Major Regional Destinations

The El Toro/Alicia/Laguna Canyon Corridor would link to state and local parks including Aliso Wood Canyons Wilderness Park, Lake Mission Viejo, and the Saddleback Memorial Medical Center, downtown Laguna Beach, and the adjacent beach areas.

CORRIDOR C: EL TORO / ALICIA / LAGUNA CANYON

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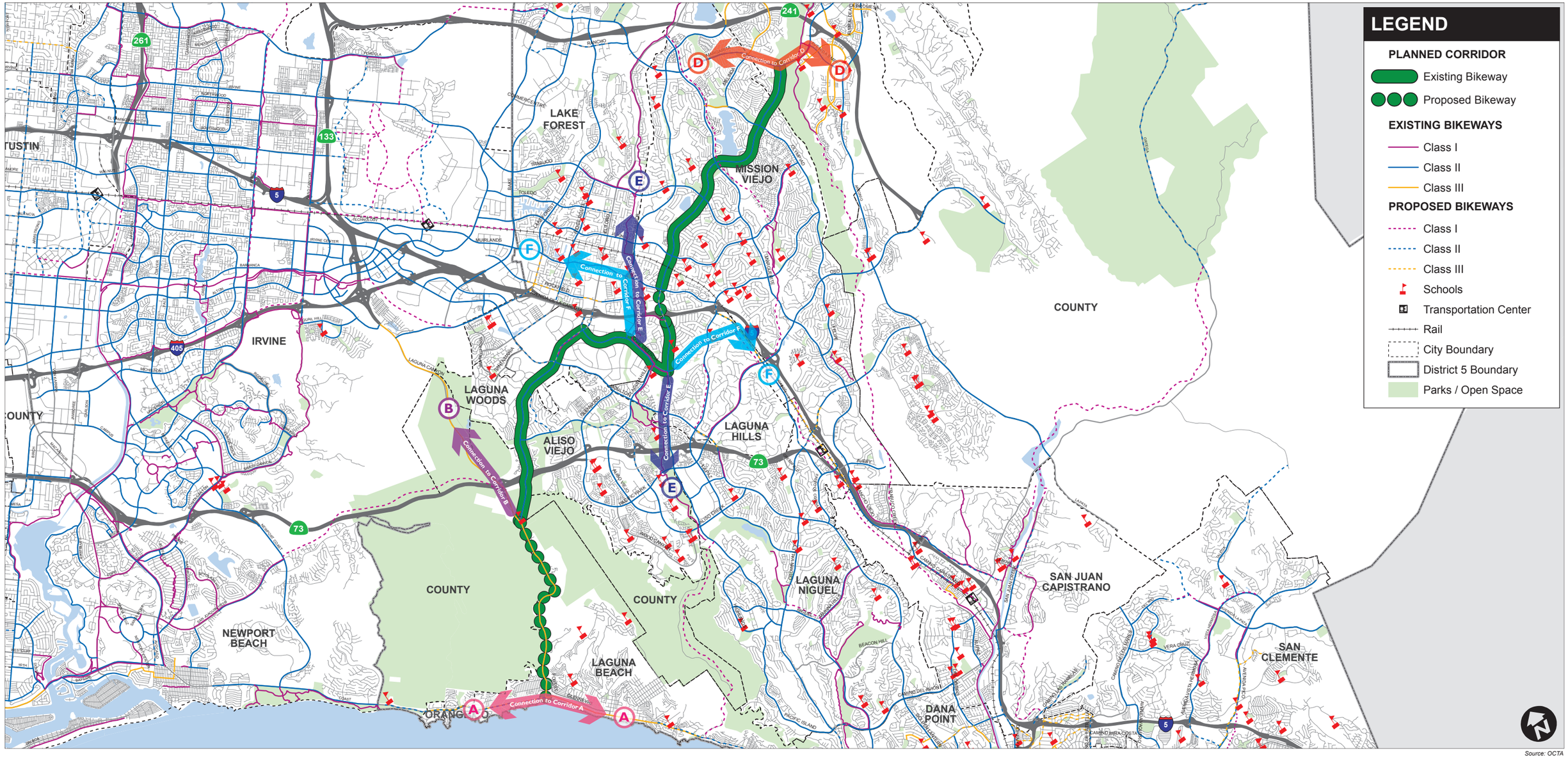

Source: OCTA

Corridor C
Bikeway Corridor Details

0.5 miles of existing Class I
10.5 miles of existing Class II
4.3 miles of existing Class III

6
Schools within 1/4-mile Served

24
Parks within 1/4-mile Served

50.4K
People within 1/4-mile Served (approx.)

15.3 miles
Of Total Corridor Length

$12.2-15.2 million
Estimated Project Cost

Figure 3-4

3.1.4 Corridor D: Portola/Santa Margarita

Overview

The Portola/Santa Margarita Corridor runs diagonal near the north boundary of District 5. The corridor is approximately 6.7 miles long, with 6.5 miles of existing Class II bike lanes and 0.6 miles of proposed Class I bike paths.

Jurisdictions:	• Lake Forest • Mission Viejo • Rancho Santa Margarita
Attractions:	• Shopping centers • Employment centers • Elementary and High Schools • State and local parks
Cost:	$6.5-$8.0 million

The corridor directly connects to Supervisorial District 3, Lake Forest, Mission Viejo, and Rancho Santa Margarita, and intersects State Route 241. The corridor has direct links to other regional bikeway corridors including the Aliso Creek, El Toro/Alicia/Laguna Canyon, and Antonio/La Pata/Pico corridors. Figure 3.5 illustrates Corridor D.

Length of Bikeway Facilities (Miles)		
Class I	**Existing**	0.0
	Proposed	0.6
Class II	**Existing**	6.5
	Proposed	0.0
Class III	**Existing**	0.0
	Proposed	0.0
Total Bikeway Miles		7.1
Corridor Length (miles)		*6.7*

Opportunities, Constraints, and Estimated Costs

Corridor D covers major residential and commercial areas in the northern portions of District 5. This is an appealing aspect of this corridor and could attract commuter and recreational riders. Class II bike lanes already exist along a majority of the corridor with connections to eleven intersections with existing or proposed bikeway facilities, providing many links for local cyclists. The corridor intersects or overlaps with three other regional corridors, expanding its network.

A majority of the street segments have high speed limits and Class II bike lanes, thus many bicyclists may not feel comfortable or safe riding next to high speed traffic. The corridor also crosses the State Route 241 freeway with Class II bike lanes provided; this may deter some riders and require special improvements.

Estimated construction costs for the Portola/Santa Margarita corridor including major intersection crossing improvements, range from $6.5 to $8.0 million.

Major Regional Destinations

The Portola/Santa Margarita Corridor would link to state and local parks, Aliso Creek Trail, Serrano Creek Trail, Trabuco Hills High School, and Tijeras Creek Elementary School.

CORRIDOR D: PORTOLA / SANTA MARGARITA

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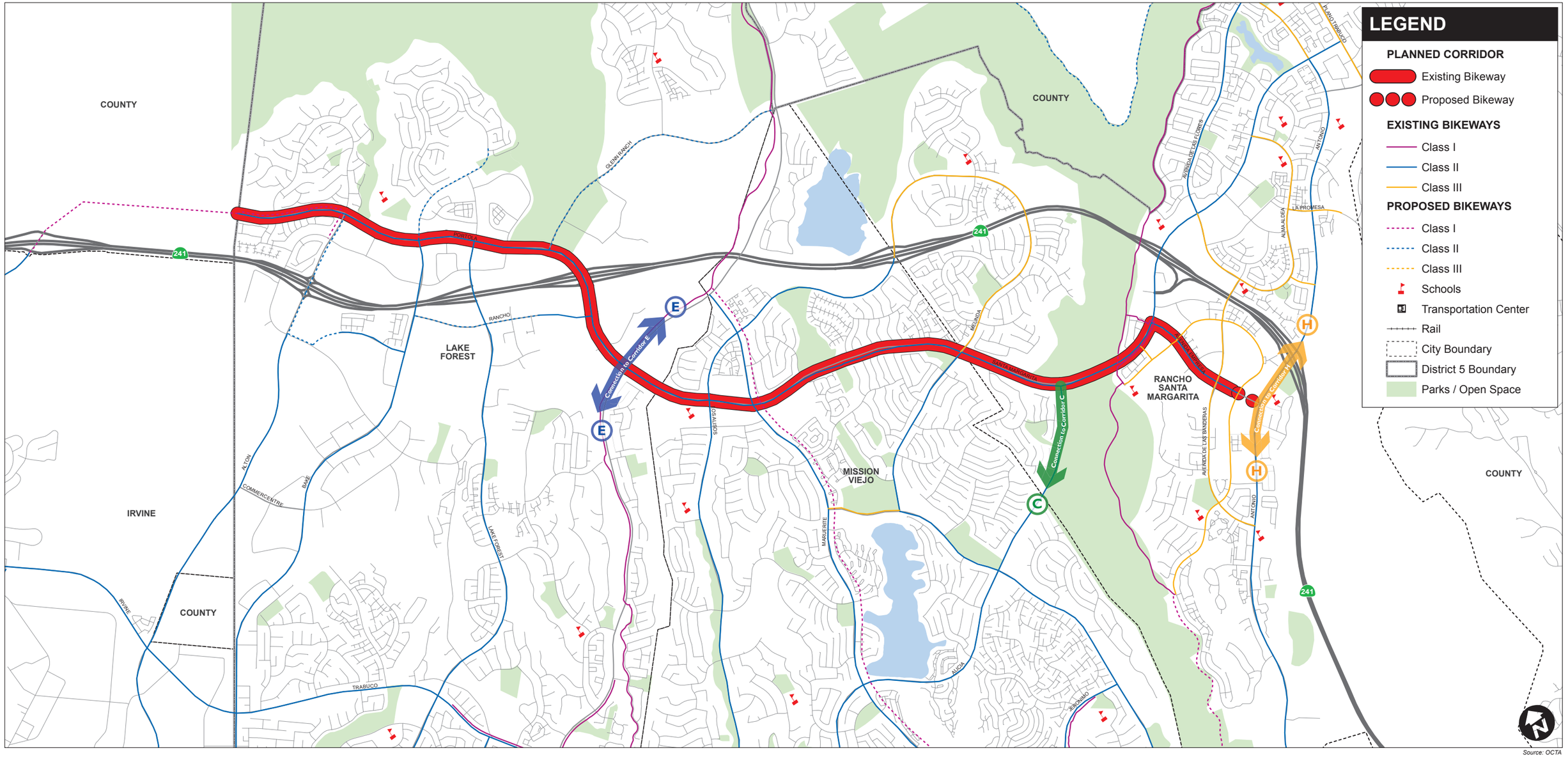

Source: OCTA

Corridor D
Bikeway Corridor Details

6.5 miles of existing Class II

4
Schools within 1/4-mile Served

7
Parks within 1/4-mile Served

26.7K
People within 1/4-mile Served (approx.)

6.7 miles
Of Total Corridor Length

$6.5-8.0 million
Estimated Project Cost

Figure 3-5

3.1.5 Corridor E: Aliso Creek Corridor

Overview

The Aliso Creek Corridor runs north-south from the north boundary of District 5 to Pacific Coast Highway. The corridor is approximately 20.3 miles long, with 13.5 miles of existing Class I bike paths and 2.0 miles of existing Class II bike lanes.

The corridor directly connects to Supervisorial District 3 and runs within the following jurisdictions: County of Orange, Lake Forest, Mission Viejo, Laguna Woods, Laguna Hills, Aliso Viejo, Laguna Niguel, and Laguna Beach. It also intersects the following Caltrans facilities: State Route 133 and 241, Interstate 5, and State Route 1. The corridor has direct links to other regional bikeway corridors including the Portola/Santa Margarita, Muirlands/Cabot/Camino Capistrano, El Toro/Alicia, Oso Parkway, and Pacific Coast Highway corridors. Figure 3.6 illustrates Corridor E.

Jurisdictions:	• County of Orange • Lake Forest • Mission Viejo • Laguna Woods • Laguna Hills • Aliso Viejo • Laguna Niguel • Laguna Beach
Attractions:	• Shopping centers • Employment centers • Elementary and High Schools • State and local parks • Beach
Cost:	$8.2-$10.0million

Length of Bikeway Facilities (Miles)		
Class I	**Existing**	13.5
	Proposed	6.3
Class II	**Existing**	2.0
	Proposed	0.0
Class III	**Existing**	0.0
	Proposed	0.0
Total Bikeway Miles		21.8
Corridor Length (miles)		*20.3*

Opportunities, Constraints, and Estimated Costs

Corridor E covers major residential and commercial areas with access to schools and local and state parks. This corridor is largely comprised of existing Class I bike paths, which is an appealing aspect of the corridor and attracts numerous users every day. Class I bike paths exist along a majority of the corridor with connections to several intersections with existing or proposed bikeway facilities, providing additional links for local cyclists. The corridor intersects or overlaps with five other regional corridors, expanding its network and choice of routes. The corridor also crosses State Route 241 and 73 freeways, along with the Interstate 5 freeway, all providing Class I facilities traveling under the freeway.

As outlined in the Strategy, the corridor connects through Aliso and Wood Canyons Wilderness Park with a Class I connection to Aliso Beach County Park. However, at the present time the lower portion of Aliso Creek Canyon is privately owned by various landowners and hosts a nine-hole golf course and small hotel. Due to the narrowness of the canyon and property easement issue, a way to accommodate both the golf course and the bike corridor has not been resolved.

Estimated construction costs for the Aliso Creek corridor including grading/retaining walls and the construction of proposed Class I facilities, range from $8.2 to $10.0 million.

Major Regional Destinations

The Aliso Creek Corridor links to state and local parks, Laguna Hills Community Center and Sports Complex, Aliso Viejo Middle School, Aliso Niguel High School, and Wood Canyon Elementary School.

CORRIDOR E: ALISO CREEK

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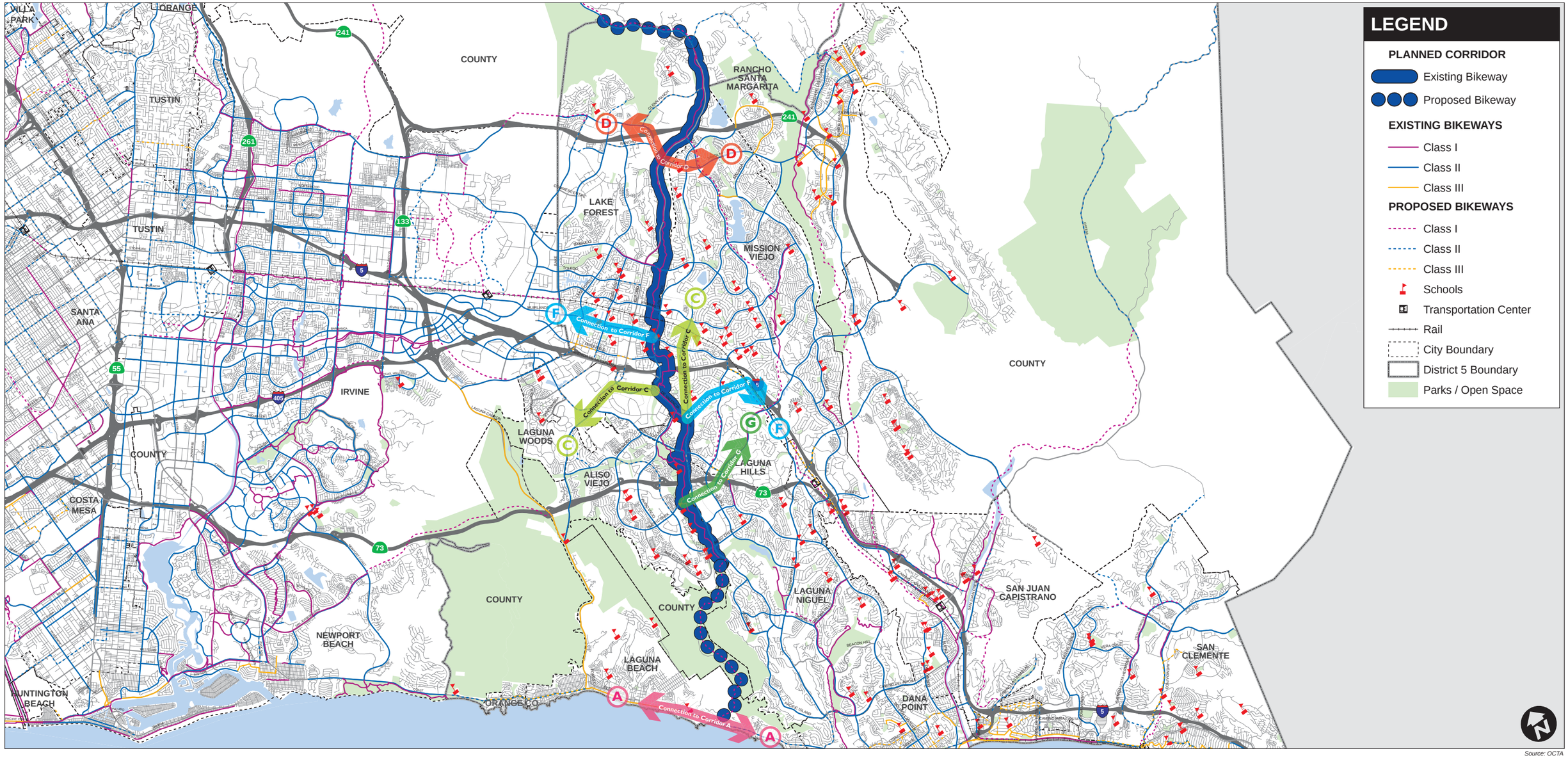

Source: OCTA

Corridor E
Bikeway Corridor Details

13.5 miles of existing Class I
2 miles of existing Class II

12
Schools within 1/4-mile Served

35
Parks within 1/4-mile Served

57.2K
People within 1/4-mile Served (approx.)

20.2 miles
Of Total Corridor Length

$8.2-10.0 million
Estimated Project Cost

Figure 3-6

3.1.6 Corridor F: Muirlands/Cabot/Camino Capistrano

Overview

The Muirlands/Cabot/Camino Capistrano Corridor runs diagonally north – south starting at the northern boundary of District 5 adjacent to Irvine and south to Pacific Coast Highway. The corridor is approximately 17.9 miles long, including 4.4 miles of existing Class I bike paths, 6.5 miles of existing Class II bike lanes, and 2.6 miles of proposed Class I bike paths. The corridor connects to Supervisorial District 3 on the north end, to Pacific Coast Highway on the south end, and crosses the I-5 Freeway at multiple locations. The corridor has direct links to other regional bikeway corridors including the Aliso Creek, El Toro/Alicia, Oso Parkway, San Juan Creek, and Pacific Coast Highway corridors. Figure 3.7 illustrates Corridor F.

Jurisdictions:	• Lake Forest • Mission Viejo • Laguna Woods • Laguna Hills • Laguna Niguel • San Juan Capistrano • Dana Point
Attractions:	• Shopping centers • Employment centers • Elementary and High Schools • State and local parks
Cost:	$7.4-$9.0 million

Length of Bikeway Facilities (Miles)		
Class I	**Existing**	4.4
	Proposed	2.6
Class II	**Existing**	6.5
	Proposed	1.5
Class III	**Existing**	1.6
	Proposed	2.0
Total Bikeway Miles		18.6
Corridor Length (miles)		*17.9*

Opportunities, Constraints, and Estimated Costs

Corridor F covers a major portion of District 5 and provides connections to some of the densest residential and commercial areas in south Orange County. It parallels the Metrolink rail corridor with access to two Metrolink stations. A large portion of the corridor is already in place, providing Class I bike paths and Class II bike lanes along the majority of the corridor. It provides many connections to several intersections with existing or proposed bikeway facilities. The corridor intersects or overlaps with five other regional corridors, expanding its network. The corridor crosses the Interstate 5 freeway at three locations along the entire corridor. There are many significant constraints for this corridor: (1) crossing the I-5 at La Paz Road, (2) using the LOSSAN railroad right-of-way along Camino Capistrano, south of the Mission Viejo Metrolink station, and (3) connection from San Juan Creek to the Coast Highway, and others.

At La Paz Road, Muirlands Boulevard (on the north side of I-5) and Cabot Road (on the south side of I-5) are separated by only a few hundred yards. However, the connection currently requires navigating the I-5 undercrossing of La Paz Road, which has very high traffic volumes. To avoid this difficult crossing an alternate route has been proposed that would go south on Los Alisos Boulevard, connect to the Aliso Creek Bikeway to cross under the I-5, with a connection to Paseo De Valencia, then back to Cabot Road. This more circuitous route adds about 1.5 miles and several hills to the corridor. During the feasibility phase other alternatives will be examined including (1) improvements to LaPaz at the freeway on/off ramps and (2) adding a Class I facility adjacent to the railroad right-of-way between Muirlands Boulevard and Cabot Road at La Paz Road. Right-of-way issues on Camino Capistrano will be reviewed during the feasibility study phase. Estimated construction costs for the Muirlands/Cabot/Camino Capistrano corridor, including major intersection crossing improvements, new Class I bike path facilities, and improvements to Class II bikeways, range from $7.4 to $9.0 million.

Major Regional Destinations

The Muirlands/Cabot/Camino Capistrano corridor would link state and local parks, Aliso Creek Trail, Los Alisos Intermediate School, Ralph A. Gates Elementary School, Laguna Hills Community Center and Sports Complex, Valencia Elementary School, Laguna Niguel/Mission Viejo Metrolink Station, San Juan Capistrano Metrolink Station, San Juan Hills Golf Club, and Palisades Elementary School.

CORRIDOR F: MUIRLANDS / CABOT / CAMINO CAPISTRANO

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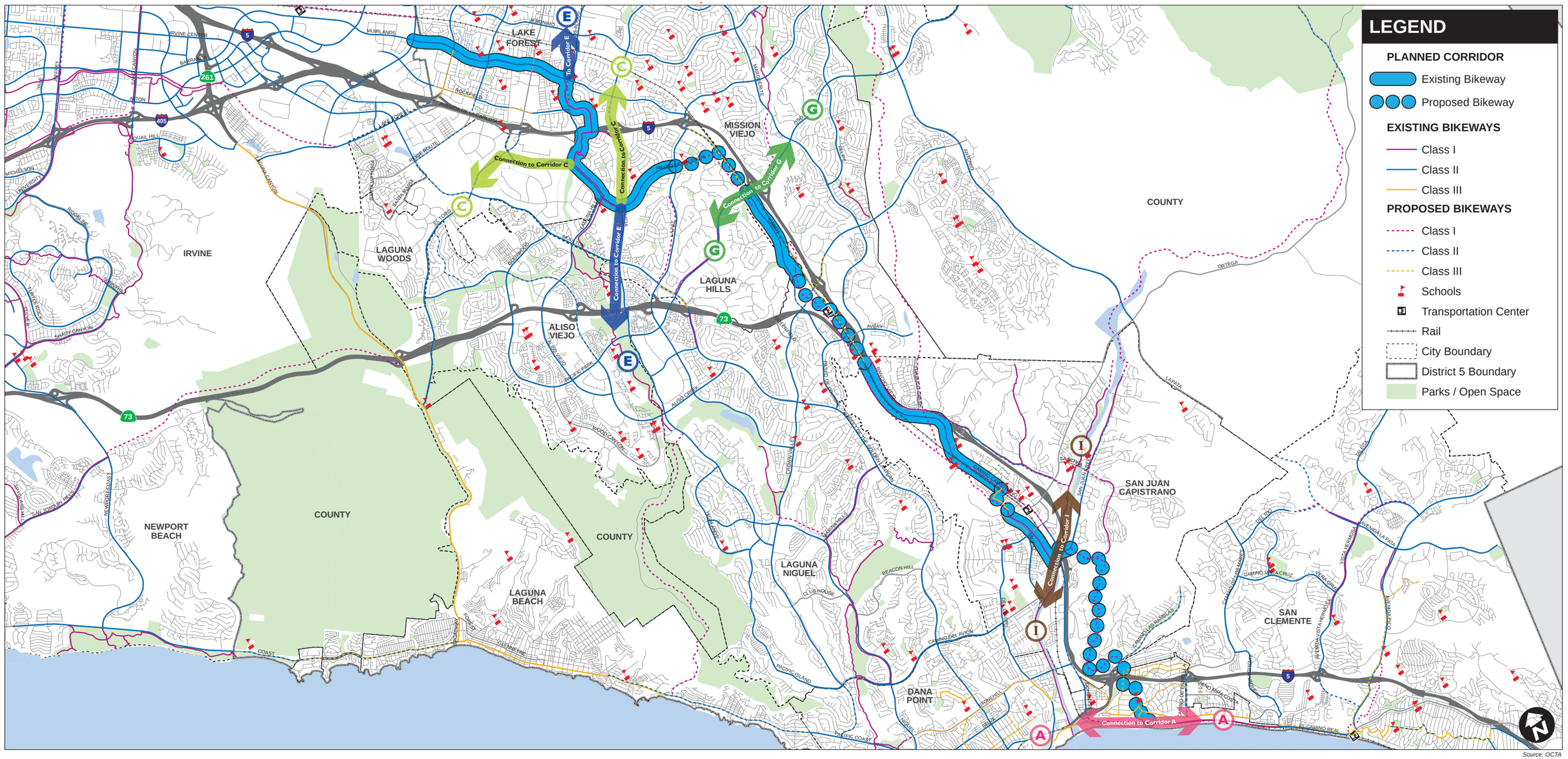

Source: OCTA

Corridor F
Bikeway Corridor Details

4.4 miles of existing Class I
6.5 miles of existing Class II
1.6 miles of existing Class III

19
Schools within 1/4-mile Served

27
Parks within 1/4-mile Served

62.6K
People within 1/4-mile Served (approx.)

17.9 miles
Of Total Corridor Length

$7.4-9.0 million
Estimated Project Cost

Figure 3-7

3.1.7 Corridor G: Oso Parkway

Overview

Jurisdictions:	• Aliso Viejo • Laguna Niguel • Laguna Hills • Mission Viejo • Rancho Santa Margarita • County of Orange
Attractions:	• Shopping centers • Middle and High Schools • State and local parks
Cost:	$5.5-$6.8 million

The Oso Parkway Corridor runs east-west from east of Aliso Creek Road to South Bend Road/Coto De Caza Drive. The corridor is approximately 8.9 miles long, with 1.7 miles of existing Class I bike paths and 8.8 miles of existing Class II bike lanes. The corridor directly connects to Aliso Viejo, Laguna Niguel, Laguna Hills, Mission Viejo, Rancho Santa Margarita, County of Orange, and intersects State Route 73 and the Interstate 5 freeway. The corridor has direct links to other regional bikeway corridors including the Aliso Creek, Muirlands/Cabot, and Antonio/La Pata/Pico corridors. Figure 3.8 illustrates Corridor G.

Length of Bikeway Facilities (Miles)		
Class I	**Existing**	1.7
	Proposed	0.0
Class II	**Existing**	8.8
	Proposed	0.0
Class III	**Existing**	0.0
	Proposed	0.0
Total Bikeway Miles		10.5
Corridor Length (miles)		*8.9*

Opportunities, Constraints, and Estimated Costs

Corridor G covers major residential areas in the central portion of District 5. The entire corridor is already in place providing Class II bike lanes along a majority of the corridor with connections to approximately seven intersections with existing or proposed bikeway facilities, providing many links for local cyclists. The corridor intersects or overlaps with three other regional corridors, expanding its network. Because the corridor has some segments with an average slope greater than 5%, some cyclists may not feel comfortable or willing to ride along portions of this corridor. The corridor also crosses the State Route 73 and 241 freeways along with the Interstate 5 freeway with Class II bike lanes provided; this may deter some riders and special improvements are needed.

Estimated construction costs for the Oso Parkway corridor including upgrading Class II bike lanes to separated bikeway facilities, range from $5.5 to $6.8 million.

Major Regional Destinations

The Oso Parkway corridor connects state and local parks, Aliso Creek Trail, Mission Viejo Golf Course, Serrano Creek Trail, Las Flores Middle School, Tesoro High School, and Wagon Wheel Sports Park.

CORRIDOR G: OSO PARKWAY

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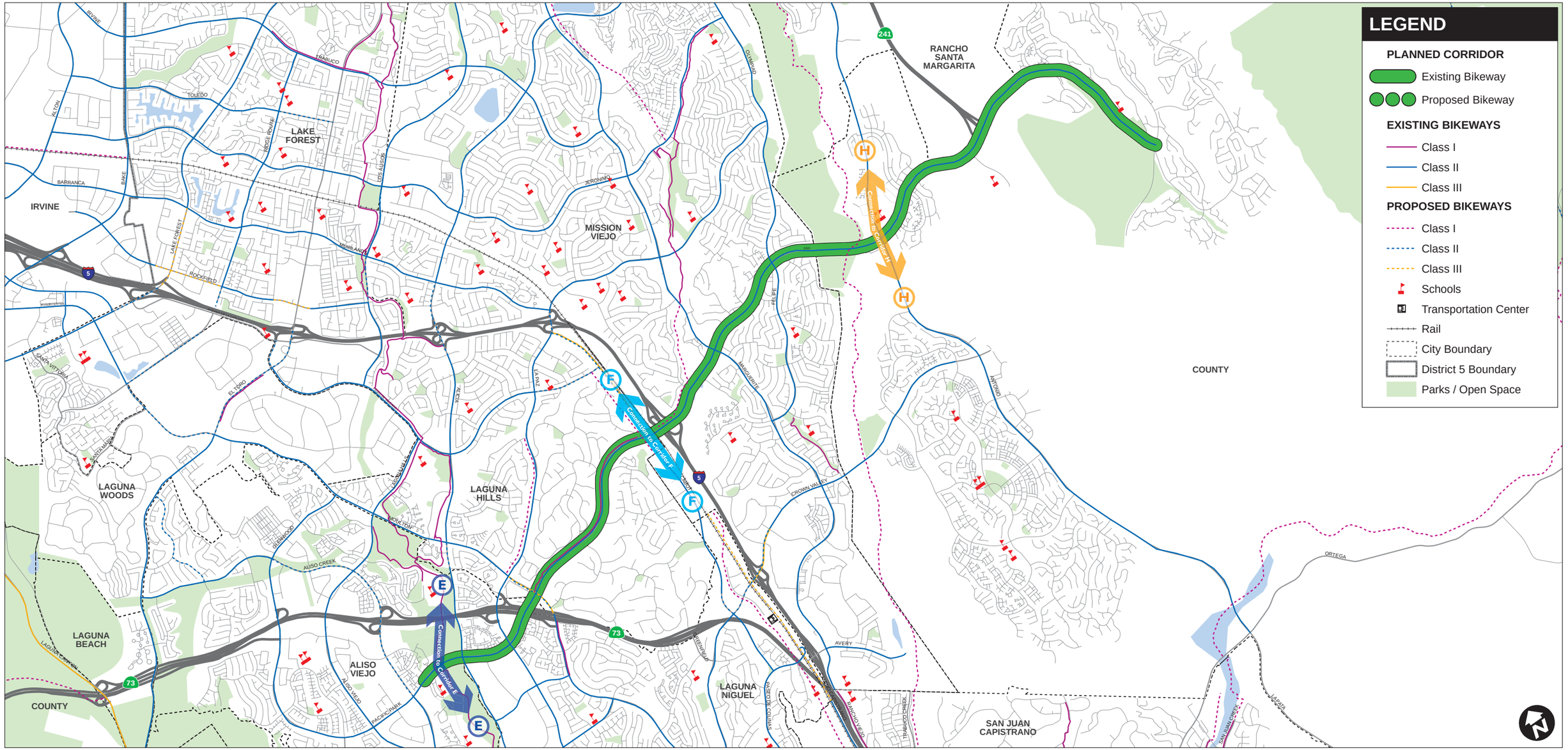

Source: OCTA

Corridor G
Bikeway Corridor Details

1.7 miles of existing Class I
8.8 miles of existing Class II

5
Schools within 1/4-mile Served

8
Parks within 1/4-mile Served

22.4K
People within 1/4-mile Served (approx.)

8.9 miles
Of Total Corridor Length

$5.5-6.8 million
Estimated Project Cost

Figure 3-8

3.1.8 Corridor H: Antonio/La Pata/Pico

Overview

Jurisdictions:	• Rancho Santa Margarita • County of Orange • San Juan Capistrano • San Clemente
Attractions:	• Shopping centers • Employment centers • Elementary, Middle and High Schools • State and local parks
Cost:	$11.1-$13.5 million

The Antonio/La Pata/Pico Corridor runs diagonally from near the north boundary of District 5 to Pacific Coast Highway. The corridor is approximately 18 miles long, with 13 miles of existing Class II bike lanes and 1 mile of existing Class I bike paths. The corridor directly connects to Rancho Santa Margarita, County of Orange, San Juan Capistrano, and San Clemente, and intersects State Route 241. The corridor has direct links to other regional bikeway corridors including the Portola/Santa Margarita, Oso Parkway, San Juan Creek, and Pacific Coast Highway corridors. Figure 3.9 illustrates Corridor H.

Length of Bikeway Facilities (Miles)		
Class I	**Existing**	1.0
	Proposed	0.2
Class II	**Existing**	13.0
	Proposed	3.5
Class III	**Existing**	0.5
	Proposed	0.0
Total Bikeway Miles		18.2
Corridor Length (miles)		*18.0*

Opportunities, Constraints, and Estimated Costs

Corridor H covers major residential and commercial areas in the eastern portions of District 5. A major portion of the corridor is already in place providing Class II bike lanes with connections to approximately ten intersections with existing or proposed bikeway facilities, providing many links for local bicyclists. The corridor also intersects or overlaps with three other regional corridors, expanding its network. Avenida Pico has limited curb to curb width with high traffic demand. An opportunity to utilize the flood channel parallel to Avenida Pico to create a Class I bike lane has been explored.

The corridor is relatively flat with only two segments having an average slope of 5% or higher. A segment of the corridor is missing and needs infrastructure to complete the corridor. The corridor also crosses the State Route 241 freeway with Class II bike lanes provided. The other challenge for Corridor H is the high speed and high volume arterial roadway.

Estimated construction costs for the Antonio/La Pata/Pico corridor including major intersection crossing improvements, improving the existing Class II bike lanes, and the new Class I bike paths, range from $11.1 to $13.5 million.

Major Regional Destinations

The Antonio/La Pata/Pico corridor provides connection to state and local parks, Trabuco Mesa Elementary School, Santa Margarita Catholic High School, Rancho Santa Margarita Intermediate School, Tijeras Creek Elementary School, Las Flores Middle School, Rancho Mission Viejo Horse Park, San Juan Hills High School, Vista Hermosa Sports Park, San Clemente High School, and the San Clemente Metrolink Station.

CORRIDOR H: ANTONIO / LA PATA / PICO

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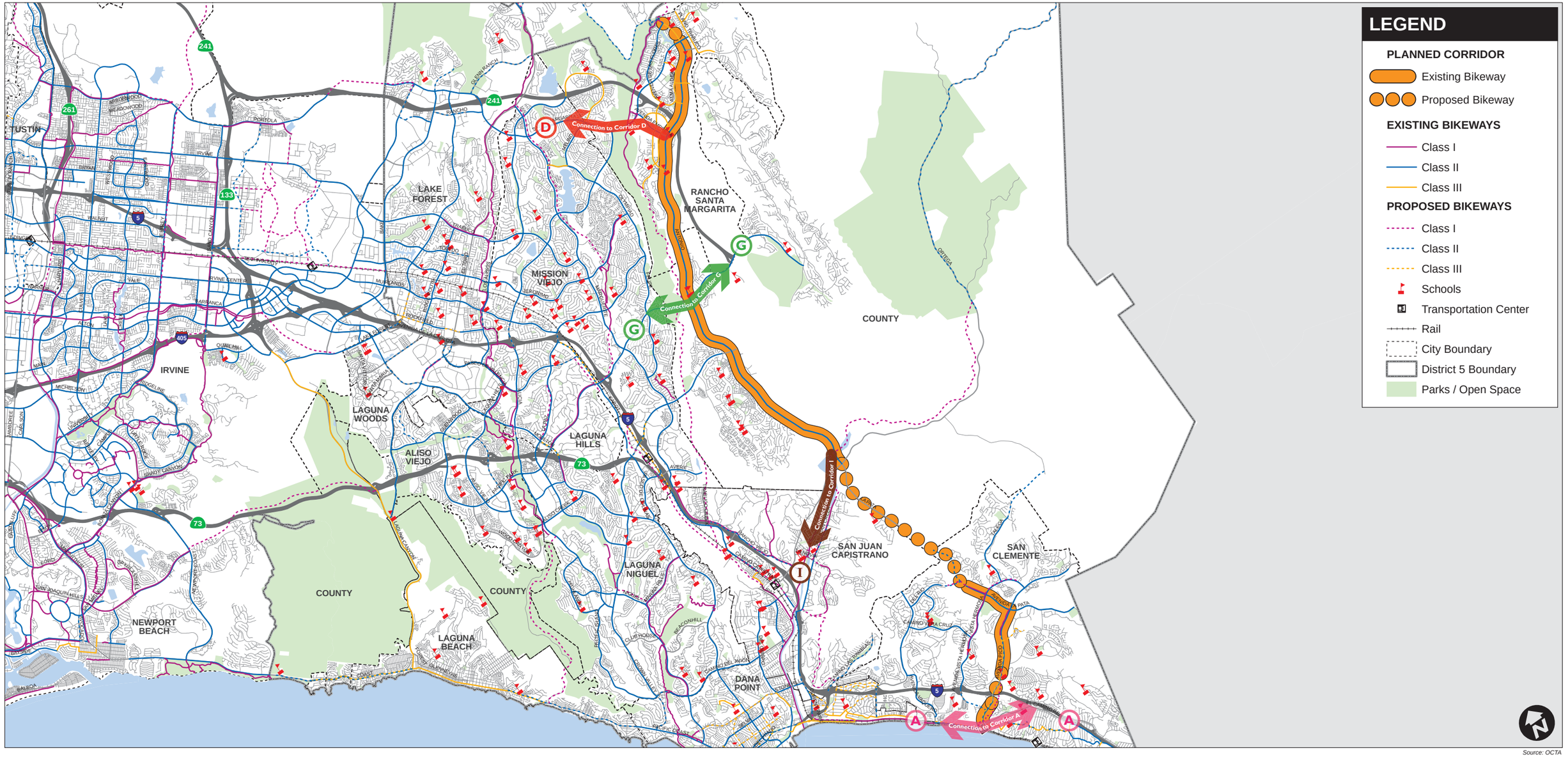

Source: OCTA

Corridor H
Bikeway Corridor Details

1 mile of existing Class I
13 miles of existing Class II
0.5 miles of existing Class III

12
Schools within 1/4-mile Served

15
Parks within 1/4-mile Served

40.8K
People within 1/4-mile Served (approx.)

18 miles
Of Total Corridor Length

$11.1-13.5 million
Estimated Project Cost

Figure 3-9

3.1.9 Corridor I: San Juan Creek

Overview

Jurisdictions:	• Lake Forest • Mission Viejo • Rancho Santa Margarita
Attractions:	• Shopping centers • Employment centers • Elementary and High Schools • State and local parks
Cost:	$3.8-$4.6 million

The San Juan Creek Corridor runs diagonally from Antonio Parkway just north of San Juan Capistrano to Doheny State beach in Dana Point. The corridor is approximately 8.6 miles long, comprised of 5.8 miles of existing Class I bike paths and 2.8 miles of proposed Class I bike paths. The corridor connects to the County of Orange, San Juan Capistrano, Dana Point, and intersects the Interstate 5 freeway. The corridor also has direct links to other regional bikeway corridors including the Antonio/La Pata/Pico, Muirlands/Cabot, and Pacific Coast Highway corridors. Figure 3.10 illustrates Corridor I.

Length of Bikeway Facilities (Miles)		
Class I	**Existing**	5.8
	Proposed	2.8
Class II	**Existing**	0.0
	Proposed	0.0
Class III	**Existing**	0.0
	Proposed	0.0
Total Bikeway Miles		8.6
Corridor Length (miles)		*8.6*

Opportunities, Constraints, and Estimated Costs

Corridor I provides connections to residential, commercial, and recreational areas in the southern portions of District 5. This corridor consists of Class I bike paths along the majority of the corridor, which is an appealing aspect of this corridor and attracts numerous users every day. The majority of the corridor is already in place, providing Class I bike lanes along a majority of the corridor with connections to four streets with existing or proposed bikeway facilities, providing access to local and regional bicyclists. The corridor intersects or overlaps with three other regional corridors, expanding its network. Because the corridor is completely off-street without intersection crossings or travel alongside vehicles, many bicyclists will feel more comfortable or safe riding along this corridor. The corridor also crosses under the Interstate 5 Freeway. There is an opportunity to pave the south/east bank of the trail and connect to the new development area of the City of San Juan Capistrano.

Estimated construction costs for the San Juan Creek corridor including major intersection crossing improvements, new Class I bike paths, and a new pedestrian/bicycle bridge where San Juan Creek and Trabuco Creek meet, providing access to the east side of the San Juan Creek, range from $3.8 to $4.6 million.

Major Regional Destinations

The San Juan Creek Corridor would provide connections and access to state and local parks, Saint Margaret's Episcopal School, City of San Juan Capistrano City Hall, and Doheny State Beach in Dana Point.

CORRIDOR I: SAN JUAN CREEK

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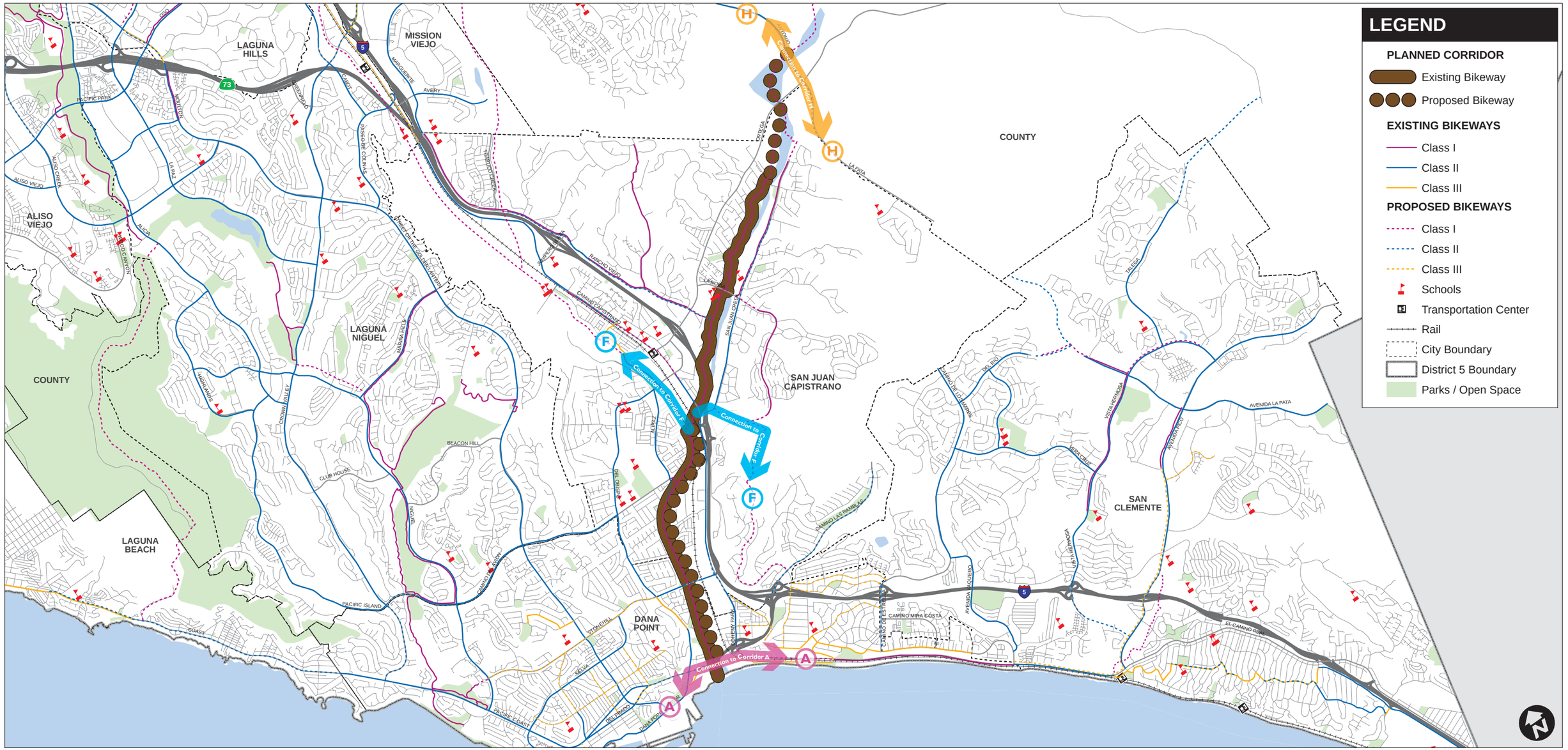


Source: OCTA

Corridor I
Bikeway Corridor Details

5.8 miles of existing Class I

9
Schools within 1/4-mile Served

5
Parks within 1/4-mile Served

18.2K
People within 1/4-mile Served (approx.)

8.6 miles
Of Total Corridor Length

$3.8-4.6 million
Estimated Project Cost

Figure 3-10

3.2 Evaluation and Ranking

3.2.1 Criteria and Weighting

Each of the proposed regional bikeway corridors were evaluated based on criteria consistent with District 5 goals and objectives. Using the District 1 and 2 criteria as a baseline, the criteria were refined through discussions with PDT members, and through public feedback received during Roundtable #1. The criteria and weighting factors for District 5 have been altered based on the input from Roundtable #1 and the PDT meetings. The criteria below were used to account for a range of opportunities, constraints, and other factors that could influence the usage and implementation of each corridor.

The criteria were developed and presented to the PDT members during the PDT Meeting #3. The criteria were refined based on the feedback from the PDT members and then used to evaluate and rank the regional corridors. During the Roundtable #1 meeting, the regional corridor evaluation analysis results were presented to the PDT members and the public. The evaluation criteria was then refined and several weighting factors were adjusted based on the feedback from the PDT members and the public during the Roundtable #1 meeting. For example, through Roundtable #1, most stakeholders agreed that the safety factor (reported collisions) needed to have a higher weighting factor due to the high speed and high volume roadway characteristic of District 5.

Table 3.1: Criteria Weighting Factor Adjustments

Criteria	Initial Weight Factor	Adjusted Weight Factor
Level of Traffic Stress	1.0	1.0
Reported Collisions	**0.5**	**1.0**
Economic Efficiency	**1.0**	**0.75**
Trip Demand	**1.0**	**0.75**
Public Support	0.5	0.5
Physical Constraints	0.5	0.5
Completes the Network	**0.5**	**0.25**
Completes the Corridor	**0.5**	**0.25**

Refinements to the criteria and weighting factors included the refinement of the criteria description and analysis methodology. Weighting factors were adjusted to allocate a higher weight on some criteria more than others, based on the feedback from the PDT members and the public. The criteria weighting factors were adjusted as shown in Table 3.1.

The regional corridors were evaluated and ranked using these criteria to help guide the implementing cities in prioritizing bikeway improvements in order to complete and/or improve the corridor bikeway facilities. The evaluation process determined which corridors would provide the greatest relative potential benefit to bicyclists in terms of regional connectivity, access to key destinations, and improved safety, while also having significant public support and limited physical constraints that could impede implementation. The top ranked proposed corridors will be further studied for feasibility in the second phase of the District 5 Bikeways Collaborative. Cities may individually advance the study of a corridor where there is interest and desire to continue the efforts of the strategy.

Table 3.2 below summarizes the criteria and weighting utilized in the ranking analysis and in determining the top ranked corridors to be further studied for feasibility. Please refer to Appendix D for additional details regarding the criteria.

Table 3.2: Criteria Description and Weighting Summary

CRITERIA	DESCRIPTION	WEIGHT
Level of Traffic Stress	Addresses perceive safety related to existing bikeway type and posted speed limits. There are four levels of traffic stress. Corridors with higher level of traffic stress are scored higher and represent a higher priority for treatment.	1.0
Reported Collisions	Addresses safety through five years of reported crash data, normalized by crashes per mile. Unlike motor vehicle crash data, the lower volume of bike crashes and lack of robust, long term exposure data (i.e. number of bicyclists using each corridor) means that this dataset is not as statistically sound. However, it is still commonly reported and easily understood. Corridors with higher collisions per mile are scored higher.	1.0
Economic Efficiency	Measures the financial benefits associated with the corridor, normalized by the number of anticipated users (which is in turn a product of the facility type, population density along the corridor and length), and divided by planning level construction costs estimates.	0.75
Trip Demand	Based on the Bicycle Priority Index (BPI). The BPI, which was developed by OCTA and accounts for various factors that influence bicycle usage including population and employment density, land use, local schools and transit.	0.75
Public Support	Incorporates public priorities through a Public Demand Index. The public input was acquired through the Roundtable #1 and online surveys.	0.5
Physical Constraints	A tally of physical constraints such as right-of-way, on-street parking, freeway ramps, and other "chokepoints". Fewer constraints result in a higher score as the corridor will be easier to implement.	0.5
Completes the Network	Regional corridors which connect to other regional and local bikeways to help complete the bikeways network. Measured by the number of intersections with other existing and proposed bikeways. Existing bikeway would be weighted more heavily. Proximity to the bikeway network is also included in the BPI.	0.25
Completes the Corridor	Proportion of the corridor that is already built to at least minimum Caltrans standards for the bikeway type that is being proposed. This helps to prioritize corridors which are already partially built. This factor is also part of the LTS Index.	0.25

3.2.2 Cost Estimate Assumptions

Planning level cost estimates were prepared for each corridor for use in the economic efficiency criterion. The costs utilized in the ranking analysis include high-level estimates based on cost averages of similar facilities. Estimates include costs for sign installations at intersections, major intersection improvements, grading and retaining walls, and other anticipated construction costs including bridges, but do not include environmental clearance, design, utility impacts, or maintenance costs. Refer to Appendix D for detailed cost estimate assumptions for each corridor.

The following are key assumptions utilized during the preparation of the cost estimates by facility type:

Class I (off-street bike path):	
Existing Facilities	Upgrade way-finding signs on existing routes, including additional bike lane signage
Proposed Facilities	• Construction of new Class I bike path with 10-foot-wide pavement and 2-foot-wide shoulders on each side, per Caltrans standards. While Caltrans allows 8-foot-wide Class I bike facilities, input from cities during the project indicated that the additional width allows for better accommodation of maintenance vehicles and provides enhanced space allocation for heavily utilized corridors. It also more readily accommodates both bicycle and pedestrian usage, which public input has suggested is an important factor. • Signage for bike path and way-finding • Street crossings were assumed to be at-grade either using nearby existing signalized intersections or a new crosswalk (enhanced crosswalks assumed in limited locations); no new traffic signals assumed. • Bridges over flood control channels were assumed, where appropriate

Class II (on-street bike lanes):	
Existing Facilities	• Upgrade way-finding along existing routes, including additional bike lane signage (particularly at intersections). • Upgrade Class II striping to include a buffer between vehicle travel lanes and the bike lane on existing facilities where feasible.
Proposed Facilities	• Stripe new Class II on-street bike lane with standard white stripe at locations where curbside travel lane is greater than 16 feet wide; buffer or colored lanes also assumed. • Widening of street by 4 feet to accommodate new Class II on-street bike lane with standard white stripe at locations where curbside travel lane is less than 16 feet wide; with cost represented on per linear foot basis assuming general costs for widening and right-of-way acquisition. • Signage for bike lane and for way-finding • Where on-street parking exists, initial cost assumes removal of on-street parking instead of street widening. The feasibility of removing parking will be more a component of the next phase of corridor analysis.

Class III (on-street bike routes):	
Existing Facilities	• Upgrade way-finding along existing routes, including additional bike lane signage, sharrows, and signage for regional corridor.
Proposed Facilities	• Implementation of sharrows, bike route signage, and way-finding signage. • Enhanced bike boulevard treatments such as traffic circles, roundabouts, and bikeway channels were not included in cost estimates pending more detailed feasibility review.

Class IV (cycle tracks)	
Existing Facilities	• N/A
Proposed Facilities	• Installation of raised islands serving as buffers between a curbside bike lane and vehicular travel lanes • Narrowing of vehicular lanes by restriping

Table 3.4 summarizes the results of the criteria ranking for the nine proposed corridors within District 5 with length and range of costs shown.

Table 3.3: Corridor Cost Estimates

Corridor ID	Corridor Name	Length (miles)	Cost Range (millions)
A	PCH	19.0	$11.5 – $14.1
B	Laguna Canyon	8.8	$8.4 – $10.3
C	El Toro/Alicia/Laguna Canyon	15.3	$12.2 – $15.0
D	Portola/Santa Margarita	6.7	$6.5 – $8.0
E	Aliso Creek	20.3	$8.2 – $10.0
F	Muirlands/Cabot/Camino Capistrano	17.9	$7.4 – $9.0
G	Oso Parkway	8.9	$5.5 – $6.8
H	Antonio/La Pata/Pico	18.0	$11.1 – $13.5
I	San Juan Creek	8.6	$3.8 – $4.6
TOTAL		**123.5**	**$74.6 – $91.3**

Note: The costs shown above are high-level estimates based on averages of similar facilities. Costs include costs for sign installations at intersections, major intersection improvements, grading and retaining walls, and other anticipated construction costs including bridges, but do not include environmental clearance, design, utility impacts, or maintenance costs.

3.2.3 Results of Criteria Ranking

Table 3.3 summarizes the detailed ranking evaluation, with raw and weighted scores shown. The weighted scores account for normalizing between 0 and 100, and weighting of each criterion.

Table 3.4: Corridor Scoring

Criteria		Rank	Score	Level of Traffic Stress		Reported Collisions		Economic Efficiency		Trip Demand		Public Input		Completes the Network		Physical Constraints		Completes the Corridor	
Best Possible Score			Tot.	RS	WS	RS	WS	RS	WS	RS	WS	RS	WS	RS	WS	RS	WS	RS	WS
			100	4.0	20	3.0	20	6.4	15	343.6	15	96	10	1.7	5	3	10	0%	5
A	PCH Corridor	1	70	3.8	19	2.9	20	0.9	2	280.1	12	96	10	0.8	3	12	2	0.0	1
C	El Toro/Alicia/ Laguna Canyon	2	65	3.9	20	2.4	16	1.5	4	288.8	13	21	2	1.0	4	20	1	0.0	5
F	Muirlands/Cabot / Camino Capistrano	3	60	2.3	12	1.1	8	6.4	15	343.6	15	47	5	0.9	3	21	1	0.3	1
D	Portola/Santa Margarita	4	59	3.9	20	1.1	7	0.6	1	317.1	14	19	2	1.7	5	6	5	0.0	5
B	Laguna Canyon	5	54	4.0	20	1.4	9	0.3	1	209.2	9	62	6	0.6	2	29	1	0.0	5
E	Aliso Creek	6	50	1.1	6	0.1	1	4.5	11	260.8	11	58	6	1.0	4	3	10	0.3	1
G	Oso Parkway	7	48	3.7	19	0.4	3	1.0	2	277.3	12	13	1	1.0	4	16	2	0.0	5
H	Antonio/La Pata/Pico	8	44	3.4	17	0.9	7	0.6	1	245.1	11	23	2	0.5	2	20	1	0.2	2
I	San Juan Creek	9	38	0.7	3	0.0	0	5.2	12	312.6	14	22	2	0.9	3	11	2	0.3	1

Note: RS = Raw Score; WS = Weighted Score

The corridor evaluation process determined that corridors A, C, and F would provide the greatest relative potential benefit to bicyclists in terms of regional connectivity, access to key destinations, and improved safety, while also possessing significant public support and limited physical constraints that could impede implementation.

The following section describes the performance of corridors for each criterion.

Criteria			Reported Collisions	
			RS	WS
Best Possible Score			3.0	20
Corridor	C	El Toro/Alicia	3.0	20
	A	PCH Corridor	2.9	19
	B	Laguna Canyon	1.4	9
	F	Muirlands/Cabot	1.1	7
	D	Portola/Santa Margarita	1.1	7
	H	Antonio/La Pata/Pico	0.9	6
	G	Oso Parkway	0.4	3
	E	Aliso Creek	0.1	1
	I	San Juan Creek	0.0	0

RS = Raw Score, WS = Weighted Score

Safety:

Corridor C received the highest score with regard to the safety criterion. This indicates that this corridor exhibited a relatively higher number of collisions per mile, and priority for treatment.

Criteria			Level of Traffic Stress	
			RS	WS
Best Possible Score			4.0	20
Corridor	B	Laguna Canyon	4.0	20
	C	El Toro/Alicia	3.9	20
	D	Portola/Santa Margarita	3.9	20
	A	PCH Corridor	3.8	19
	G	Oso Parkway	3.7	19
	H	Antonio/La Pata/Pico	3.4	17
	F	Muirlands/Cabot	2.3	12
	E	Aliso Creek	1.1	6
	I	San Juan Creek	0.7	3

RS = Raw Score, WS = Weighted Score

Level of Traffic Stress

Corridor B received the highest score with regard to Level of Traffic Stress. This indicates that the corridor had relatively higher posted speeds and lack of designated bicycle facilities.

Criteria			Trip Demand	
			RS	WS
Best Possible Score			343.6	15
Corridor	F	Muirlands/Cabot	343.6	15
	D	Portola/Santa Margarita	317.1	14
	I	San Juan Creek	312.6	14
	C	El Toro/Alicia	288.8	13
	A	PCH Corridor	280.1	12
	G	Oso Parkway	277.3	12
	E	Aliso Creek	260.8	11
	H	Antonio/La Pata/Pico	245.1	11
	B	Laguna Canyon	209.2	9

RS = Raw Score, WS = Weighted Score

Trip Demand: Bicycle Priority Index (BPI)

Corridor F received the highest BPI score indicating the most potential demand for bicycle demand. Some of the most densely populated and major employment centers in south Orange County are in close proximity to Corridor F.

Criteria			Economic Efficiency	
			RS	WS
Best Possible Score			6.4	15
Corridor	F	Muirlands/Cabot	6.4	15
	I	San Juan Creek	5.2	12
	E	Aliso Creek	4.5	11
	C	El Toro/Alicia	1.5	4
	A	PCH Corridor	1.1	3
	G	Oso Parkway	1.0	2
	D	Portola/Santa Margarita	0.6	1
	H	Antonio/La Pata/Pico	0.6	1
	B	Laguna Canyon	0.3	1

RS = Raw Score, WS = Weighted Score

Economic Efficiency

Corridor F received the highest score for economic efficiency and exhibited the most benefit for the cost to complete/enhance the corridor. The majority of Corridor F is already in place and would require relatively minimal work to complete, but serve the most potential demand.

Criteria			Public Input	
			RS	WS
Best Possible Score			96	10
Corridor	A	PCH Corridor	96	10
	B	Laguna Canyon	62	6
	E	Aliso Creek	58	6
	F	Muirlands/Cabot	47	5
	H	Antonio/La Pata/Pico	23	2
	I	San Juan Creek	22	2
	C	El Toro/Alicia	21	2
	D	Portola/Santa Margarita	19	2
	G	Oso Parkway	13	1

RS = Raw Score, WS = Weighted Score

Public Support

Corridor A received the highest score for public support. Pacific Coast Highway is one of the most iconic bicycling routes in California and is recognized throughout Orange County as a popular and scenic bicycling destination.

Criteria			Physical Constraints	
			RS	WS
Best Possible Score			3	10
Corridor	E	Aliso Creek	3	10
	D	Portola/Santa Margarita	6	5
	I	San Juan Creek	11	2
	A	PCH Corridor	12	2
	G	Oso Parkway	16	2
	C	El Toro/Alicia	20	1
	H	Antonio/La Pata/Pico	20	1
	F	Muirlands/Cabot	21	1
	B	Laguna Canyon	29	1

RS = Raw Score, WS = Weighted Score

Constraints

Corridor E received the highest score for having the least amount of constraints. The Aliso Creek corridor is entirely off-street and has minimal at-grade crossings. It is also aligned along a natural water body with minimal slope.

Criteria			Completes the Corridor	
			RS	WS
Best Possible Score			0.0	5
Corridor	B	Laguna Canyon	0.0	5
	G	Oso Parkway	0.0	5
	D	Portola/Santa Margarita	0.0	5
	C	El Toro/Alicia	0.0	5
	H	Antonio/La Pata/Pico	0.2	2
	E	Aliso Creek	0.3	1
	I	San Juan Creek	0.3	1
	F	Muirlands/Cabot	0.3	1
	A	PCH Corridor	0.3	1

RS = Raw Score, WS = Weighted Score

Complete the Corridor

Corridor's B, G, D, and C received the highest score with regard to completing the corridor. This indicates that these corridors are relatively the most complete and already in place and would require only gap closures to complete.

Criteria			Completes the Network	
			RS	WS
Best Possible Score			1.7	5
Corridor	D	Portola/Santa Margarita	1.7	5
	C	El Toro/Alicia	1.0	4
	E	Aliso Creek	1.0	4
	G	Oso Parkway	1.0	4
	A	PCH Corridor	0.8	3
	F	Muirlands/Cabot	0.9	3
	I	San Juan Creek	0.9	3
	B	Laguna Canyon	0.6	2
	H	Antonio/La Pata/Pico	0.5	2

RS = Raw Score, WS = Weighted Score

Complete the Network

Corridor D received the highest score exhibiting the most connections to other bike facilities. This indicates that Corridor D serves as a key connection point in the overall bike network.

3.2.4 Top Ranked Corridors

As shown in Table 3.3 the three top ranked corridors are:

- **Corridor A:** Pacific Coast Highway;
- **Corridor C:** El Toro/Alicia/Laguna Canyon;
- **Corridor F:** Muirlands/Cabot/Camino Capistrano

Each of the District 5 cities, the County of Orange, and Caltrans have jurisdiction over portions of these three corridors.

The Pacific Coast Highway Corridor, which extends from the north side of Laguna Beach to San Clemente received the highest score. This score was driven by the level of traffic stress (19 out of a possible 20 points), reported collisions (20 out of 20 possible points), trip demand (12 out of 15) and strong public input (10 out of 10).

El Toro/Alicia/Laguna Canyon Corridor, which extends from the base of the Santa Ana Mountains in Mission Viejo to the beach in Laguna Beach, received the second highest score. This score was driven by the level of traffic stress (20 out of a possible 20 points), reported collisions (16 out of 20 possible points), and trip demand (13 out of 15).

Muirlands/Cabot/Camino Capistrano Corridor, which extends from just north of the I-5 in Lake Forest SE to San Juan Capistrano and the Dana Point/San Clemente Border, was the third highest ranking corridor. This score was driven by economic efficiency (15 out of a possible 15 points), trip demand (15 out of 15 possible points), trip demand (12 out of 15) and to a lesser extent level of traffic stress (12 out of 20 possible points).

These three corridors will be further studied for feasibility in the second phase of the District 5 Bikeways Collaborative. The feasibility analyses may determine that segments of certain corridors should be shifted to parallel roadways, depending upon circumstances and/or constraints. Therefore, the nine corridors identified in this report are only conceptual and their exact alignments may change in subsequent stages of planning and design. This design flexibility will ensure that the best possible routes are included in transportation plans and applications for construction funds.

4.0 ACTION PLAN

4.1 Potential Near-Term Efforts

This section identifies potential near-term projects that can be implemented by each of the cities within District 5 to begin implementation of the proposed corridors. Potential near-term projects are those that are expected to have a low construction cost and can be implemented in a relatively short period of time as funds become available. Implementation and funding of these projects would be the responsibility of each jurisdiction. OCTA would assist local jurisdictions in obtaining funding for these projects by providing letters of support, grant notifications and guidance, and design solutions. Coordination between jurisdictions is highly encouraged to implement bikeway connections simultaneously.

Each of the nine regional bikeway corridors has been reviewed at a conceptual level to identify "potential near-term" projects expected to require minimum capital investment, little or no right-of-way acquisition, and may require minimal environmental review. These types of projects may include restriping a street to implement a Class II bikeway, signing a street to designate it as a Class III bikeway, or signing and striping an existing paved off-street path or maintenance road of sufficient width to serve as a Class I off-street bikeway. For existing Class II bike lanes, if there is enough roadway width, enhancing the existing Class II bike lane to a buffered bike lane can be easily implemented.

Table 4.1 summarizes the proposed near-term improvements along with estimated costs and jurisdictional responsibilities. Figure 4.1 shows the locations of the proposed near-term improvements.

Table 4.1: Proposed Near-Term Improvements

Corridor	Location	Owner/ Operator	Proposed Improvement	Length (feet)	Cost Estimate
A: Pacific Coast Highway	PCH (west city limit to Cliff Dr)	Laguna Beach/Caltrans	New Class II (on-street, striping)	5,970	$65,670
	PCH (Nyes Place to Eastline Drive)	Laguna Beach/Caltrans	New Class II (on-street, striping)	14,230	$156,530
	El Camino Real (Camino Capistrano to Avenida Estacion)	San Clemente	New Class IV	10,000	$524,000
B: Laguna Canyon	Laguna Canyon Road at SR-73	County of Orange / Caltrans	Stripe bike lanes through freeway interchange	3,000	$33,000

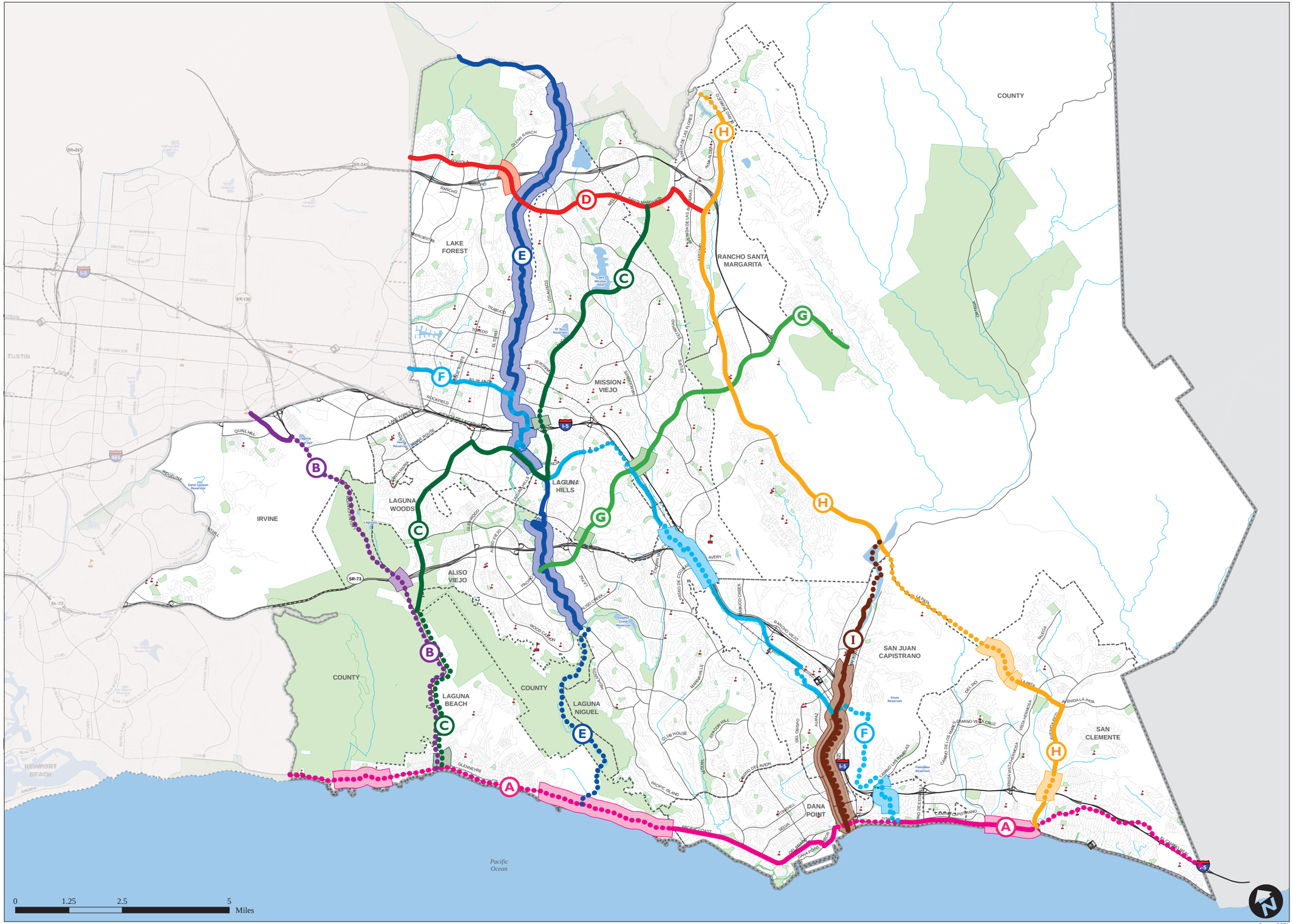
Corridor	Location	Owner/ Operator	Proposed Improvement	Length (feet)	Cost Estimate
C: El Toro / Alicia / Laguna Canyon	Broadway Street (Laguna Canyon Road to PCH)	Laguna Beach	Upgrade Existing Facility (signage and other)	1,510	$453
D: Portola / Santa Margarita	SR-241 and Portola Parkway	County of Orange / Caltrans	Class II buffered bikeway striped through interchange	3,000	$33,000
E: Aliso Creek	Aliso Creek Trail	County of Orange,	Upgrade existing Class I by adding way-finding signage	4,670	$1,401
		Mission Viejo		5,930	$1,779
		Lake Forest		30,050	$9,015
		Laguna Woods		2,870	$861
		Laguna Hills		3,410	$1,023
		Aliso Viejo		14,550	$4,365
F: Muirlands/ Cabot/Camino Capistrano	Camino Capistrano (Metrolink Station to south city limit)	Laguna Niguel	New Class III (on-street, signage)	3,710	$9,275
	Via California (Camino Las Ramblas to Calle Beinvenido)	San Clemente	New Class III (on-street, signage)	510	$1,275
	Via California (Via Velez to Via Lopez)	Dana Point	New Class II (on-street, striping)	540	$5,940
	Via Fortuna (Via California to Via Sacramento)	Dana Point	New Class III (on-street, signage)	840	$2,100
	Via Sacramento (Via Fortuna to Camino Capistrano) & Via California (via Lopez to Via Fortuna)	Dana Point	New Class III (on-street, signage)	1,950	$4,875
G: Oso Parkway	Oso Parkway at I-5 Freeway	OCTA and Caltrans	Add buffered class II striping through intersection (with green paint)	5,500	$75,000
	Oso Parkway at Moulton Parkway	Aliso Viejo	Add Class II striping to the intersection	900	$10,000
H: Antonio / La Pata / Pico	La Pata - west city limits to Del Rio	San Clemente	New Class II (on-street striping)	870	$9,570
	La Pata - Del Rio to Calle Saluda	San Clemente	New Class I (off-street paving)	1,200	$180,000
	Avenida Pico (Calle Frontera/Avenida Presidio to Calle De Industrias/Via Pico Plaza)	San Clemente	New Class II (on-street striping)	3,000	$33,000

Corridor	Location	Owner/ Operator	Proposed Improvement	Length (feet)	Cost Estimate
I: San Juan Creek	Avenida Siega/Calle Arroyo to Calle Jardin	San Juan Capistrano	Upgrade Existing Facility (Signage and Other)	19,700	$5,931
	Calle Jardin to Doheny State Beach	Dana Point	Upgrade Existing Facility (Signage and Other)	6,240	$1,872
	East side of San Juan Creek (Trabuco Creek Trail to Stonehill Dr)	San Juan Capistrano	New Class I - off street paving	7,620	$1,143,000
	East side of San Juan Creek (Stonehill Dr to PCH)	Dana Point	New Class I - off street paving	3,810	$571,500

NEAR TERM CORRIDOR IMPROVEMENTS

OCTA District 5 Bikeways Collaborative

KOA CORPORATION PLANNING & ENGINEERING



Source: OCTA

BIKEWAY CORRIDORS

Existing Facility	Proposed Facility	Near Term Project	
			A: Pacific Coast Highway
			B: Laguna Canyon
			C: El Toro/Alicia
			D: Portola/Santa Margarita
			E: Aliso Creek
			F: Muirlands/Cabot/Camino Capistrano
			G: Oso Parkway
			H: Antonio/La Pata/Pico
			I: San Juan Creek

LEGEND

- Transportation Center
- Rail
- Schools
- Colleges
- Parks / Open Space
- Waterbody
- City Boundary
- Supervisorial District 5

Figure 4-1

4.2 Programmatic Recommendations

Of the five E's of bicycle planning, four are related to programs; encouragement, education, enforcement and evaluation. Programs should complement engineering improvements such as bike paths, lanes, and routes by providing the education and encouragement to ensure that the facilities get maximum utilization.

4.2.1 Encouragement

Safe Routes to School Program

The Safe Routes to School (SRTS) Program (www.saferoutesinfo.org) focuses on both education and infrastructure development with the goal of increasing the number of children who walk and bike to school on a regular basis.

The program offers promotional and educational materials to help communities develop effective safe routes to schools programs. The statewide Active Transportation Program (ATP) for funding bike and pedestrian programs includes a specific category for SRTS programs. These grants can be used for either infrastructure or educational programs that promote children walking and biking to school. One of the advantages of SRTS grants is that they require no local match. For more on funding opportunities, see Chapter 6.

Bike month is a nationwide event held in May of each year. The intent of the month long campaign is to increase awareness of bicycling, its benefits and impact, as well as encourage bicycling across all segments of the population. OCTA has an active campaign each May that includes not only a bike-to-work day, but a number of events held throughout the month. In addition, many of the cities in District 5 hold their own bike-related events.

For more information on National Bike Month, go to the League of American Bicyclists www.bikeleague.org/bikemonth. For a list of events in Orange County, see www.octa.net/Share-the-Ride/Bike/Bike-Month

Employer-Based Encouragement Programs

Many companies, OCTA, and participating cities work with or provide information to employees about commuting by bicycle. A useful resource is an article published in Inc Magazine in 2010 titled "How to encourage your employees to bike to work." It has a checklist showing what companies (and government agencies) can do to encourage their employees to bike to work.

Launch Party for New Bikeways

When a new bikeway is built, some residents will become aware of it and use it, while others may not realize that they have improved bikeway options available.

Conducting opening events where you invite local dignitaries, school groups, bike clubs, and local businesses to participate is a great way to help raise early awareness and use of new facilities.

Elected and school officials are often eager to be involved in these types of events, as they can be used to highlight programs they have encouraged and championed in the community.

Open Streets Events

Open streets events have many names: Sunday Parkways, Ciclovias, Summer Streets, and Sunday Streets. These events have become increasingly popular across the County. In Southern California, these events have been hosted from Los Angeles to Santa Ana, Garden Grove, and San Diego. Los Angeles's events routinely attract over 100,000 participants and have encouraged large numbers of people who do not regularly ride a bike to come out and enjoy car-free city streets.

One of the many benefits of these events is highlighting the businesses along the route and showing people how easy it is to dine and shop by bike. A recent study from UCLA, titled "Economic impacts of CicLAvia: Study Finds Gain To Local Businesses" discusses the significant economic impact of these events.

For a guide to conducting an open streets event, go to the Alliance for Biking and Walking website: www.bikewalkalliance.org/resources/reports/open-streets-guide.

Bicycle Friendly Community

The League of American Bicyclists recognizes communities that are good, friendly, safe places to ride your bike; cities that welcome and encourage bicyclists and bicycling. According to the league's website, "A BFC welcomes bicyclists by providing safe accommodations for bicycling and encouraging people to bike for transportation and recreation. Making bicycling safe and convenient are keys to improving public health, reducing traffic congestion, improving air quality and improving quality of life."

Being recognized as a bike friendly community is becoming more and more important in attracting and retaining new residents as well as businesses. People of all ages ranging from school age, to newly working adults to aging baby boomers are looking for cities that offer an active lifestyle and provide an opportunity to choose to get out of their vehicle and use alternative forms of transportation including bicycling. Businesses are looking to locate and grow in cities that offer a lifestyle that will attract new employees and customers; one of their important criteria has become having a bike (and pedestrian) friendly culture.

In Orange County, the cities of Irvine and Huntington Beach, along with the County, have achieved recognition as Bike Friendly Communities. Nationwide, over 300 communities are recognized as being bike friendly.

For information on the advantages of being recognized as a bike friendly community and on obtaining bike friendly status see the League of American Bicyclists website www.bikeleague.org/bfa.

4.2.2 Education

Bicycle Resource Website

Educating both bicycles and motorists is an important aspect of being bike friendly. Bicyclists need to understand safe bicycling behavior and the basics of bicycle maintenance. They need to understand how to deal with traffic as well as pedestrians and other bicyclists. Motorists need to understand that bicyclists have the same rights that vehicle drivers have. Now motorists need to understand safety rules, such as the 3-foot law.

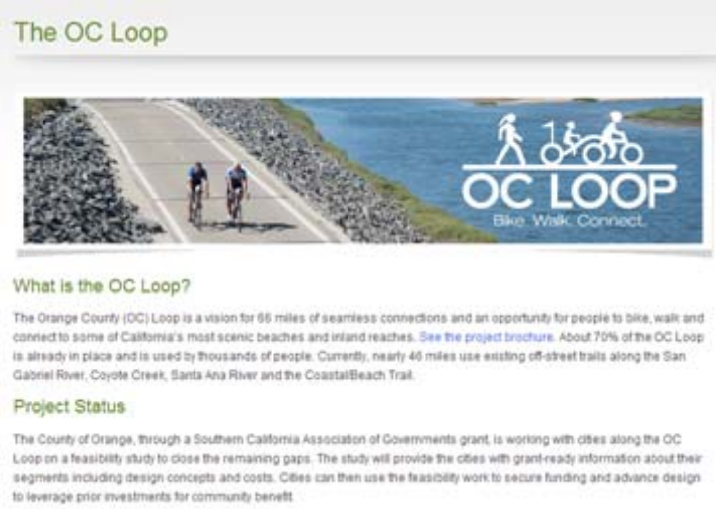
OCTA hosts several pages dedicated to bicycling and bicycle safety: http://www.octa.net/Share-the-Ride/Bike/Riding-in-Orange-County/OC-Bikeways-Map/

Bicycle resource websites may also include:

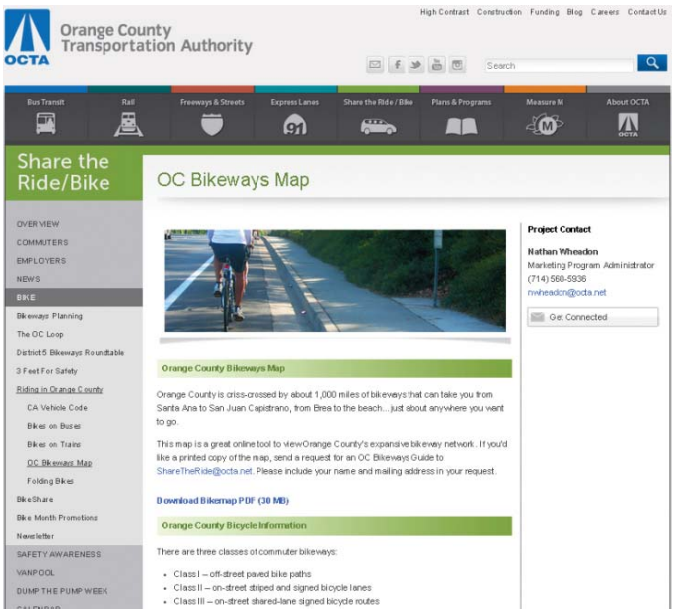
- Advertisements for all bikeways after implementation
- Bicycling tips including information on how to:
  - Carry items using baskets and panniers
  - Properly lock a bike
  - Ride in the rain with help from fenders and rain gear
  - Tips can also include information on the importance of bicycle lights and reflectors.
- Bikeway maintenance and repair phone numbers
- Bicycle events calendar
- Bicycle traffic skills classes information
- multilingual versions

Marketing Concurrent with New Facilities

Education about new facilities can help notify and educate both cyclists and motorists about newly installed facilities. OCTA has a history of effective marketing using local events to highlight new facilities. These include special events associated with opening segments of facilities, such as ribbon cutting ceremonies and bike rides where local private and governmental entities are invited to participate, along with local school and youth groups.



Social media and the web are also important tools for marketing new facilities. A recent example of a marketing campaign associated with the OC Loop, a 66-mile largely off-street bike and pedestrian facility that connects northern inland OC with the beach communities can be found at www.octa.net/OCLOOP



A marketing campaign that highlights bicyclists and pedestrian safety is an important part of creating public awareness.

OCTA has a strong history of creating community outreach programs, using social media, and creating public service messages including items such as banner ads, in particular those placed on OCTA busses.

OCTA's yearly Bike Month Campaign has been very effective at conveying a safety message for both motorists and bicyclists.

Funding sources for similar campaigns that can be conducted at the city level are discussed in Chapter 6.

Adult Bicycling Traffic Skills Classes

Most adult bicyclists have not received any formal training on safe bicycling practices, the rules of the road, and bicycle handling skills. If they received any bike education at all, it was most likely as a child. Now, many of the adults who are being encouraged to return to bicycling feel uncomfortable, in many cases, even riding in their neighborhood.

Adult classes offered by League of American Bicyclist certified instructors are available by contacting www.bikeleague.org. These courses combine some short lectures about riding skills and simple bike maintenance. More importantly they offer the bicyclist the opportunity to learn new skills or refresh old skills in a safe environment, accompanied by a certified instructor.

Route 004 : Silver Lake to Downtown

Meet Thursdays at 8:00am at Caffe Vita on Sunset near Hillhurst and the Vista Theater. This route uses bike lanes on Sunset Boulevard, Rampart Boulevard and 7th Street to take us from Los Feliz/Silverlake past beautiful MacArthur Park to Downtown Los Angeles, ending at 7th and Grand where you can refuel at Bottega Louie if the ride leaves you with a sweet tooth. Majority of the route is on bike lanes, but we will share the road with automobiles for brief sections. We'll keep it low-stress and low-sweat; this is more of a trolley than high-speed rail. Even still, we'll make the trip in about 30 minutes!

A recent innovation in LA has been the creation of "bike trains" for adults. Just as a train, a bike train runs on a given schedule over a given route. Bike trains have been used for several years to aid children going to and from school. More recently, a similar concept has been implemented for adults in LA. There are currently eight routes in LA. For each of these routes a group will meet one or two days per week. Each ride has a conductor who guides the group along the route as well as provides any assistance that is necessary. For more information on Bike Trains for Adults see http://labiketrains.com/

Youth Bicycle Skills Classes

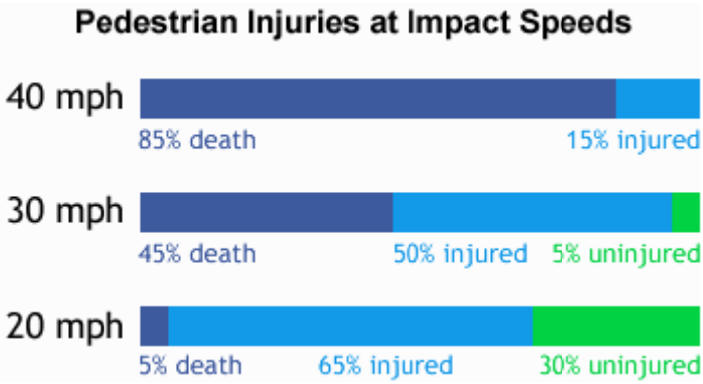
School-based bicycle education programs educate students about the rules of the road and safe bicycling skills. Safe routes to schools (SRTS) educational grants are available for these programs, which are typically offered for upper elementary and middle school age children. Funding strategies for these programs is discussed in Chapter 6.

Bike trains and walking school buses, where parents or staff guide students to and from school over a set route at a set time, are being added in more and more schools across Southern California. In some cases these are formal programs that are sponsored by the school. In other cases the programs are organized and coordinated informally by parents who want the children to have the opportunity to walk and/or bike to school. These programs allow children with different skill levels to interact and provide an alternative to the class-room or school-yard based training.

4.2.3 Enforcement

Bicycle Patrol

Police bicycle patrols not only increase the mobility of officers in dense areas but also offer the opportunity for officers to interact with bicyclists in a non-confrontational, low key manor. Bicycle patrol officers know both the law as well as the challenges faced by bicyclists on a day-to-day basis. These officers can demonstrate and explain safe riding techniques as well as provide enforcement if appropriate.



Speed Feedback Signs and Rest in Red Signals

Vehicle speeds greatly affect the severity of the crash for the bicyclist or pedestrian. The adjacent figure, from the Safe Routes to School (SRTS) guide to slowing down traffic, shows that at a speed of 20 MPH, the percentage of pedestrians being killed in a crash is under 5% but at a speed of 40 mph, the percentage is 85%.

Speed feedback signs have been shown to be an effective means of making the driver more aware of their speed and encouraging them to reduce their speed.

A relatively new traffic engineering tool involves setting traffic lights for when vehicles approach a signal over the legal speed limit, the light turns red. Once the vehicle slows to below the limit, it will turn green, allowing the vehicle to proceed. The City of Long Beach has recently installed these with success at two locations. A video showing how this works can be seen at www.youtube.com/watch?v=x5zhziy7TIA

Targeted Enforcement

Targeted enforcement uses the focused efforts of police officers at known locations where compliance is low. According to the Federal Highway Traffic Administration (FHWA) these programs are most effective when crash, citation or other sources of information suggests that the site is unusually hazardous due to illegal driving practices.

According to the FHWA, "The advantage of targeted enforcement is that it can be implemented in a very short period of time and identified problems can be addressed almost immediately. The disadvantage is that the effectiveness is usually measured in terms of days and perhaps weeks, rather than months or years." For more information on targeted enforcement see: safety.fhwa.dot.gov/intersection/resources/intsafestratbro/ug1.cfm

Adult Bicycle Education Diversion Program

A few cities in the State of California have adopted adult bicycle diversion programs. In these programs, when bicyclists are given a traffic ticket they are provided the opportunity to take a bike education program rather than paying the full price of the ticket. At the present time Huntington Beach has a program for teens; Marin County has an adult program. Due to potential conflicts with state regulations these programs have not been widely adopted across the state.

4.2.4 Evaluation

Evaluation programs measure and evaluate the impact of projects, policies and programs.

Surveys

Surveys are useful for eliciting infrastructural deficiency and attitudinal information. These may be intercept surveys conducted in the field during events or in locations such as bike shops. They may also be conducted online. For this report both online and face-to-face surveys were used to collect both behavioral information as well as indications of preferred routes and to determine corridor rankings.

Counts

Bike counts are an important part of any bike program. As the National Bicycle and Pedestrian Documentation Project says, "One of the greatest challenges facing the bicycle and pedestrian field is the lack of documentation on usage and demand. Without accurate and consistent demand figures, it is difficult to measure the impacts of investments in these modes."

Standard forms and instructions for bike counts can be downloaded from the National Bicycle and Pedestrian Documentation Project website (www.bikepeddocumentation.org).

In addition to yearly counts, counts can be done on a before and after basis to show the impact of a specific project. Most projects that are funded by government grants routinely incorporate these counts into the project plans.

Recently, several cities have started to use automated counters that are useful in collecting long term counts, establishing daily, weekly, or monthly variations, and almost always requiring fewer person hours (National Bicycle and Pedestrian Documentation project: Automatic count technologies).

The photo on the previous page shows one form of counter that has recently been installed in on the Santa River Trail.

Several other cities including Portland, OR, Minneapolis, MN and Arlington, VA, are installing counters such as the one shown on the left. These counters not only keep track of the number of bicyclists, but visibly display the results on a real time basis. (Photo by Eco-Counter)

Automated counters are an important element in helping determine the effectiveness of bike programs. With their effectiveness and efficiency in data collection and their reasonable costs ($2,000-$3,000 or less per installation), they can be incorporated in most future projects.

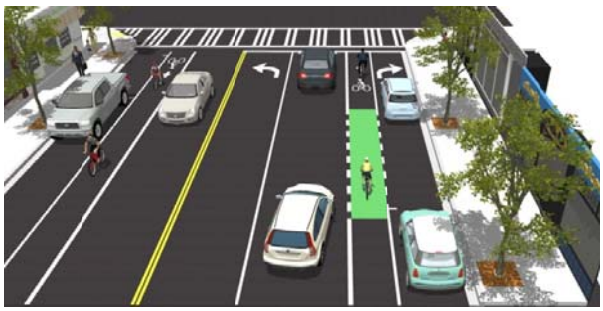
A recent project sponsored jointly by SCAG and the Los Angeles County MTA is designed to help compile, organize, make accessible and create a standard for bike count data in Southern California. As a result of the project, a clearinghouse for bike count data has been created and is being maintained by UCLA. The project includes information on best practices and forms for bike counts, a literature review, and a white paper on bike counts, travel demand modeling, and benefits estimation. For more information on the Bike Count Clearinghouse see www.bikecounts.luskin.ucla.edu.

5.0 BICYCLE FACILITY TOOLKIT

5.1 Introduction

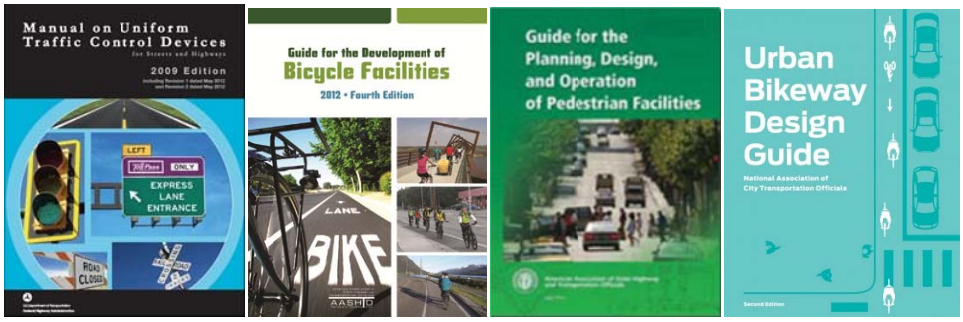
This chapter is intended to assist the Orange County Transportation Authority and local jurisdictions within the District 5 study area in the selection and design of bicycle facilities. District 5 is unique from the other Districts in Orange County in which corridors are on major arterials due to the topography of District 5. Many of these corridors have existing bike lanes; however an extensive shared-use path network also exists throughout District 5.

The following pages pull together best practices by facility type from public agencies and municipalities nationwide. Within the design section, treatments are covered within a single-sheet tabular format relaying important design information and discussion, example photos, schematics (if applicable), and existing summary guidance from current or upcoming draft standards. Existing standards are referenced throughout and should be the first source of information when seeking to implement any of the treatments featured here.



5.1.1 National Standards

Several agencies and organizations provide design standards for bike facilities in the US. The most commonly used manuals that outline these standards are listed below.



The Federal Highway Administration's Manual on Uniform Traffic Control Devices (MUTCD) defines the standards used by traffic engineers nationwide to install and maintain traffic control devices on all public streets, highways, bikeways, and private roads open to public traffic. The FHWA MUTCD forms the basis of the California MUTCD, which is the standard used by most cities in California.

To further clarify the MUTCD, the FHWA created a table of contemporary bicycle facilities that lists various bicycle related signs, markings, signals, and other treatments and identifies their official status (e.g., can be implemented, currently experimental). See Bicycle Facilities in the Manual on Uniform Traffic Control Devices.

There are some newer bikeway treatments that may not be explicitly covered by the MUTCD that are often subject to experiments, interpretations and official rulings by the FHWA. The MUTCD Official Rulings is a resource that allows website visitors to obtain information about these supplementary materials. Copies of various documents (such as incoming request letters, response letters from the FHWA, progress reports, and final reports) are available on this website.

American Association of State Highway and Transportation Officials (AASHTO) Guide for the Development of Bicycle Facilities, updated in June 2012 provides guidance on dimensions, use, and layout of specific bicycle facilities. The standards and guidelines presented by AASHTO provide basic information, such as minimum sidewalk widths, bicycle lane dimensions, detailed striping requirements and recommended signage and pavement markings.

The National Association of City Transportation Officials' (NACTO) 2014 Urban Bikeway Design Guide is the newest publication of nationally recognized bikeway design standards, and offers guidance on the current state of the practice designs. The intent of the guide is to offer substantive guidance for cities seeking to improve bicycle transportation in places where competing demands for the use of the right of way present unique challenges. All of the NACTO Urban Bikeway Design Guide treatments are in use internationally and in many cities around the US.

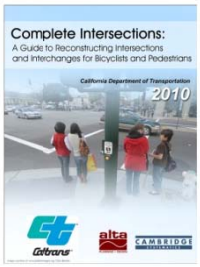
Meeting the requirements of the Americans with Disabilities Act (ADA) is an important part of any bicycle and pedestrian facility project. The United States Access Board's proposed Public Rights-of-Way Accessibility Guidelines (PROWAG) and the 2010 ADA Standards for Accessible Design (2010 Standards) contain guidance and standards, respectively, for the construction of accessible facilities. This includes requirements for sidewalk curb ramps, slope requirements, and pedestrian railings along stairs.

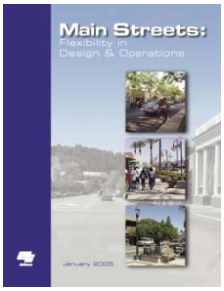
Some of these treatments are not directly referenced in the current versions of the AASHTO Guide or the MUTCD, although many of the elements of these treatments are found within these documents. In all cases, engineering judgment is recommended to ensure that the application makes sense for the context of each treatment, given the many complexities of urban streets.

Below is a list of the websites associated with these standards and guides and their associated manuals.

1. FHWA. Bicycle Facilities and the Manual on Uniform Traffic Control Devices. 2011. http://www.fhwa.dot.gov/environment/bikeped/mutcd_bike.htm
2. MUTCD Official Rulings. FHWA. http://mutcd.fhwa.dot.gov/orsearch.asp
3. http://nacto.org/cities-for-cycling/design-guide/
4. http://www.access-board.gov/guidelines-and-standards/streets-sidewalks/public-rights-of-way
5. www.ada.gov/2010ADAstandards_index.htm

5.1.2 State Standards and Guidelines



California Highway Design Manual (HDM) (2012)

This manual establishes uniform policies and procedures to carry out highway design functions for the California Department of Transportation. The 2012 edition incorporated Complete Streets focused revisions to address the Department Directive 64 R-1.

Under existing California law, all local agencies responsible for the development or operation of bikeways or roadways where bicycle travel is permitted must utilize Caltrans adopted design criteria and specifications as contained in the HDM and MUTCD. For bikeways that do not meet these standards, cities and counties can apply for a design exception from Caltrans. However, according to the Legislative Analyst's review during passage of Assembly Bill 1193 in 2014, "local governments complain that the process is cumbersome and time-consuming. In contrast, cities and counties may, but are not required to, utilize the HDM when designing local streets and roads." AB 1193 allows local governments to adopt alternative national criteria, such as AASHTO's or NACTO's.

Complete Intersections: A Guide to Reconstructing Intersections and Interchanges for Bicyclists and Pedestrians (2010)

This California Department of Transportation reference guide presents information and concepts related to improving conditions for bicyclists and pedestrians at major intersections and interchanges. The guide can be used to inform minor signage and striping changes to intersections, as well as major changes and designs for new intersections.

Main Streets: Flexibility in Design & Operations (2013)
This Caltrans booklet is an informational guide that reflects many of the recent updates to the Caltrans manuals and policies that improve multimodal access, livability and sustainability within the transportation system. The document will help users locate information about standards and procedures descried in the Caltrans Highway Design Manual (HDM), the California Manual on Uniform Traffic Control Devices (California MUTCD) and the Project Development Procedures Manual (PDPM) www.dot.ca.gov/hq/LandArch/mainstreet/main_street_3rd_edition.pdf

NCHRP Legal Digest 53: Liability Aspects of Bikeways (2010)
This digest is a useful resource for city staff considering innovative engineering solutions to localized issues. The document addresses the liability of public entities for bicycle collisions on bikeways as well as on streets and highways. The report will be useful to attorneys, transportation officials, planners, maintenance engineers and all persons interested in the relative rights and responsibilities of motorists and bicyclists on shared roadways.

New Legislation Allowing Safety Standards Other Than Caltrans' HDM: AB 1193
AB 1193, signed into law on September 22, 2014, allows local agencies to adopt, by resolution, safety standards for bikeways other than Caltrans' Highway Design Manual. According to the Legislative Analyst, AB 1193 "allows local governments to deviate from state criteria when designing bikeways, but does not give them complete control. Cities and counties that elect to use design criteria not contained within the HDM would have to ensure that the alternative criteria have been reviewed and approved by a qualified engineer, are adopted by resolution at a public meeting, and adhere to guidelines established by a national association of public agency transportation officials, such as the National Association of City Transportation Officials." The bill also expands the definition of bikeways to include cycle tracks or separated bikeways, also referred to as "Class IV bikeways," which promote active transportation and provide a right-of-way designated exclusively for bicycle travel adjacent to a roadway and which are protected from vehicular traffic. Types of separation include, but are not limited to, grade separation, flexible posts, inflexible physical barriers, or on-street parking.

5.1.3 Bicycle Facility Standards Compliance

Some of these bicycle facilities covered by these guidelines are not directly referenced in the current versions of the California Highway Design Manual or the California MUTCD, although many of the elements of these treatments are found within these documents. An "X" marking in Table 5.1 below identifies the inclusion of a particular treatment within the national and state design guides. A "-" marking indicates a treatment may not be specifically mentioned, but is compliant assuming MUTCD compliant signs and markings are used.

In all cases, engineering judgment is recommended to ensure that the application makes sense for the context of each treatment, given the many complexities of urban streets.

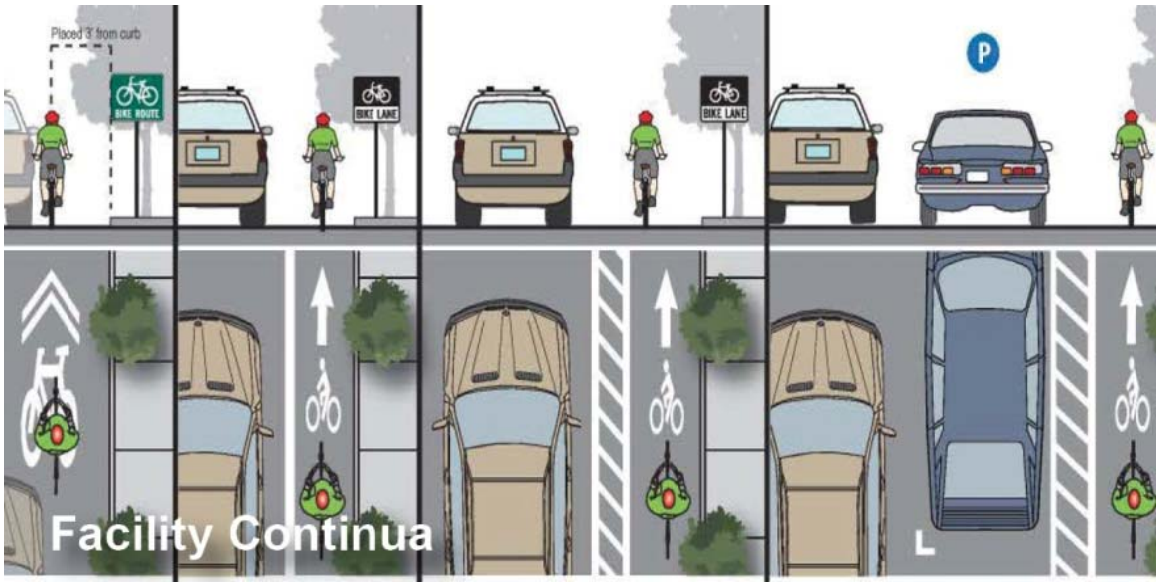
Table 5.1: National and State Design Guides

	Caltrans	Caltrans	NACTO
	CA MUTCD (2014)	Highway Design Manual (2014)	Urban Bikeway Design Guide (2014)
Signed Shared Roadway	X		
Marked Shared Roadway	X		X
Bicycle Boulevard	-		X
Bicycle Lane	X	X	X
Buffered Bicycle Lane	X	-	X
Cycle Tracks		Same as Class I	X
Bike Box	Experimental		X
Bike Lanes to the left of Right Turn Only Lanes	X		X
Green-Colored Bike Lanes in Conflict Areas	FHWA Interim Approval (IA-14)		X
Combined Bike Lane/Turn Lane	Disallowed		X
Two-Stage Turn Queue Boxes	At T-intersections		X
Intersection Crossing Markings	X		X
Wayfinding Sign Types & Placement	X		X
Wayfinding Sign Placement	X		X
Bicycle Signal Heads	X		X
Active Warning Beacons	X		X
Pedestrian Hybrid Beacons	X		X

5.2 Bicycle Facility Selection

There are no 'hard and fast' rules for determining the most appropriate type of bicycle facility for a particular location – roadway speeds, volumes, right-of-way width, presence of parking, adjacent land uses, and expected bicycle user types are all critical elements of this decision. Studies find that the most significant factors influencing bicycle use are motor vehicle traffic volumes and speeds. Additionally, most bicyclists prefer facilities separated from motor vehicle traffic or located on local roads with low motor vehicle traffic speeds and volumes. Because off-street pathways are physically separated from the roadway, they are perceived as safe and attractive routes for bicyclists who prefer to avoid motor vehicle traffic. Consistent use of treatments and application of bikeway facilities allow users to anticipate whether they would feel comfortable riding on a particular facility, and plan their trips accordingly. This section provides guidance on various factors that affect the type of facilities that should be provided.


Facility Classification


Placed 3' from curb
BIKE ROUTE
BIKE LANE
BIKE LANE
P
Facility Continua

5.2.1 Facility Classification

Description

Consistent with bicycle facility classifications throughout the nation, these Bicycle Facility Design Guidelines identify the following classes of facilities by degree of separation from motor vehicle traffic.

Shared Roadways (No bikeway designation) are bikeways where bicyclists and cars operate within the same travel lane, either side by side or in single file depending on roadway configuration. In some instances, streets may be fully adequate and safe without bicycle specific signing and pavement markings.

Class III Bikeways (Bike Routes) are Shared Roadways configured with pavement markings, signage and other treatments including directional signage, traffic diverters, chicanes, chokers and /or other traffic calming devices to reduce vehicle speeds or volumes. Such enhanced treatments often are associated with Bicycle Boulevards.

Class II Bikeways (Bike Lanes) use signage and striping to delineate the right-of-way assigned to bicyclists and motorists. Bike lanes encourage predictable movements by both bicyclists and motorists.

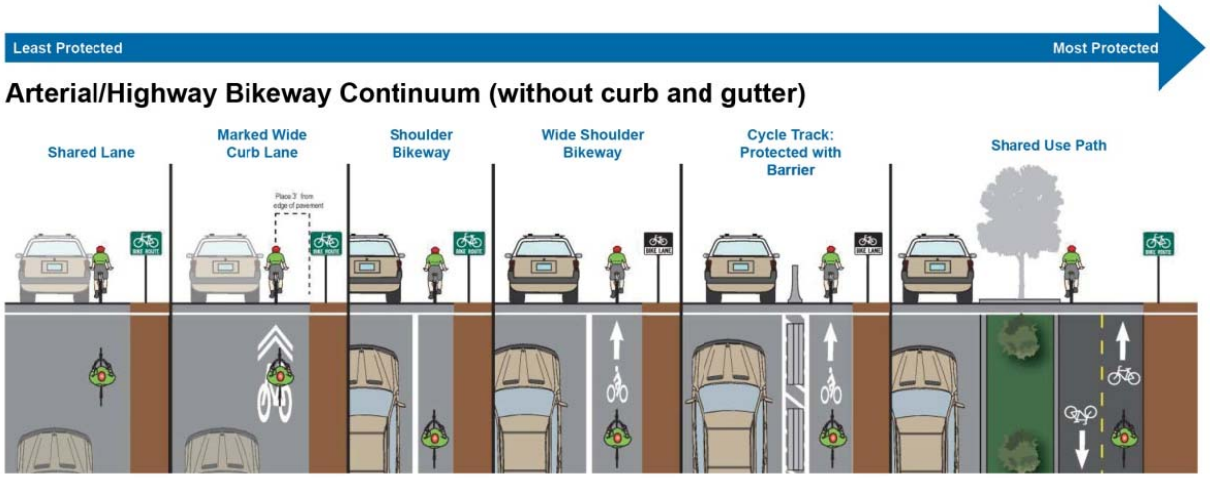
Class IV Bikeways (Cycle Tracks) are exclusive bike facilities that combine the user experience of a separated path with the on-street infrastructure of conventional bike lanes.

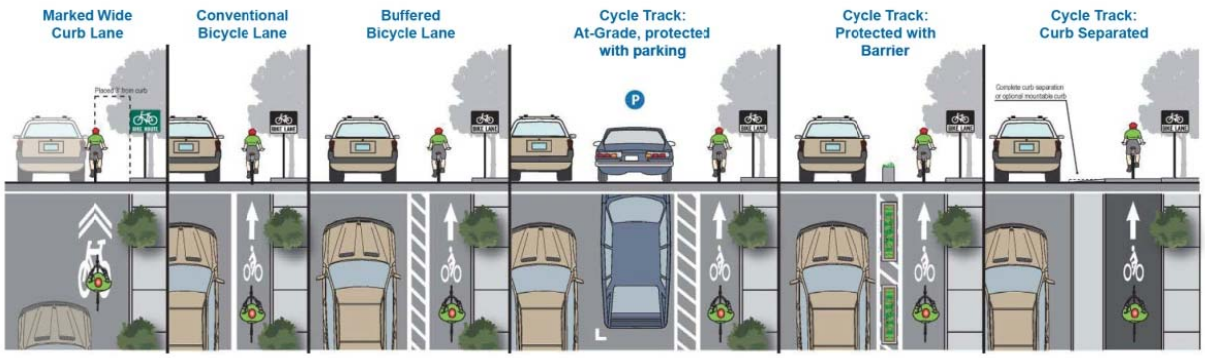
Class I Bikeways (Bike Paths) are facilities separated from roadways for use by bicyclists and pedestrians.

5.2.2 Facility Continua

The following continua illustrate the range of bicycle facilities applicable to various roadway environments, based on the roadway type and desired degree of separation. Engineering judgment, traffic studies, previous municipal planning efforts, community input and local context should be used to refine criteria when developing bicycle facility recommendations for a particular street. In some

corridors, it may be desirable to construct facilities to a higher level of treatment than those recommended in relevant planning documents in order to enhance user safety and comfort. In other cases, existing and/or future motor vehicle speeds and volumes may not justify the recommended level of separation, and a less intensive treatment may be acceptable.





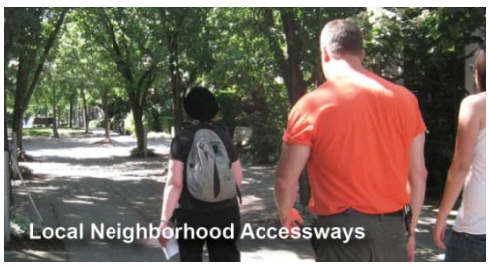
5.3 Shared-use Paths

A shared-use path allows for two-way, off-street use for pedestrians, skaters, wheelchair users, joggers and other non-motorized users, as well as for bicyclists. These facilities are frequently found in parks, along rivers, beaches, and in greenbelts or utility corridors where there are few conflicts with motorized vehicles. Path facilities can also include amenities such as lighting, signage, and fencing (where appropriate).

Throughout the United States outside of California, the terms "shared-use path" and "Class I bike path" are used interchangeably. However, California law requires all bikeways, i.e., "all facilities that provide primarily for, and promote, bicycle travel", to conform to the Caltrans Highway Design Manual, even bikeways that are not under Caltrans' jurisdiction. For this reason, paths that fall short of the HDM's requirements for Class I pavement widths, shoulders, vertical clearance, and separation from the edge of travel way of a parallel street are often labeled "shared-use paths", removing the implication that the path is primarily for bicyclists.

Key features of shared-use paths include:

- Frequent access points from the local road network.
- Directional signs to direct users to and from the path.
- A limited number of at-grade crossings with streets or driveways.
- Terminating the path where it is easily accessible to and from the street system.
- Separate treads for pedestrians and bicyclists when heavy use is expected.



5.3.1 General Design Practices

Description

Shared-use paths can provide a desirable facility, particularly for recreation, and users of all skill levels preferring separation from traffic. Bicycle paths should generally provide directional travel opportunities not provided by existing roadways.

Guidance

Width

- 9 feet is the minimum allowed by the HDM for a one-way Class I bicycle path consisting of a 5-foot paved width with 2-foot shoulders on each side.
- 12 feet is the minimum allowed by the HDM for a two-way Class I bicycle path consisting of two 4-foot lanes and 2-foot shoulders on each side. On structures, the clear width of a Class I path between railings shall be not less than 10 feet.

Lateral Clearance

- The minimum separation between the edge of pavement of a one-way or a two-way bicycle path and the edge of travel way of a parallel road or street shall be 5 feet plus the standard shoulder width. Prior to 2012, the Highway Design Manual allowed narrower separation if a physical barrier is included. Since 2012, however, a physical barrier would not result in a reduced separation.

Overhead Clearance

- The minimum vertical clearance allowed by the HDM to obstructions across the width of a bike path is 8 feet, and 7 feet over shoulder.

Striping

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

Materials and Maintenance
Asphalt is the most common surface for bicycle paths. The use of concrete for paths has proven to be more durable over the long term.

Existing Locations

- Avenida Pico, San Clemente (see photo on previous page)
- Avenida Vista Hermosa in San Clemente
- Aliso Creek Bike Path in Laguna Hills

Potential Locations

- Trabuco Creek in Rancho Santa Margarita
- Service road in Aliso and Wood Canyons Wilderness Park, Orange County
- Avenida California in San Juan Capistrano

5.3.2 Paths in River and Utility Corridors

Description
Utility and waterway corridors often offer excellent shared-use path development and bikeway gap closure opportunities. Utility corridors typically include power line and sewer corridors, while waterway corridors include canals, drainage ditches, rivers, and beaches. These corridors offer excellent transportation and recreation opportunities for bicyclists of all ages and skills.

Guidance
Shared-use paths in utility corridors should meet or exceed general design practices, and must conform to the Caltrans Highway Design Manual if designated as a Class I bike path.

Access Points
Any access point to the path should be well-defined with appropriate signage designating the pathway as a shared-use path or bicycle facility and prohibiting motor vehicles.

Path Closure
Public access to the path may be prohibited during the following events:

- Canal/flood control channel or other utility maintenance activities
- Inclement weather or the prediction of storm conditions

5.3.3 Paths in Abandoned Rail Corridors

Description

Commonly referred to as Rails-to-Trails or Rail-Trails, these projects convert vacated rail corridors into off-street paths. Rail corridors offer several advantages, including relatively direct routes between major destinations and generally flat terrain.

Guidance

Shared-use paths in abandoned rail corridors should meet or exceed general design practices. If additional width allows, wider paths and landscaping are desirable.

In full conversions of abandoned rail corridors, the sub-base, superstructure, drainage, bridges, and crossings are already established. Design becomes a matter of working with the existing infrastructure to meet the needs of a rail-trail.

Discussion

It is often impractical and costly to add material to existing railroad bed fill slopes. This results in trails that meet minimum path widths, but often lack preferred shoulder and lateral clearance widths.

Additional References and Guidelines

- *AASHTO. Guide for the Development of Bicycle Facilities. 2012.*
- *California MUTCD. 2014.*
- *Flink, C. Greenways. 1993.*

Materials and Maintenance

For paths that are susceptible to flooding or ponding, permeable pavement is an option to reduce water collection.

Existing Locations

- San Juan Creek Trail, San Juan Capistrano (see photo on previous page)

Potential Locations

- TBD

5.3.4 Paths in Active Rail Corridors

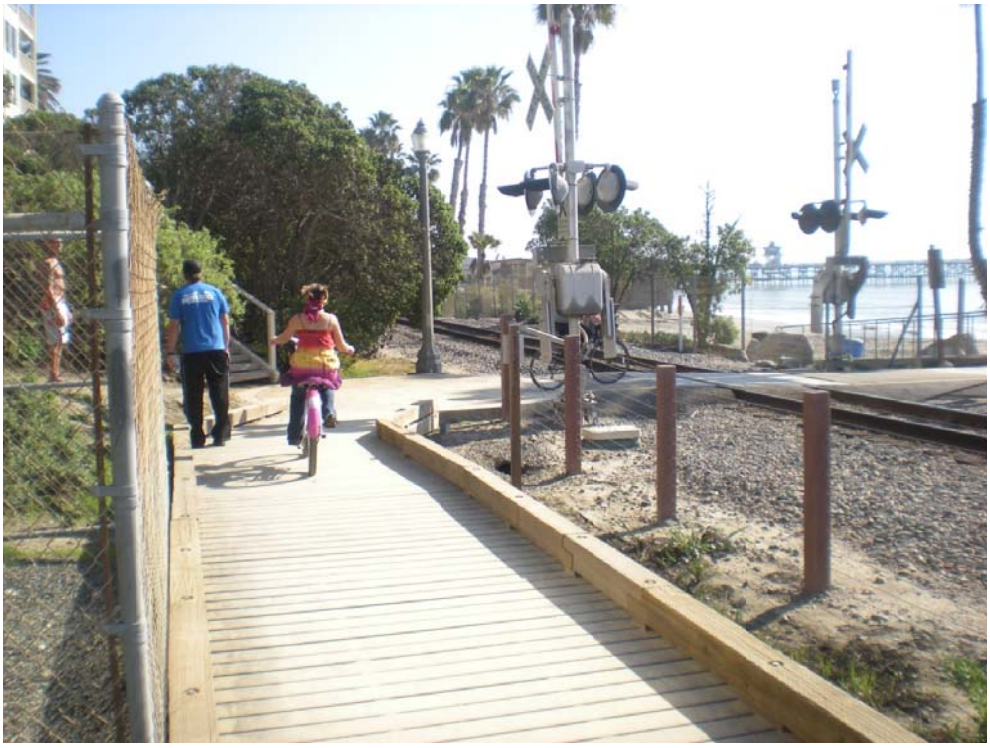
Description

Rails-with-Trails projects typically consist of paths adjacent to active railroads. It should be noted that some constraints could impact the feasibility of rail-with-trail projects. In some cases, space needs to be preserved for future planned freight, transit or commuter rail service. In other cases, limited right-of-way width, inadequate setbacks, concerns about safety and trespassing, and numerous mid-block crossings may affect a project's feasibility.

Guidance

If required, fencing should be a minimum of 5 feet in height with higher fencing than usual next to sensitive areas such as switching yards. Setbacks from the active rail line will vary depending on the speed and frequency of trains, and available right-of-way. Furthermore, the railroad operators have their own design criteria regarding separation from bikeways.

Metrolink's SCRRA Rail-with-Trail Design Guidelines provide recommended minimum setbacks from the centerline of the nearest track. For example, the setback should be 40 feet where the main line railroad speed is between 90 mph and 79 mph. Where these setbacks cannot be met, "additional barriers, vertical separation or other methods shall be employed."



Discussion

Railroads typically require fencing with all rail-with-trail projects. Concerns with trespassing and security can vary with the amount of train traffic on the adjacent rail line and the setting of the bicycle path, i.e. whether the section of track is in an urban or rural setting.

Additional References and Guidelines

- *AASHTO. Guide for the Development of Bicycle Facilities. 2012.*
- *California MUTCD. 2014.*
- *FHWA. Rails-with-Trails: Lessons Learned. 2002.*
- *Metrolink SCRRA Rails-with-Trails Design Guidelines, 2010*

Materials and Maintenance

For paths that are susceptible to flooding or ponding, permeable pavement is an option to reduce water collection.

Existing Locations

- San Clemente Beach Trail (see photo above)
- Aliso Creek Bike Path, Lake Forest

Potential Locations

- LOSSAN Corridor in Mission Viejo, Laguna Niguel, and Lake Forest

5.3.5 Local Neighborhood Accessways

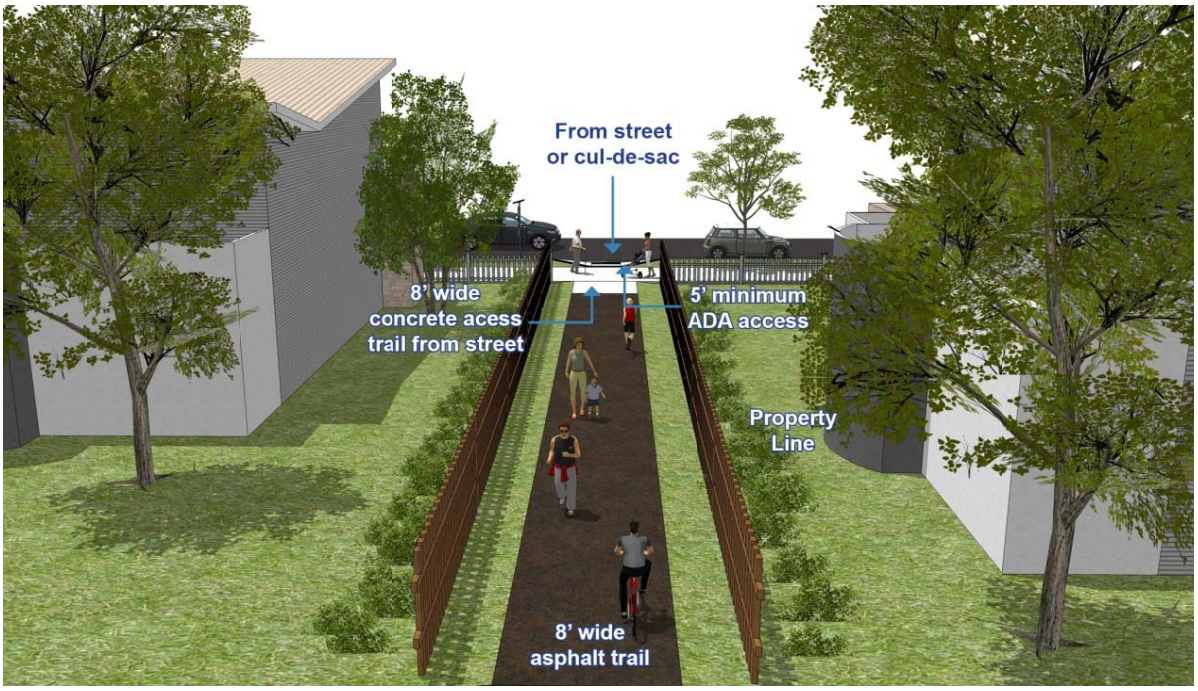
Description

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

Additionally, these smaller trails can be used to provide bicycle and pedestrian connections between dead-end streets, cul-de-sacs, and access to nearby destinations not provided by the street network.

Guidance

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



Discussion

Neighborhood access should be designed into new subdivisions at every opportunity and should be required by City/County subdivision regulations.

Additional References and Guidelines

- *AASHTO. Guide for the Development of Bicycle Facilities. 2012.*

Materials and Maintenance

For paths that are susceptible to flooding or ponding, permeable pavement is an option to reduce water collection.

Existing Locations

- Horno Creek Road to Marbella Vista Road, San Juan Capistrano (see photo above)
- Aliso Creek Bike Path at Clarington Dr., Laguna Hills

Potential Locations

- Cul-de-sac connections
- Neighborhood easements

5.4 Path/Roadway Crossing

At-grade roadway crossings can create potential conflicts between path users and motorists; however, well-designed crossings can mitigate many operational issues and provide a higher degree of safety and comfort for path users. This is evidenced by the thousands of successful facilities around the United States with at-grade crossings. In most cases, at-grade path crossings can be properly designed to provide a reasonable degree of safety and can meet existing traffic and safety standards. Path facilities that cater to bicyclists can require additional considerations due to the higher travel speed of bicyclists versus pedestrians.


Marked/Unsignalized Crossings


Signalized Crossings


Overcrossings

5.4.1 Marked/Unsignalized Crossings

Description

A marked/unsignalized crossing typically consists of a marked crossing area, signage, and other markings to slow or stop traffic. The approach to designing crossings at mid-block locations depends on an evaluation of vehicular traffic, line of sight, pathway traffic, use patterns, vehicle speed, road type, road width, and other safety issues such as proximity to major attractions.

When space is available, using a median refuge island can improve user safety by providing pedestrians and bicyclists space to perform the safe crossing of one side of the street at a time.

Guidance

Maximum traffic volumes

- < 9,000-12,000 Average Daily Traffic (ADT) volume
- Up to 15,000 ADT on two-lane roads, preferably with a median
- Up to 12,000 ADT on four-lane roads with median

Maximum travel speed: 35 MPH

Minimum line of sight

- 25 MPH zone: 155 feet
- 35 MPH zone: 250 feet
- 45 MPH zone: 360 feet

Discussion

Unsignalized crossings of multi-lane arterials over 15,000 ADT may be possible with features such as sufficient crossing gaps (more than 60 per hour), median refuges, and/or active warning devices like rectangular rapid flash beacons.

Additional References and Guidelines

- *AASHTO. Guide for the Development of Bicycle Facilities. 2012*
- *California MUTCD. 2014*

Existing Location for Potential Improvement

- Shady Canyon Drive, Irvine (see photo above)
- Aliso Creek Bike Path at Los Alisos Blvd, Lake Forest
- Pacific Coast Highway Connector at Coast Hwy, Dana Point

5.4.2 Signalized Crossings

Description

Path crossings within approximately 400 feet of an existing signalized intersection with pedestrian crosswalks are typically diverted to the signalized intersection to avoid traffic operation problems when located so close to an existing signal. For this restriction to be effective, barriers and signing may be needed to direct path users to the signalized crossing. If no pedestrian crossing exists at the signal, modifications should be made.

Guidance

Path crossings should not be provided within approximately 400 feet of an existing signalized intersection. If possible, route path directly to the signal.

Discussion

In the US, the minimum distance a marked crossing can be from an existing signalized intersection varies from approximately 250 to 660 feet. Engineering judgment and the context of the location should be taken into account when choosing the appropriate allowable setback.

Additional References and Guidelines

- *AASHTO. Guide for the Development of Bicycle Facilities. 2012*
- *AASHTO. Guide for the Planning, Design, and Operation of Pedestrian Facilities. 2004*

Materials and Maintenance

If a sidewalk is used for crossing access, it should meet ADA guidelines.

Existing Locations

- Laguna Hills Drive at Paseo de Valencia, Laguna Hills (see photo above)
- Aliso Creek Bike Path at Alicia Pkwy, Laguna Hills
- Trabuco Side Path at Trabuco Rd and El Toro Rd, Lake Forest

Potential Locations

- Avenida Empresa at Santa Margarita Pkwy, Rancho Santa Margarita
- Salt Creek Bike Path at Ritz Carlton Dr. and Pacific Coast Hwy, Dana Point

5.4.3 Overcrossings

Description

Bicycle/pedestrian overcrossings provide critical non-motorized system links by joining areas separated by barriers such as deep canyons, waterways or major transportation corridors. In most cases, these structures are built in response to user demand for safe crossings where they previously did not exist. Grade-separated crossings may be needed where existing bicycle/pedestrian crossings do not exist, where ADT exceeds 25,000 vehicles, and where 85th percentile speeds exceed 45 miles per hour.

Guidance

- 10-foot minimum width between railings, 14 feet preferred. If overcrossing has any scenic vistas additional width should be provided to allow for stopping. A separate 5-foot pedestrian area may be provided for facilities with high bicycle and pedestrian use.
- 10-foot headroom on overcrossing
- Vertical clearance below will vary depending on feature being crossed:
  - ✓ Roadway: 17 feet
  - ✓ Freeway: 18.5 feet
  - ✓ Heavy Rail Line: 23 feet

Discussion

Overcrossings for bicycles and pedestrians typically fall under the Americans with Disabilities Act (ADA), which strictly limits ramp slopes of 8.33% (1:12) with 5-foot landings every 30 feet. Title 24 of the California Code of Regulations requires gradients up to 5% (1:20) to have 5-foot landings at 400-foot intervals.

Additional References and Guidelines

- *AASHTO. Guide for the Development of Bicycle Facilities. 2012.*
- *AASHTO. Guide for the Planning, Design, and Operation of Pedestrian Facilities. 2004.*

Materials and Maintenance

Potential issues with vandalism

Existing Locations

San Juan Creek Bicycle-Pedestrian Bridge, San Juan Capistrano (see photo on previous page)
Bicycle-Pedestrian Bridge over I-5, San Clemente (see photo above)
Pedestrian Overpass at Paseo De Cristobal and Esplanade, San Clemente

Possible Locations

San Juan Creek near Trabuco Creek confluence in San Juan Capistrano

5.5 Separated Bikeways

Designated exclusively for bicycle travel, separated bikeways are segregated from vehicle travel lanes by striping (Class II), or physical measures such as parking, bollards, raised islands, or curbs (Class IV Cycle Tracks). Separated bikeways are most appropriate on arterial and collector streets where higher traffic volumes and speeds warrant greater separation.

5.5.1 Bicycle Lane

Description

This facility provides an exclusive lane for one-way bicycle travel on a street or highway, installed along streets in corridors where there is significant bicycle demand, and where there are distinct needs that can be served by them. On streets with on-street parking, bicycle lanes are located between the parking area and the traffic lanes and used in the same direction as motor vehicle traffic.


Bicycle Lane


Bicycle Lanes and Diagonal Parking

Many bicyclists, particularly less experienced riders, are more comfortable riding on a busy street if it has a striped and signed bikeway than if they are expected to share a lane with vehicles.

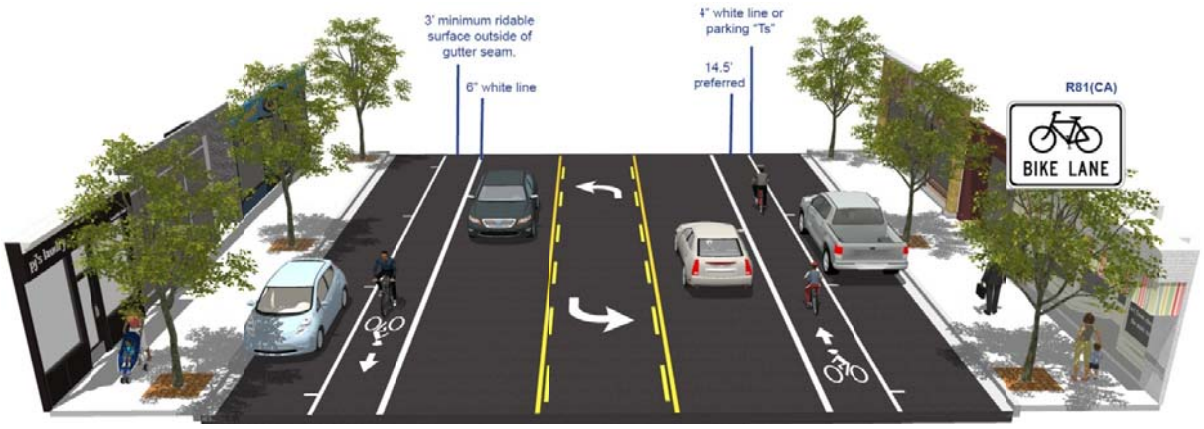
Guidance

Provide 5-foot minimum width for bicycle lanes located between parking and traffic lanes. Six feet is desired.


Buffered Bicycle Lanes

- Provide 4-foot minimum width if no gutter exists. With a normal 2-foot gutter, minimum bicycle lane width is five feet.
- 14.5-foot preferred from curb face to edge of bike lane. (12-foot minimum).
- 7-foot maximum width for use adjacent to arterials with high travel speeds. Greater widths may encourage motor vehicle use of bike lane.
- When approaching an intersection with right turn only lanes, the bike lane should be transitioned to a through bike lane to the left of the right turn only lane.


Cycle Tracks



Discussion

Wider bicycle lanes are desirable in certain situations such as on higher speed arterials (45 mph+) where use of a wider bicycle lane would increase separation between passing vehicles and bicyclists. Consider Buffered Bicycle Lanes when further separation is desired.

Additional References and Guidelines

- AASHTO Guide for the Development of Bicycle Facilities, 2012
- California MUTCD, 2014
- NACTO Urban Bikeway Design Guide, 2012
- Caltrans California HDM, 2012

Materials and Maintenance

Paint can wear more quickly in high traffic areas.

Existing Locations

- Oso Pkwy, Aliso Viejo
- Niguel Rd, Laguna Niguel

Potential Locations

- Golden Lantern Street, Dana Point (see photo above)
- Crown Valley Pkwy, Dana Point

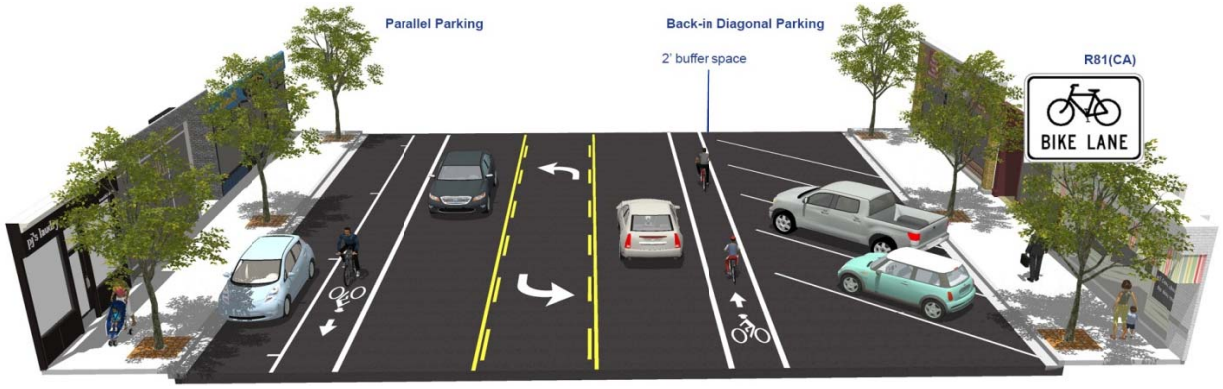
5.5.2 Bicycle Lanes and Diagonal Parking

Description

The back-in/head-out parking is considered safer than conventional head-in/back-out parking due to better visibility when leaving. This is particularly important on busy streets or where vehicle drivers may find their views blocked by large vehicles or tinted windows in adjacent vehicles. The presence of raised median islands helps prevent motorists from using a back-in stall for head-in parking

Guidance

Based on existing dimensions from test sites and permanent facilities, provide 16 feet from curb edge to inner bicycle lane stripe and a five foot bicycle lane.



Discussion

Test the facility on streets with existing head-in angled parking and moderate to high bicycle traffic. Additional signs to direct vehicle driver in how the back-in angled parking works is recommended.

Additional References and Guidelines

- City of Los Angeles Bicycle Plan Update, City of Los Angeles

Existing Locations

- None

Potential Locations

- TBD

5.5.3 Buffered Bicycle Lane

Description

Buffered Bike Lanes as defined in the Urban Bikeway Design Guide are "conventional bike lanes paired with a buffered space separating the bike lane from the adjacent motor vehicle travel lane and/or parking lane." Buffered bike lanes are allowed as per California 2014 MUTCD guidelines for buffered preferential lanes (section 3D-01).

Conventional bike lanes typically provide a 5 to 6-foot wide space between the curb and travel lane. However, many bicyclists are uncomfortable riding this close to moving traffic particularly on higher speed and/or higher volume roadways. A recent study from Portland State titled "Evaluation of innovative bicycle facilities," shows that bicyclists feel a lower risk of being "doored" in a buffered bike lane and nearly nine in ten bicyclists prefer buffered lanes to standard lanes. Seven in ten bicyclists indicated they would go out of their way to ride on a buffered bike lane over a standard lane.

The NACTO Urban Bikeway Design guides list several advantages of buffered lanes including:

- Providing a "shy" distance between motor vehicles and bicyclists.
- Providing space for bicyclists to pass another bicyclist without encroaching into the adjacent motor vehicle travel lane.
- Encouraging bicyclists to ride outside of the door zone when buffer is between parked cars and the bike lane.
- Providing a greater space for bicycling without making the bike lane appear so wide that it might be mistake for a travel lane or a parking lane.
- Appealing to a wider cross-section of bicyclist users.
- And encouraging bicycling by contributing to the perception of safety among users of the bicycle network.

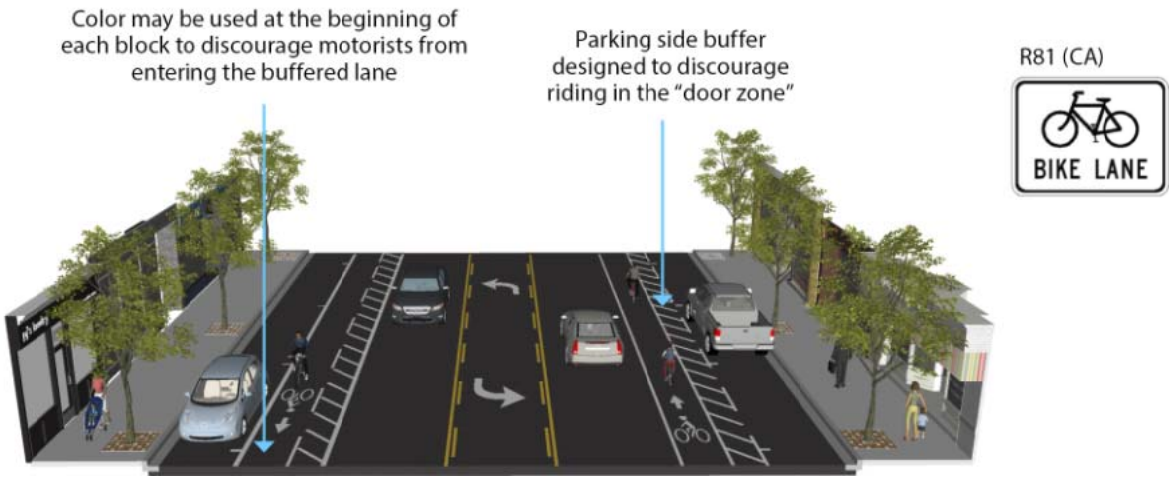
There are three types of buffers:

1. Parking side or curb buffer
2. Travel lane side buffer
3. Combined side or double buffer

Parking side or curb buffer:

Parking or curb side buffers provide space between the bicyclist and parked cars or the gutter pan. This (1) reduces the potential for a bicyclist to strike a car door being opened by a driver, (2) eliminates use of the gutter pan as part of the bike lane, and (3) moves the bicyclist out of the blind spots of motorists approaching on side streets or driveways.

The limitation to the parking side or curb side buffer is that they do not provide the "shy space" that makes bicyclists feel more comfortable, but they do reduce the risk of dooring and the use of the gutter pan as part of the bike lane.



Travel side (left) and parking side (right) buffers

Travel side buffer:

Travel side buffers provide space between the bicyclist and motor vehicles in the travel lane. High speed, high volume roadways make many bicyclists uncomfortable. Recent studies from the Portland State have shown that a simple buffer substantially increases the level of comfort for most bicyclists. The example below shows side travel side buffer on PCH in Dana Point.

Combined side or double sided buffer:

The combined side or double sided buffer offers advantage of guiding the bicyclists away from the door zone while providing a perceived safer distance between the bicyclist and motor vehicles.

Guidance

According to California MUTCD 2014 - Section 3D Buffered bike lanes are considered "allowable" treatments. Signage and dimensional guidelines are the same as for Class 2 bicycle lanes. Additional guidance is included in the NACTO Urban Bikeway Design Guide.

- Bike lane word and/or symbol shall be used (MUTCD Figure 9C-3).
- The buffer shall have interior diagonal cross hatching or chevron markings if it is 3 feet in with or wider.
- The buffer shall be marked with 2 white lines. The California MUTCD 2104 standards (Section 3D.01) are such that for a bicyclist to be allowed to cross a double white line it must be dashed (these are the same standards applied to buffered HOV Lanes). Thus it is recommended that that the inside line be dashed instead of solid.
- Buffers should be at least 24inches wide.

Discussion

- Add diagonal striping on the outer buffer adjacent to the traffic lanes.
- On-street parking remains adjacent to the curb.
- A travel lane may need to be eliminated or narrowed to accommodate buffers.

Additional References and Guidelines

- NACTO Urban Bikeway Design Guide, 2014
- Portland State University, Center for Transportation Studies (2011) Evaluation of innovative bicycle facilities.
- California MUTCD 2014 Edition

Materials and Maintenance

Paint can wear more quickly in high traffic areas.

Existing Locations

- Pacific Coast Highway, Dana Point

Potential Locations

- Pacific Coast Hwy, Laguna Beach (see photo on previous page)
- Antonio Parkway, Ladera Ranch & Rancho Santa Margarita

5.5.4 Cycle Track or Class IV Bike Facilities

Description

Cycle tracks, which were recently designated as Class IV facilities in California, are an exclusive bike facility that combines the user experience of a separated path with the on-street infrastructure of a conventional bike lane. A cycle track is physically separated from motor traffic and distinct from the sidewalk. These differ from buffered lanes in that the bicyclist is separated from the travel lanes by a physical barrier.

Class IV: Cycle Track

Cycle tracks have different forms but all share common elements they provide space that is intended to be exclusively or primarily used by bicycles, and are separated from motor vehicle travel lanes, parking lanes, and sidewalks. Raised cycle tracks may be at the level of the adjacent sidewalk or set at an intermediate level between the roadway and sidewalk to separate the cycle track from the pedestrian area.

Over the past five years more than 100 new separated bike facilities have been added in the US. This relatively new type of facility has been shown to be effective in increasing the number of bicyclists using the street, increasing safety for bicyclists, pedestrians and motorists and increasing access to local businesses (Lessons from the Green Lanes: Evaluating Protected Bike Lanes in the US, National Institute for Transportation and Communities, 2014).

Separated bikeways can increase safety and promote proper riding by:

- Defining road space for bicyclists and motorists, reducing the possibility that motorists will stray into the bicyclists' path.
- Discouraging bicyclists from riding on the sidewalk.

Guidance

Cycle tracks should ideally be placed along streets with long blocks and few driveways or mid-block access points for motor vehicles.

One-Way Cycle Tracks

- NACTO Guidelines recommend a 7-foot minimum to allow passing. 5-foot minimum width in constrained locations. Note: In accordance with AB 1193, signed in 2014, the local agency

must pass a resolution to adopt NACTO Guidelines in lieu of the Caltrans Highway Design Manual if the one-way cycle track width is less than 9 feet.

- One way cycle tracks can be either conventional flow (i.e., go the same direction as the adjacent traffic) or contra-flow (opposite direction of adjacent traffic flow, such as to the left side of traffic on a one-way street).

Two-Way Cycle Tracks

- Cycle tracks located on one-way streets have fewer potential conflict areas than those on two-way streets.
- 12-foot recommended minimum for two-way facility. 8-foot minimum in constrained locations. Note: In accordance with AB 1193, signed in 2014, the local agency must pass a resolution to adopt NACTO Guidelines in lieu of the Caltrans Highway Design Manual if the two-way cycle track width is less than 12 feet.

Discussion

Special consideration should be given at transit stops to manage bicycle and pedestrian interactions. Driveways and minor street crossings are unique challenges to cycle track design. Parking should be prohibited within 30 feet of the intersection to improve visibility.

Additional References and Guidelines

- NACTO. Urban Bikeway Design Guide. 2014.
- Lessons from the Green Lanes: Evaluating Protected Bike Lanes in the US, National Institute for Transportation and Communities, 2014

Materials and Maintenance

Depending upon the width, barrier-separated and raised cycle tracks may require smaller equipment for sweeping.

Existing Locations

- PCH in Dana Point just north of San Clemente

Potential Locations

- El Camino Real, San Clemente


Bike Lanes and Right Turn Only Lanes


Colored Bike Lanes in Conflict Areas


Combined Bike Lane/Turn Lane


Intersection Crossing Markings


Bike Lanes at High Speed Interchanges


Bike Boxes

5.6 Separated Bikeways at Intersections

Designs for intersections with bicycle facilities should reduce conflict between bicyclists (and other vulnerable road users) and vehicles by heightening the level of visibility, denoting clear right-of-way, and facilitating eye contact and awareness with other modes.

Intersection treatments can improve both queuing and merging maneuvers for bicyclists, and are often coordinated with timed or specialized signals. The configuration of a safe intersection for bicyclists may include elements such as color, signage, medians, signal detection, and pavement markings. Intersection design should take into consideration existing and anticipated bicyclist, pedestrian, and motorist movements. The degree of mixing or separation between bicyclists and other modes is intended to reduce the risk of crashes and increase bicyclist comfort. The level of treatment required for bicyclists at an intersection will depend on the bicycle facility type used, whether bicycle facilities are intersecting, and the adjacent street function and land use.

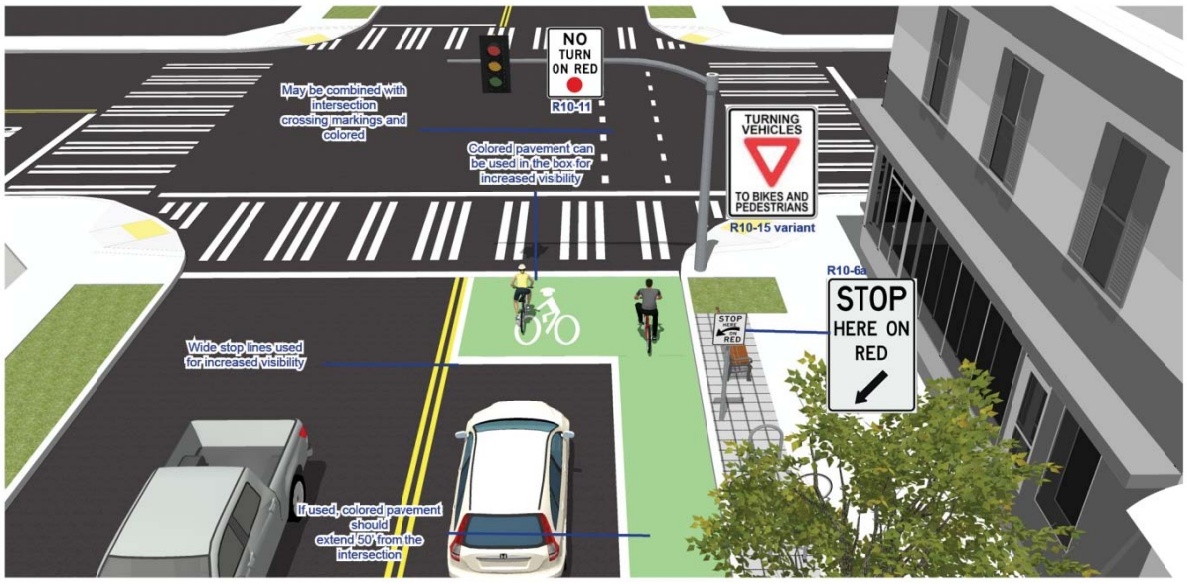
5.6.1 Bike Box

Description

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

Guidance

- 14' minimum depth
- A "No Turn on Red" (MUTCD R10-11) sign shall be installed to prevent vehicles from entering the Bike Box.
- A "Stop Here on Red" sign should be post mounted at the stop line to reinforce observance of the stop line.
- A "Yield to Bikes" sign should be post-mounted in advance of and in conjunction with an egress lane to reinforce that bicyclists have the right-of-way going through the intersection.
- An ingress lane should be used to provide access to the box.
- A supplemental "Wait Here" legend can be provided in advance of the stop bar to increase clarity to motorists.
- Requires permission to experiment from the Federal Highways Administration.



Discussion

Bike boxes should be placed only at signalized intersections. Bike boxes should be used in locations that have a large volume of bicyclists and are best utilized in central areas where traffic is usually moving more slowly.

Additional References and Guidelines

- NACTO. Urban Bikeway Design Guide. 2014
- FHWA. Interim Approval (IA-14). 2011

Materials and Maintenance

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

Existing Locations

- None

Potential Locations

- TBD

5.6.2 Bike Lanes at Right Turn Only Lanes

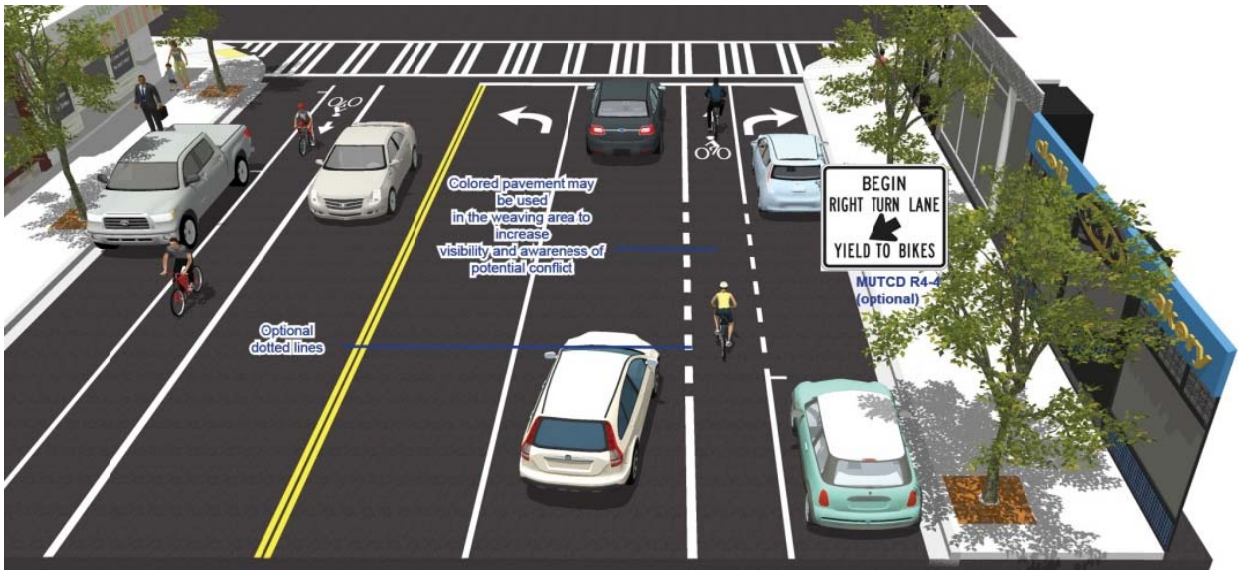
Description

Class II bike lanes may be placed between the right-turn lane and the right-most through lane. Bicyclists would access the bike lane pocket through a weave zone, with signage or pavement markings indicating that motorists should yield to bicyclists through the conflict area.

Guidance

At right turn only lanes:

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



Additional References and Guidelines

- AASHTO. Guide for the Development of Bicycle Facilities. 2012.
- California MUTCD. 2014.
- NACTO. Urban Bikeway Design Guide. 2014.
- Caltrans. California HDM. 2012.
- Caltrans. Complete Intersections. 2010.

Materials and Maintenance

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

Existing Locations

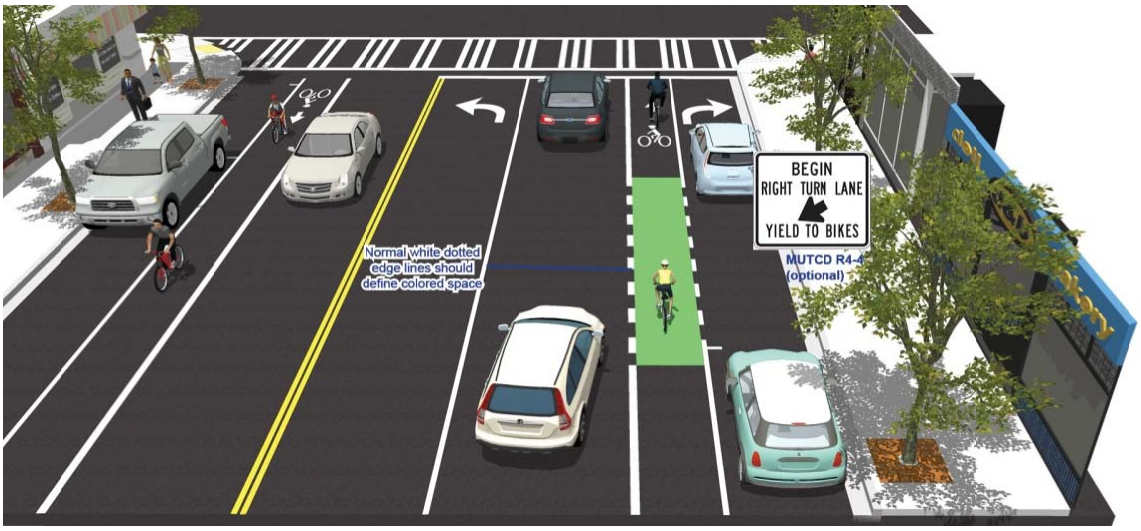
- Pacific Coast Highway at Camino Capistrano, San Clemente (see photo on previous page)
- Pacific Coast Hwy at Crown Valley Pkwy, Dana Point

5.6.3 Colored Bike Lanes in Conflict Areas

Description

The Federal Highway Administration (FHWA) has granted the State of California approval for optional use of green colored pavement in marked bicycle lanes and in extensions of bicycle lanes through intersections and other traffic conflict areas. It should be noted that the green colored pavement as

described under this approval is used for two different situations: first, to denote a lane that is exclusively used for bicyclists and second, to advise motorists and bicyclists that they are sharing the same patch of pavement and should beware of each other's presence. Local agencies have adopted different philosophies on the usage of green colored pavement. Some agencies use green colored pavement only for Class II lanes where bicyclists have exclusive use, and leave the conflict zones uncolored. Other agencies use the green colored pavement only in conflict zones, such as the weave zone shown in the figure below.



Discussion

The best practices for green colored pavement are still evolving. As of this date, more agencies use green colored pavement for conflict zones than for exclusive bicyclist lanes. The amount of green paint used by such agencies varies dramatically. Some agencies fill the entire conflict zones with solid green paint, while others use a pattern of green stripes. Some agencies use green colored pavement across every driveway, alley, and cross streets, while others reserve the use of green colored pavement for conflict zones that merit special attention. The precise design of green colored pavement remains at the discretion of the local agencies.

It should be noted that the combination of a shared lane marking ("sharrow") within green colored pavement, as is used on Second Street in the Belmont Shores community of Long Beach, is no longer approved for new experimentation by the FHWA. However, the FHWA may accept for experimentation the use of green colored pavement as a "background conspicuity enhancement".

Additional References and Guidelines

- AASHTO. Guide for the Development of Bicycle Facilities. 2012.
- California MUTCD. 2014.
- NACTO. Urban Bikeway Design Guide. 2014.
- Caltrans. California HDM. 2012.
- Caltrans. Complete Intersections. 2010.

Existing Locations

- None

Potential Locations

- Pacific Coast Hwy at Crown Valley Pkwy, Dana Point
- Lake Forest Dr. at Jeronimo Rd., Lake Forest

5.6.4 Combined Bike Lane / Turn Lane

Description

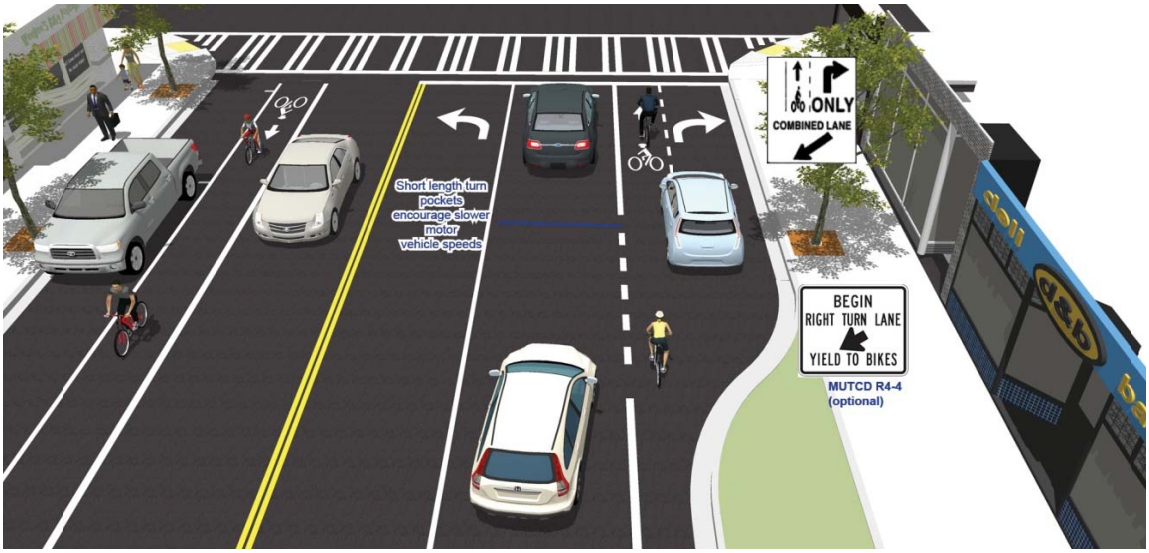
The combined bicycle/right turn lane places a standard-width bike lane on the left side of a dedicated right turn lane. A dotted line delineates the space for bicyclists and motorists within the shared lane. This treatment includes signage advising motorists and bicyclists of proper positioning within the lane. This treatment has been used at intersections lacking sufficient space to accommodate both a standard through bike lane and right turn lane.

Guidance

The FHWA has disallowed the experimental use of combined bike lane/turn lane markings. Previously, typical installations were as follows:

Maximum shared turn lane width is 13 feet; narrower is preferable.

- Bike Lane pocket should have a minimum width of 4 feet with 5 feet preferred.
- A dotted 4 inch line and bicycle lane marking should be used to clarify bicyclist positioning within the combined lane, without excluding cars from the suggested bicycle area.
- A "Right Turn Only" sign with an "Except Bicycles" plaque may be needed to make it legal for through bicyclists to use a right turn lane.



Discussion

Unless the FHWA resumes granting permission to experiment with a combined bike lane/turn lane, this treatment will not be recommended.

Additional References and Guidelines

- NACTO. Urban Bikeway Design Guide. 2014.
- AASHTO. Guide for the Development of Bicycle Facilities. 2012.

Existing Locations

- None

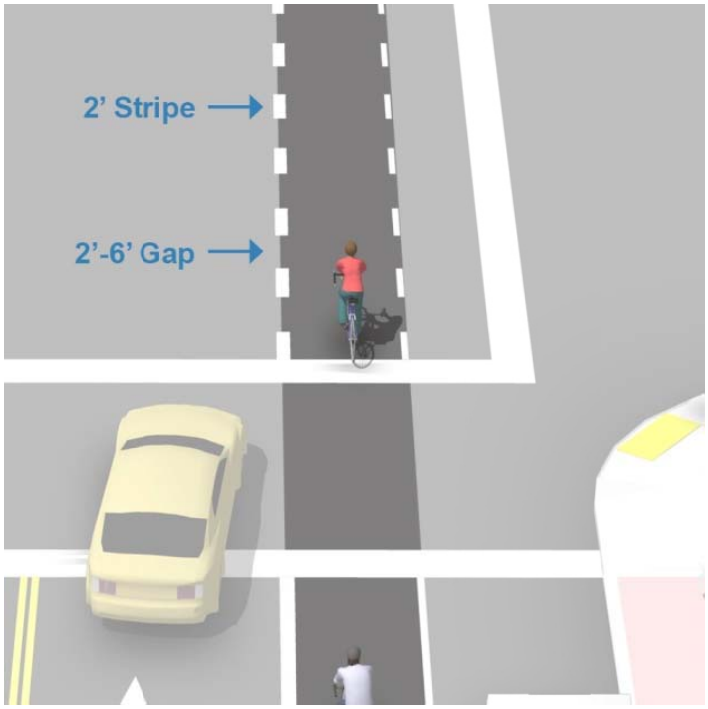
5.6.5 Intersection Crossing Markings

Description

Bicycle pavement markings through intersections indicate the intended path of bicyclists through an intersection or across a driveway or ramp. They guide bicyclists on a safe and direct path through the intersection and provide a clear boundary between the paths of through bicyclists and either through or crossing motor vehicles in the adjacent lane.

Guidance

- See MUTCD Section 3B.08: "dotted line extensions"



Additional References and Guidelines

- AASHTO. Guide for the Development of Bicycle Facilities. 2012.
- California MUTCD. 2014.
- NACTO. Urban Bikeway Design Guide. 2014.

Materials and Maintenance

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

Existing Locations

- None

Potential Locations

- Pacific Coast Hwy, Dana Point and Laguna Beach

5.6.6 Two-Stage Turn Box

Description

A two-stage turn box provides bicyclists a way to make left turns at multi-lane signalized intersections from a right side cycle track or bike lane. Bicyclists are often reluctant to weave into traffic to turn left. A two-stage left turn box allows bicyclists to continue straight while the traffic signal displays green for the original direction of travel, during one stage of a traffic signal, and then wait for the second stage when the cross street receives a green light to complete the move.

Guidance

- A two-stage turn box to facilitate a jughandle turn at a T-intersection is presently allowed in the Federal and California MUTCD's.
- A two-stage turn box for use other than for a jughandle turn at a T-intersection is experimental. Required design elements include a bicycle symbol pavement marking, a pavement marking turn or through arrow, full-time turn on red prohibition for the cross street, and passive detection of bicycles if the signal phase that permits bicyclists to enter the intersection during the second stage of their turn is actuated.
- Green colored pavement is optional.

Discussion

While two-stage turns may increase bicyclist comfort in many locations, this configuration typically results in higher average signal delay for bicyclists versus a vehicular style left turn maneuver.

Additional References and Guidelines

- NACTO. Urban Bikeway Design Guide. 2014.

Materials and Maintenance

Paint can wear more quickly in high traffic areas.

Existing Locations

- None

Potential Locations

- Antonio Pkwy at Santa Margarita Pkwy, Rancho Santa Margarita
- Marguerite Pkwy at Oso Pkwy, Mission Viejo

5.6.7 Bike Lanes at Diverging Ramp Lanes

Description

Some arterials may contain high speed freeway-style designs such as merge lanes and exit ramps, which can create difficulties for bicyclists. The entrance and exit lanes typically have intrinsic visibility problems because of low approach angles and feature high speed differentials between bicyclists and motor vehicles. Strategies to improve safety focus on increasing sight distances, creating formal crossings, and minimizing crossing distances.

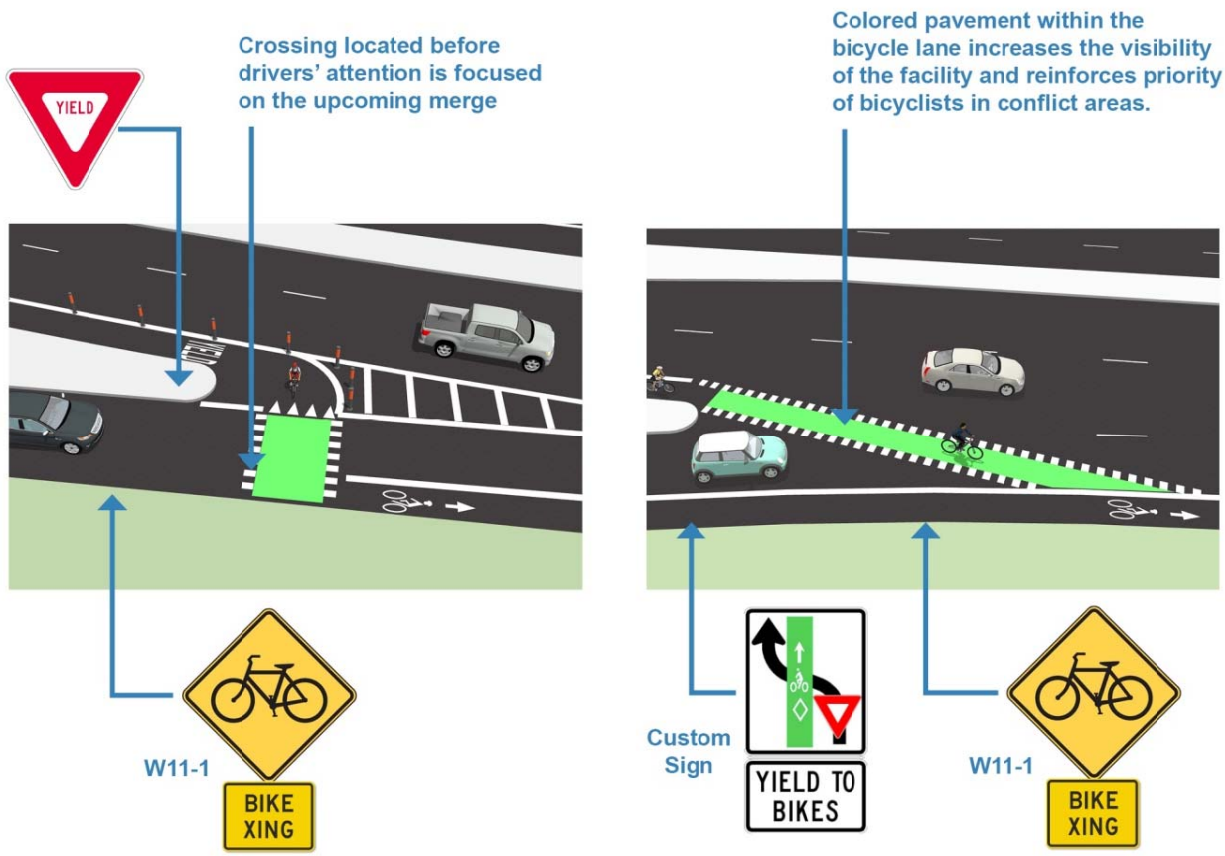
Guidance

Entrance Ramps:

- Angle the bike lane to increase the approach angle with entering traffic. Position crossing before drivers' attention is focused on the upcoming merge.

Exit Ramps:

- Use a jug handle turn to bring bicyclists to increase the approach angle with exiting traffic, and add yield striping and signage to the bicycle approach.



Discussion

Green colored pavement is optional.

Additional References and Guidelines

- AASHTO. Guide for the Development of Bicycle Facilities. 2012.
- California MUTCD. 2014.
- Caltrans. Complete Intersections. 2010.

Materials and Maintenance

Locate crossing markings out of wheel tread when possible to minimize wear and maintenance costs.

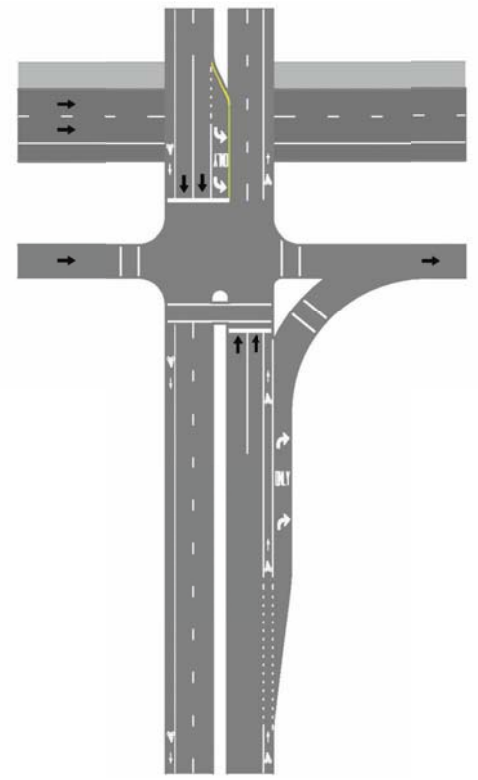
Existing Location with Proposed Improvement

- San Juan Creek Rd at Valle Rd, San Juan Capistrano
- Research Dr. at Irvine Center Dr., Irvine

5.6.8 Freeway Interchange Design

Description

Freeway Interchanges can be significant obstacles to bicycling if they are poorly designed. Travel through some interchange designs may be particularly challenging for young bicyclists. Key design features at conflict areas through interchanges should be included to improve the experience for bicyclists.



Guidance

Entrance Ramps:

- A right-turn lane should be configured with a taper as an "add-lane" for motorists turning right onto the freeway entrance ramp.
- A bike lane should be provided along the left side of the right turn lane. Dotted through bike lane striping provides clear priority for bicyclists at right turn 'add lane' on-ramps.

Exit Ramps:

- Motorists existing the freeway and turning onto the crossroad should be controlled by a stop sign, signal, or yield sign, rather than allowing a free flowing movement.

Discussion

The on-ramps should be configured as a right-turn-only "add lane" to assert through bicyclist priority. Designs that are functional for bicycle passage typically encourage slowing or require motor vehicle traffic to slow or stop. Designs that encourage high-speed traffic movements are difficult for bicyclists to negotiate.

Additional References and Guidelines

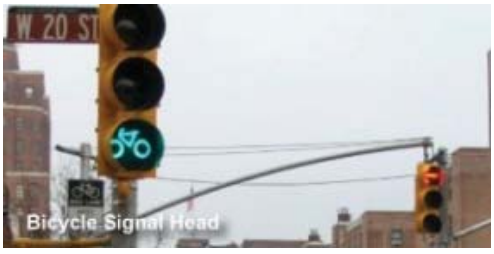
- AASHTO. Guide for the Development of Bicycle Facilities. 2012.
- California MUTCD. 2014.
- Caltrans. Complete Intersections. 2010.

Materials and Maintenance

Locate crossing markings out of wheel tread when possible to minimize wear and maintenance costs.

5.7 Signalization

Determining which type of signal or beacon to use for a particular intersection depends on a variety of factors. These include speed limits, traffic volumes, anticipated bicycle crossing traffic, and the configuration of planned or existing bicycle facilities. Signals may be necessary as part of the construction of a protected bicycle facility such as a cycle track with potential turning conflicts, or to decrease vehicle or pedestrian conflicts at major crossings. An intersection with bicycle signals may reduce stress and delays for a crossing bicyclist, and discourage illegal and unsafe crossing maneuvers.



5.7.1 Bicycle Detection and Actuation

Loop or Video Detectors

For signalized intersection movements that do not normally receive a green light unless actuated by a car or pedestrian, the California Vehicle Code requires installation of detectors capable of detecting bicyclists at the limit line. This is most commonly handled with either inductive loop detectors or with video detection. Traffic actuated signals should be sensitive to bicycles, should be located in the bicyclist's expected path, and stenciling should direct the bicyclist to the point where the bicycle will be detected. This allows the bicyclist to stay within the lane of travel without having to maneuver to the side of the road to trigger a push button.

Push Button Actuation

A bicyclist pushbutton may be used to supplement the required limit line detectors. These buttons should be mounted in a location that permits their activation by a bicyclist without having to dismount.

Discussion

Proper bicycle detection should meet two primary criteria: 1) accurately detects bicyclists and 2) provides clear guidance to bicyclists on how to actuate detection (e.g., what button to push, where to stand). The requirement for bicycle detection at all new and modified approaches to traffic signals is included in the CA MUTCD 2014.

Additional References and Guidelines

- AASHTO. Guide for the Development of Bicycle Facilities. 2012.
- NACTO. Urban Bikeway Design Guide. 2014.
- California MUTCD. 2014.
- Caltrans. Policy Directive 09-06. 2009.
- Caltrans. Complete Intersections. 2010.

Materials and Maintenance

Signal detection and actuation for bicyclists should be maintained with other traffic signal detection and roadway pavement markings.

5.7.2 Bicycle Signal Heads

Description

The California MUTCD authorizes the use of bicycle signal heads only at locations that meet Caltrans Bicycle Signal Warrants. FHWA's Interim Approval IA-16, dated December 24, 2013, specifies a more detailed application of bicycle signal indications. Bicycle signal heads may be used for a movement that is not in conflict with any simultaneous motor vehicle movements at a signalized intersection, including right or left turns on red. The bicycle movement may not be modified by lane-use signs, turn prohibition signs, pavement markings, separate turn signal indications, or other traffic control devices.

The size of signal lenses may be 4 inches, 8 inches, or 12 inches in diameter, with the 4-inch lens size reserved only for supplemental near side mountings.

Additional References and Guidelines

- California MUTCD. 2014.
- FHWA Interim Approval IA-16, 2013.

Materials and Maintenance

Bicycle signal heads require the same maintenance as standard traffic signal heads, such as replacing bulbs and responding to power outages.

5.7.3 Active Warning Beacons

Description

Active warning beacons are user-actuated illuminated devices designed to increase motor vehicle yielding compliance at crossings of multi-lane or high volume roadways. Types of active warning beacons include conventional circular yellow flashing beacons, in-roadway warning lights, or Rectangular Rapid Flash Beacons (RRFB). RRFBs have blanket approval in California per FHWA MUTCD IA11.

Guidance

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

- Warning beacons shall initiate operation based on pedestrian or bicyclist actuation and shall cease operation at a predetermined time after actuation or, with passive detection, after the pedestrian or bicyclist clears the crosswalk.

Additional References and Guidelines

- NACTO. Urban Bikeway Design Guide. 2014.
- California MUTCD. 2014.
- FHWA. Interim Approval (IA-11). 2008.
- Caltrans. Complete Intersections. 2010.

Materials and Maintenance

Depending on power supply, maintenance can be minimal. If solar power is used, RRFBs can run for years without issue.

Existing Locations

- Shady Canyon Trail at Shady Canyon Rd, Irvine

Potential Locations

- Aliso Creek Bike Path at Los Alisos Blvd, Lake Forest

5.7.4 Pedestrian Hybrid Beacons

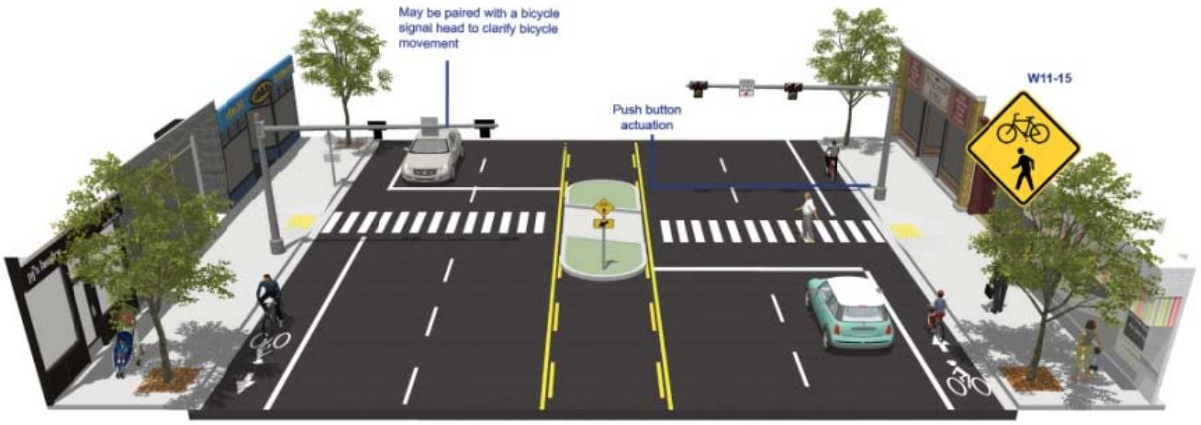
Description

A pedestrian hybrid beacon, also known as a High-intensity Activated CrossWalK (HAWK), consists of a signal-head with two red lenses over a single yellow lens on the major street, and pedestrian and/or bicycle signal heads for the minor street. The signal normally displays dark indications to motor vehicle traffic. When actuated by a pedestrian, the signal displays a yellow light, followed by an interval where both red lights are displayed steadily during the pedestrian walk interval, followed by alternating flashing red indications during the pedestrian clearance interval. As used in other states, pedestrian hybrid beacons are used to improve non-motorized crossings of major streets in locations where side-street volumes do not support installation of a conventional traffic signal or where there are concerns that a conventional signal will encourage additional motor vehicle traffic on the minor street. However, due to California law that prohibits the installation of STOP signs on approaches to signalized intersections, hybrid beacons may only be used at mid-block crossing locations.

Guidance

Pedestrian hybrid beacons may be installed without meeting traffic signal control warrants if roadway speed and volumes are excessive for comfortable user crossing.

- If installed within a signal system, signal engineers should evaluate the need for the pedestrian hybrid beacon to be coordinated with other signals.
- Parking and other sight obstructions should be prohibited for at least 100 feet in advance of and at least 20 feet beyond the marked crosswalk



Discussion

An alternative to a pedestrian hybrid beacon is a standard signal face that displays a flashing red indication during the pedestrian clearance phase. The advantage of a standard signal face is that it displays no dark indications that could be interpreted by a motorist to be a symptom of a power outage that requires coming to a stop.

Additional References and Guidelines

- California MUTCD. 2014.

Materials and Maintenance

Signing and striping need to be maintained to help users understand any unfamiliar traffic control.

Existing Locations for Potential Improvement

- Laguna Niguel Family YMCA Bike Path at Crown Valley Pkwy, Laguna Niguel
- Creekside Access Rd at Aliso Viejo Pkwy and Briar Glenn, Aliso Viejo

5.8 Shared Roadways

On shared roadways, bicyclists and motor vehicles use the same roadway space. These facilities are typically used on roads with low speeds and traffic volumes; however they can be used on higher volume roads with wide outside lanes or shoulders. A motor vehicle driver will usually have to cross over into the adjacent travel lane to pass a bicyclist, unless a wide outside lane or shoulder is provided. Shared roadways employ a large variety of treatments from simple signage and shared lane markings to more complex treatments including directional signage, traffic diverters, chicanes, chokers, and/or other traffic calming devices to reduce vehicle speeds or volumes.

Signed Shared Roadway


Marked Shared Roadway


Bicycle Boulevard

5.8.1 Signed Shared Roadway

Description

Signed shared roadways are Class III facilities generally located on roadways with lower speeds and lower traffic volumes. Class III facilities are designated as roadways with no striped bicycle lanes, but include signage to indicate the roadway is a bicycle route. Shared roadways can be used on higher volume roads with wide outside lanes or shoulders. A motor vehicle driver will usually have to cross over into the adjacent travel lane to pass a bicyclist, unless a wide outside lane or shoulder is provided.

Guidance

"BIKE ROUTE" - This sign (D11-1) is intended for use where no unique designation of routes is desired. Directional changes should be signed with appropriate arrow sub-plaques (D1-1b) or directional signage

"Bicycles May Use Full Lane"- This sign (R4-11) sign may be used:

- On roadways where there are no bicycle lanes or adjacent shoulders usable by cyclists and where travel lanes are too narrow for cyclists and motor vehicles to safely operate side-by-side.

- In locations where it is important to inform all road users that cyclists may occupy the travel lane.

Discussion

A Bicycle May Use Full Lane sign (R4-11) may be used on a lane that is too narrow for a bicycle and an automobile to share the road side by side within the same lane).

Additional References and Guidelines

- AASHTO. Guide for the Development of Bicycle Facilities. 2012.
- California MUTCD. 2014.

Materials and Maintenance

Maintenance needs for bicycle wayfinding signs are similar to other signs, and will need periodic replacement due to wear.

Existing Locations

- South Ola Vista, San Clemente (see photo above)
- Pacific Coast Hwy, Laguna Beach

Potential Locations

- Calle Amanecar, San Clemente
- Via California, San Juan Capistrano

5.8.2 Marked Shared Roadway

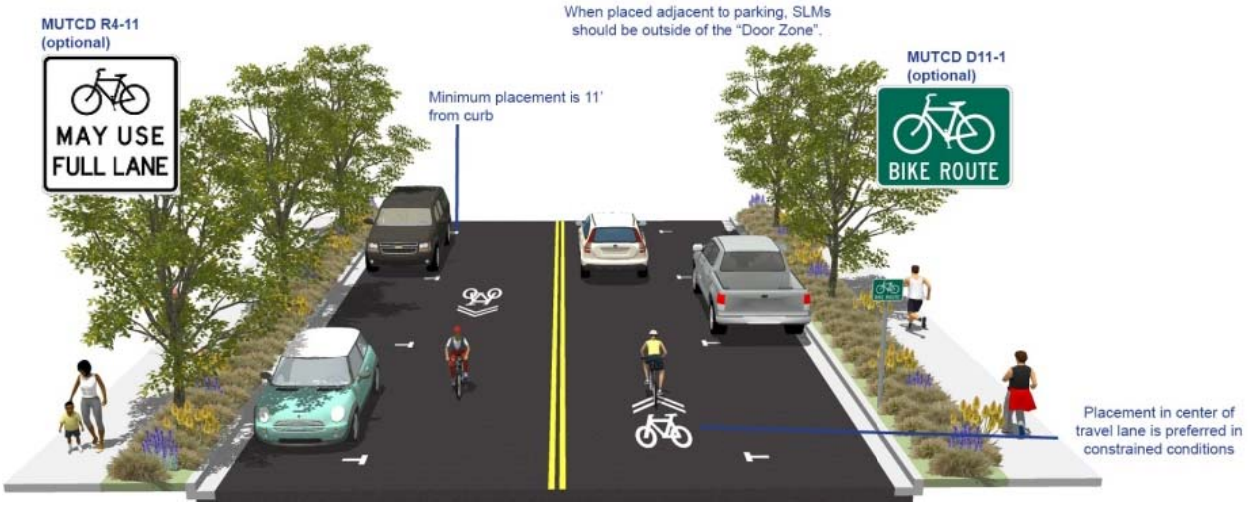
Description

The shared lane marking (SLM) or "sharrow" is commonly used where parking is allowed adjacent to the travel lane. The center of the marking should be located where bicyclists would be clear of the open doors of parked cars. This often results in the bicyclists being near the center of the right-most travel lane.

Guidance

Shared lane markings may be considered in the following situations:

- On constrained roadways too narrow to stripe with bicycle lanes
- To delineate space within a wide outside lane where cyclists can be expected to ride
- On roadways where it is important to increase vehicle driver awareness of cyclists
- On roadways where cyclists tend to ride too close to parked vehicles



Discussion

Class II bike lanes should be considered on roadways with outside travel lanes wider than 15 feet, or where other lane narrowing or removal strategies may provide adequate road space. Sharrows shall not be used on shoulders, on designated Bike Lanes, or to designate Bicycle Detection at signalized intersections. (MUTCD 9C.07)

Additional References and Guidelines

- Caltrans HDM Chapter 300
- California MUTCD 2014
- NACTO Urban Bikeway Design Guide, 2012
- Model Design Manual of Living Streets, 2011

Existing Locations

- Gleneyre St, Laguna Beach (see photo above)
- South Ola Vista, San Clemente

Potential Locations

- Blue Lantern St, Dana Point
- Low volume, low speed streets

5.8.3 Bicycle Boulevard

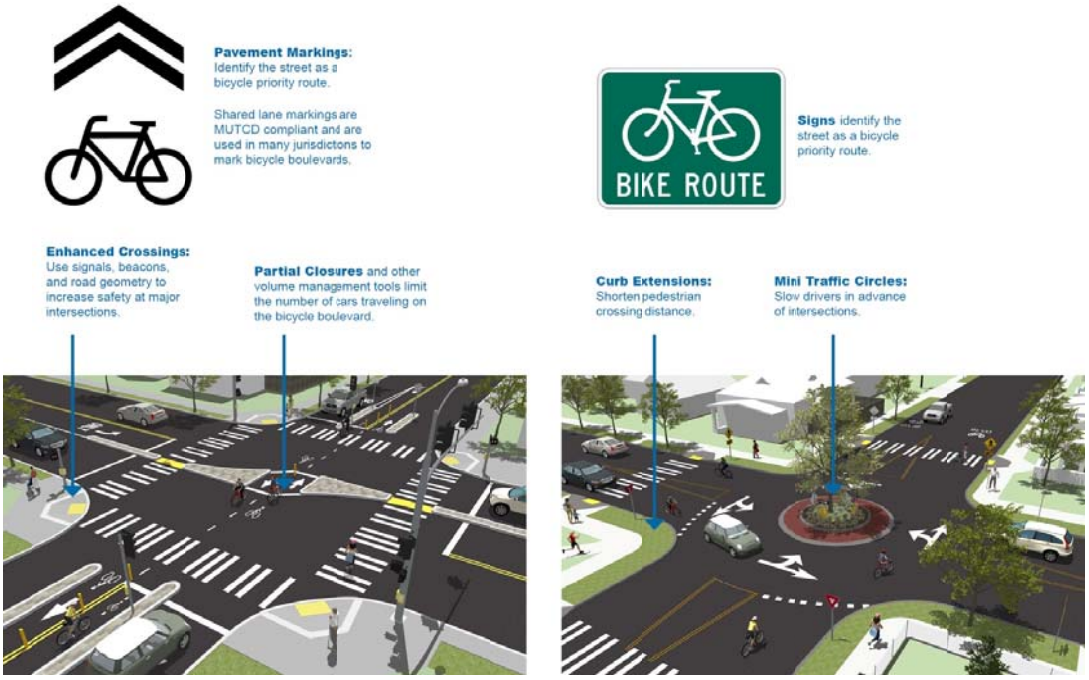
Description

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

Guidance

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

- Bicycle boulevards should have a maximum posted speed of 25 mph. Use traffic calming to maintain an 85th percentile speed below 22 mph.
- Implement volume control treatments such as traffic diverters based on the context of the bicycle boulevard and using engineering judgment. Target motor vehicle volumes range from 1,000 to 3,000 vehicles per day.
- Intersection crossings should be designed to slow motor vehicles, enhance safety for bicyclists and pedestrians and minimize delay for bicyclists.



Discussion

The term "bicycle boulevard" implies a facility that encourages bicycle usage while reducing motor vehicle volumes and/or speeds to a greater extent than on a typical Class III route. Some of the treatments used to encourage cycling may include preferential treatment by means of exclusions from turn restrictions, contra-flow access through a one-way street, exclusive traffic signal phases, or the re-orientation of stop sign control to favor the bicycle boulevard. Traffic calming techniques may include bulbouts, chokers, traffic circles, roundabouts, speed humps, turn restrictions, or barricades.

Additional References and Guidelines

- Caltrans HDM Chapter 300
- California MUTCD 2012
- NACTO Urban Bikeway Design Guide, 2012
- AASHTO. Guide for the Development of Bicycle Facilities. 2012.
- FHWA Mini-Roundabouts. 2010

Existing Locations

- Traffic circle at Calle Colima, San Clemente (see photo above)

Potential Locations

- TBD

5.9 Bikeway Signing

The ability to navigate through a city is informed by landmarks, natural features and other visual cues.
Signs throughout the city may indicate to bicyclists:

- Direction of travel
- Location of destinations
- Travel time/distance to those destinations

Wayfinding Signage

These signs will increase users' comfort and accessibility to the bicycle systems. Signage can serve both wayfinding and safety purposes including:


Wayfinding Sign Placement

- Helping to familiarize users with the bicycle network
- Helping users identify the best routes to destinations
- Helping to address misperceptions about time and distance
- Helping overcome a "barrier to entry" for people who are not frequent bicyclists (e.g., "interested but concerned" bicyclists)

A community-wide bicycle wayfinding signage plan would identify:

- Sign locations
- Sign type – what information should be included and design features
- Destinations to be highlighted on each sign – key destinations for bicyclists
- May include approximate distance and travel time to each destination Bicycle wayfinding signs also visually cue motorists that they are driving along a bicycle route and should use caution. Signs are typically placed at key locations leading to and along bicycle routes, including the intersection of multiple routes. Too many road signs tend to clutter the right-of-way, and it is recommended that these signs be posted at a level most visible to bicyclists rather than per vehicle signage standards.

5.9.1 Wayfinding Sign Types

Description

A bicycle wayfinding system consists of comprehensive signing and/or pavement markings to guide bicyclists to their destinations along preferred bicycle routes. There are three general types of wayfinding signs:

Confirmation Signs

- Indicate to bicyclists that they are on a designated bikeway. Make motorists aware of the bicycle route.
- May include destinations and distance/time. Do not include arrows.

Turn Signs

- Indicate where a bikeway turns from one street onto another street. Can be used with pavement markings.
- Include destinations and arrows.

Decisions Signs

- Mark the junction of two or more bikeways.
- Inform bicyclists of the designated bike route to access key destinations.
- Destinations and arrows are required, distances are optional but recommended.
- The inclusion of bicycle travel time is nonstandard, but is recommended.

Discussion

There is no standard color for bicycle wayfinding signage. Section 1A.12 of the MUTCD establishes the general meaning for signage colors. Green is the color used for directional guidance and is the most common color of bicycle wayfinding signage in the US, including those in the MUTCD.

Additional References and Guidelines

- AASHTO. Guide for the Development of Bicycle Facilities. 2012.
- California MUTCD. 2014.
- NACTO. Urban Bikeway Design Guide. 2014.

Materials and Maintenance

Maintenance needs for bicycle wayfinding signs are similar to other signs and will need periodic replacement due to wear.

5.9.2 Wayfinding Sign Placement

Guidance

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

Decisions Signs

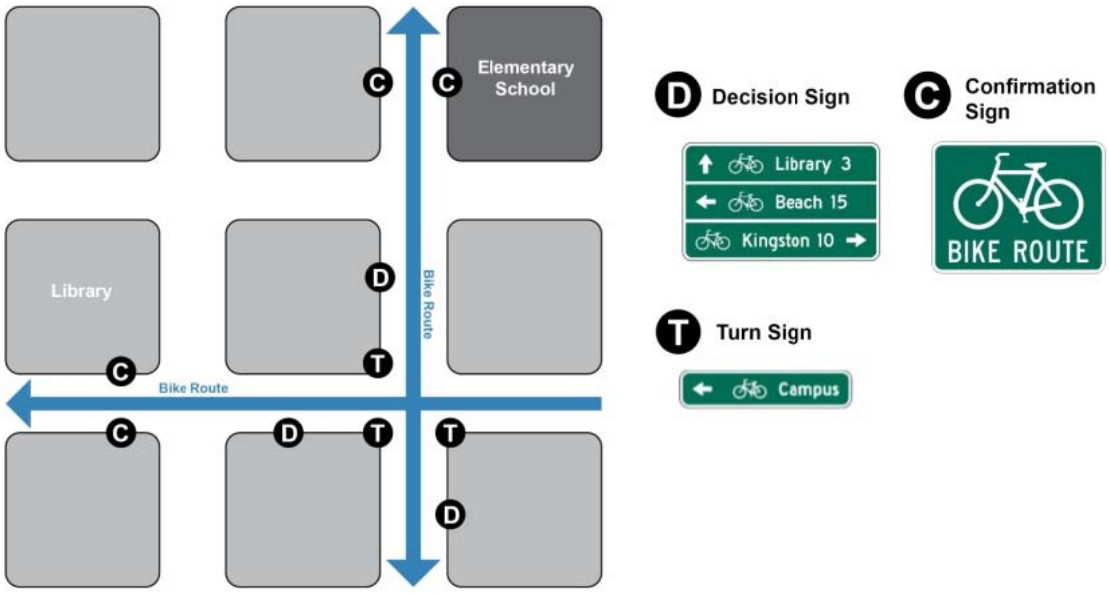
- Near-side of intersections in advance of a junction with another bicycle route.
- Along a route to indicate a nearby destination.

Confirmation Signs

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

Turn Signs

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



Discussion

It can be useful to classify a list of destinations for inclusion on the signs based on their relative importance to users throughout the area. A particular destination's ranking in the hierarchy can be used to determine the physical distance from which the locations are signed.

Additional References and Guidelines

- AASHTO. Guide for the Development of Bicycle Facilities. 2012.
- California MUTCD. 2014.
- NACTO. Urban Bikeway Design Guide. 2012.

Materials and Maintenance

Maintenance needs for bicycle wayfinding signs are similar to other signs and will need periodic replacement due to wear.

5.10 Retrofitting Existing Streets to Add Bikeways

Most major streets are characterized by conditions (e.g., high vehicle speeds and/or volumes) for which dedicated bike lanes are the most appropriate facility to accommodate safe and comfortable riding. Although opportunities to add bike lanes through roadway widening may exist in some locations, many major streets have physical and other constraints that would require street retrofit measures within existing curb-to-curb widths. As a result, much of the guidance provided in this section focuses on effectively reallocating existing street width through striping modifications to accommodate dedicated bike lanes.

Although largely intended for major streets, these measures may be appropriate for any roadway where bike lanes would be the best accommodation for bicyclists.

5.10.1 Lane Narrowing

Description

Lane narrowing utilizes roadway space that exceeds minimum standards to provide the needed space for bike lanes. Many roadways have existing travel lanes that are wider than those prescribed in local and national roadway design standards, or which are not marked. Most standards allow for the use of 11 feet and sometimes 10 feet wide travel lanes to create space for bike lanes.

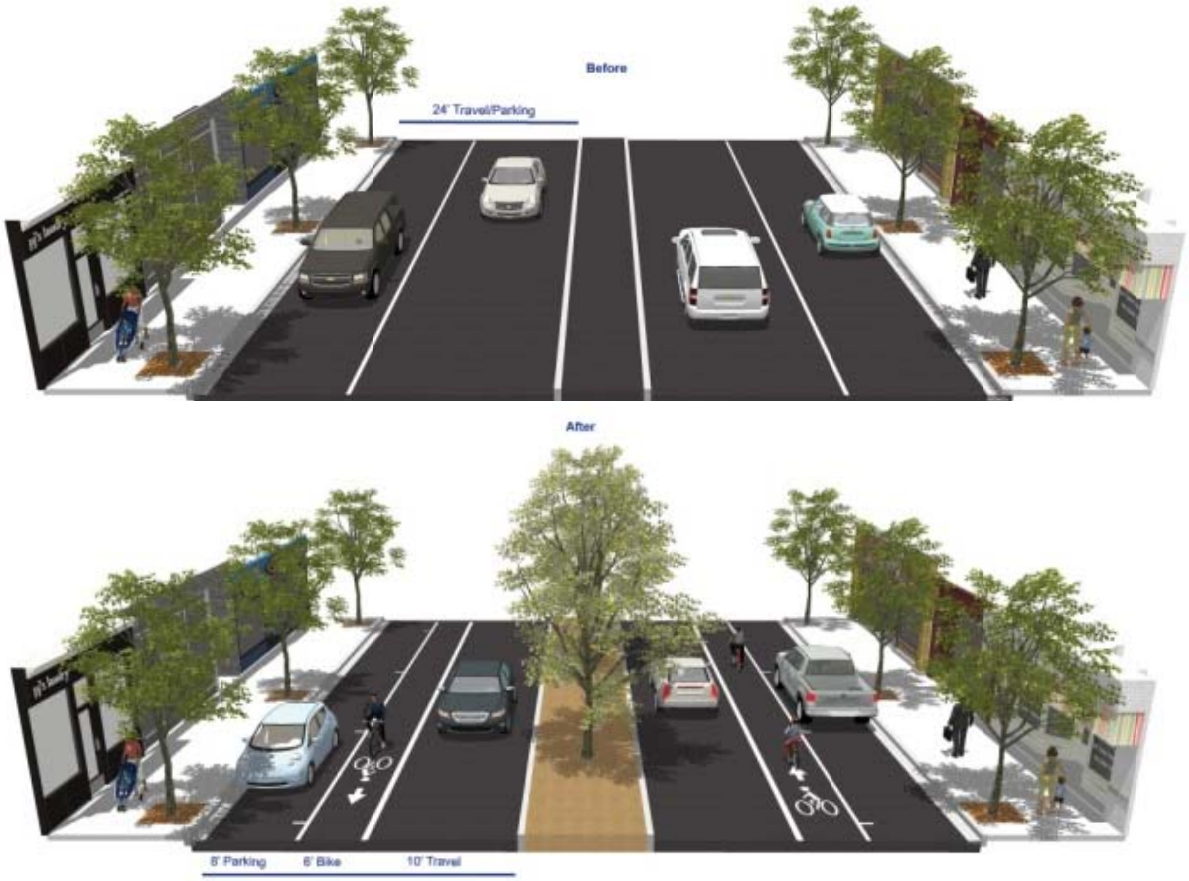
Guidance

Vehicle lane width:

- Before: 10 to 15 feet
- After: 10 to 11 feet

Bicycle lane width:

- Guidance on Bicycle Lanes applies to this treatment



Discussion

Special consideration should be given to the amount of heavy vehicle traffic and horizontal curvature before the decision is made to narrow travel lanes. Center turn lanes can also be narrowed in certain situations to provide space for bike lanes.

Additional References and Guidelines

- AASHTO. Guide for the Development of Bicycle Facilities. 2012.
- AASHTO. A Policy on Geometric Design of Highways and Streets. 2004.
- Caltrans. California HDM. 2012.
- Caltrans. Main Streets. 2005.

Materials and Maintenance

Repair rough or uneven pavement surface.

5.10.2 Lane Reconfiguration

Description

The removal of a single travel lane will generally provide sufficient space for two bike lanes on each side of a street. Streets with excess vehicle capacity provide opportunities for bike lane retrofit projects.

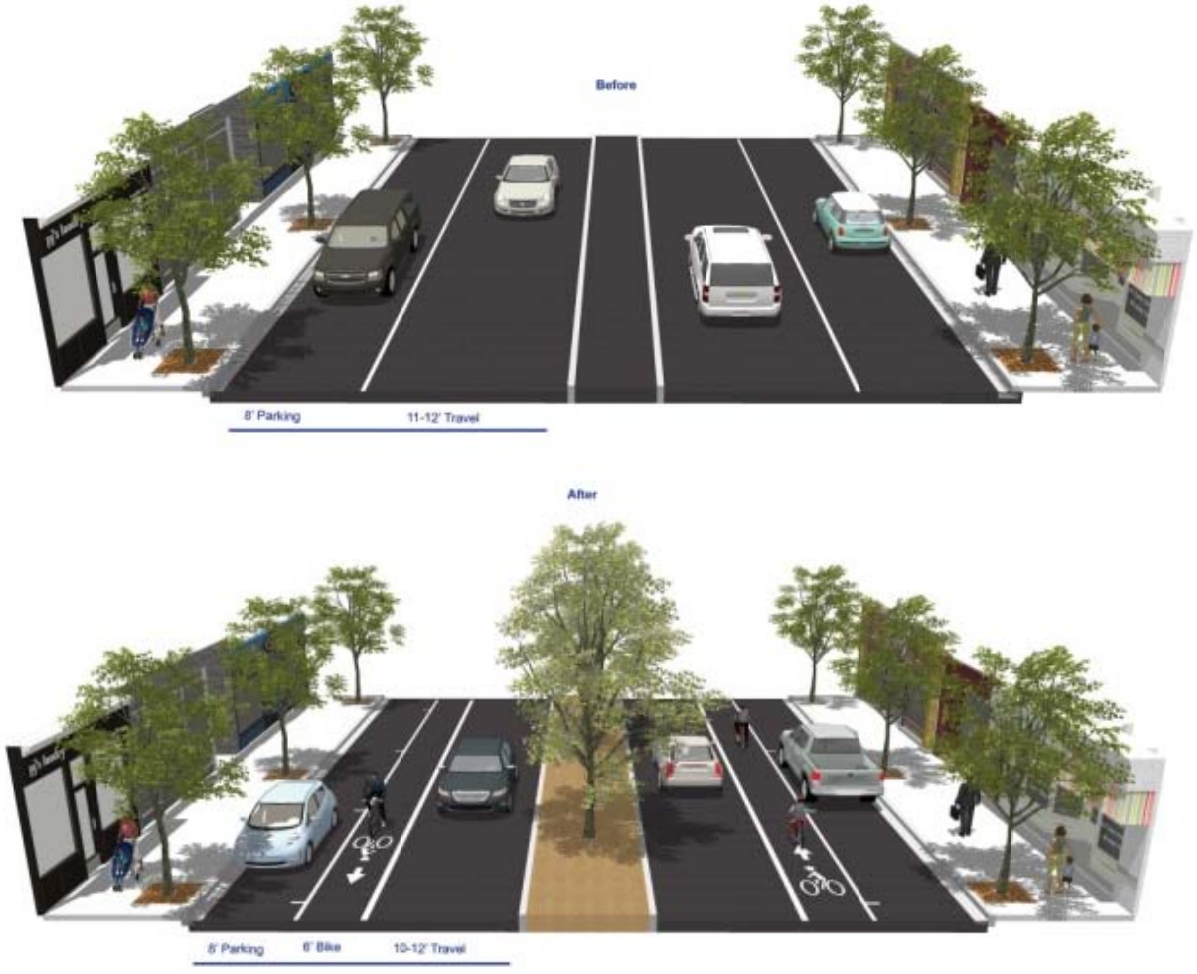
Guidance

Vehicle lane width:

- Width depends on project. No narrowing may be needed if a lane is removed.

Bicycle lane width:

- Guidance on Bicycle Lanes applies to this treatment.



Discussion

Depending on a street's existing configuration, traffic operations, user needs and safety concerns, various lane reduction configurations may apply. For instance, a four-lane street (with two travel lanes in each direction) could be modified to provide one travel lane in each direction, a center turn lane, and bike lanes.

Additional References and Guidelines

- AASHTO. Guide for the Development of Bicycle Facilities. 2012.
- FHWA. Evaluation of Lane Reduction "Road Diet" Measures on
- Crashes. 2010.
- Caltrans. Main Streets. 2005.

Materials and Maintenance

Repair rough or uneven pavement surface.

5.11Bicycle Support Facilities

Facilities

Bicycle Parking

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

Access to Transit

Safe and easy access to bicycle parking facilities is necessary to encourage commuters to access transit via bicycle. Providing bicycle access to transit and space for bicycles on buses and rail vehicles can increase the feasibility of transit in lower-density areas, where transit stops are beyond walking distance of many residences. People are often willing to walk only a quarter- to half-mile to a bus stop, while they might bike as much as two or more miles to reach a transit station.


Bicycle Parking


On-Street Bicycle Corral


Bicycle Lockers

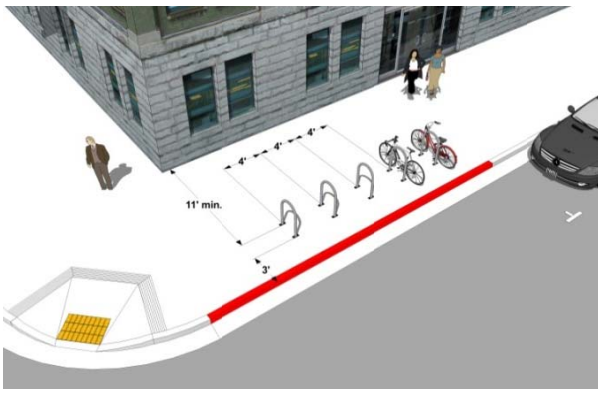

Secure Parking Areas (SPA)


Bicycle Access to Transit

5.11.1Bicycle Racks

Description

Secure bicycle parking at likely destinations is an integral part of a bikeway network. Adequate bicycle parking should be incorporated into any new development or redevelopment project. Bicycle parking should be given a balanced level of importance when considering car parking improvements or development. In commercial areas where bicycle traffic is more prevalent, as well as parks and shopping centers, increased bicycle parking is recommended.

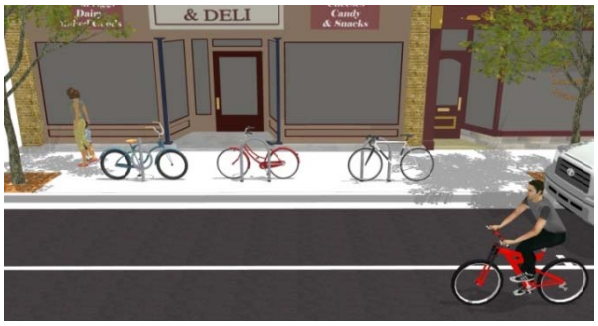


Bicycle rack type plays a major role in the utilization of the bicycle racks. Only racks that support the bicycle at two points and allow convenient locking should be used. The Association for Pedestrian and Bicycle Professionals (APBP) recommends selecting a bicycle rack that:

- Supports the bicycle in at least two places, preventing it from falling over
- Allows locking of the frame and one or both wheels with a U-lock
- Is securely anchored to ground
- Resists cutting, rusting and bending or deformation

Guidance

- Does not bend wheels or damage other bicycle parts
- Accommodates high security U-shaped bicycle locks
- Accommodates securing the frame and wheels
- Does not trip pedestrians
- Are easily accessed yet protected from motor vehicles
- Are covered if users will leave their bicycles for long periods
- Located in areas that cyclists are most likely to travel



Additional References and Guidelines

- AASHTO. Guide for the Development of Bicycle Facilities. 2012.
- APBP. Bicycle Parking Guide 2nd Edition. 2010.

Materials and Maintenance

Use of proper anchors will prevent vandalism and theft.

5.11.2 On-Street Bicycle Corral

Description

Bicycle corrals are generally former vehicle parking stalls converted to bicycle parking. Most have been on-street conversions, but they are now being incorporated into shopping center parking lots as well. Corrals can accommodate up to 20 bicycles per former vehicle parking space. On-street bicycle corrals provide many benefits where bicycle use is high and/ or growing:

Businesses - Corrals provide a much higher customer to parking space ratio and advertise "bicycle friendliness." They also allow more outdoor seating for restaurants by moving the bicycle parking off the sidewalk. Some cities have instituted programs that allow local businesses to sponsor or adopt a bicycle corral to improve bicycle parking in front of their business.

Pedestrians - Corrals clear the sidewalks and those installed at corners also serve as curb extensions
Cyclists - Corrals increase the visibility of cycling and greatly expand bicycle parking options

Vehicle drivers - Corrals improve visibility at intersections by preventing large vehicles from parking at street corners and blocking sight lines

Guidance

See guidelines for sidewalk Bicycle Rack placement.

- Can be used with parallel or angled parking
- Parking stalls adjacent to curb extensions are good candidates for bicycle corrals since the concrete extension serves as delimitation on one side
- Can be customized and have been designed and fabricated to complement specific locations

Discussion

In many communities, the installation of bicycle corrals is driven by requests from adjacent businesses, and is not a city-driven initiative. In other areas, the city provides the facility and business associations take responsibility for the maintenance of the facility.

Additional References and Guidelines

- *APBP. Bicycle Parking Guide 2nd Edition. 2010.*

Materials and Maintenance

Physical barriers may obstruct drainage and collect debris. Establish a maintenance agreement with neighboring businesses.

5.11.3 Bicycle Lockers

Description

Bicycle parking facilities intended for long-term parking must protect against theft of the entire bicycle and its components and accessories.

Three common ways of providing secure long-term bicycle parking are:

- Fully enclosed lockers accessible only by the user, either coin-operated, or by electronic, on-demand locks operated by "smartcards" equipped with touch-sensitive imbedded RFID chips.
- A continuously monitored facility that provides at least medium-term type bicycle parking facilities generally available at no charge
- Restricted access facilities in which short-term type bicycle racks are provided and access is restricted only to the owners of the bicycles stored there

Perhaps the easiest retrofit is the bicycle locker. Generally, they are as strong as the locks on their doors and can secure individual bicycles with their panniers, computers, lights, etc., left in place. Some bicycle locker designs can be stacked to double the parking density.

Lockers with coin-operated locks can be a target of theft and may attract various unintended uses. This can be mitigated by installing lockers with mesh sides to allow periodic inspection.

Guidance

Minimum dimensions: width (opening) 2.5 feet; height 4 feet; depth 6 feet.

- Four-foot side clearance and 6-foot end clearance.
- Seven-foot minimum distance between facing lockers.
- Locker designs that allow visibility and inspection of contents are recommended for security.
- Access is controlled by a key or access code.

Discussion

Long-term parking facilities are more expensive to provide than short-term facilities, but are also significantly more secure. Although many bicycle commuters would be willing to pay a nominal fee to guarantee the safety of their bicycle, long-term bicycle parking should be free wherever automobile parking is free.

Additional References and Guidelines

- *AASHTO. Guide for the Development of Bicycle Facilities. 2012.*
- *APBP. Bicycle Parking Guide 2nd Edition. 2010.*

Materials and Maintenance

Regularly inspect the functioning of moving parts and enclosures. Change keys and access codes periodically to prevent access to unapproved users.

5.11.4 Secure Parking Areas (SPA)

Description

A Secure Parking Area for bicycles, also known as a Bike SPA or Bike & Ride (when located at transit stations), is a semi-enclosed space that offers a higher level of security than ordinary bike racks. Accessible via key-card, combination locks, or keys, Bike SPAs provide high-capacity parking for 10 to 100 or more bicycles. Increased security measures create an additional transportation option for those whose biggest concern is theft and vulnerability.

Guidance

Key features may include:

- Closed-circuit television monitoring
- Double high racks & cargo bike spaces
- Bike repair station with bench
- Bike tube and maintenance item vending machine
- Bike lock "hitching post" – allows people to leave bike locks
- Secure access for users

Discussion

Long-term parking facilities are more expensive to provide than short-term facilities, but are also significantly more secure. Although many bicycle commuters would be willing to pay a nominal fee to guarantee the safety of their bicycle, long-term bicycle parking should be free wherever automobile parking is free.

Additional References and Guidelines

- AASHTO. Guide for the Development of Bicycle Facilities. 2012
- APBP. Bicycle Parking Guide 2nd Edition. 2010

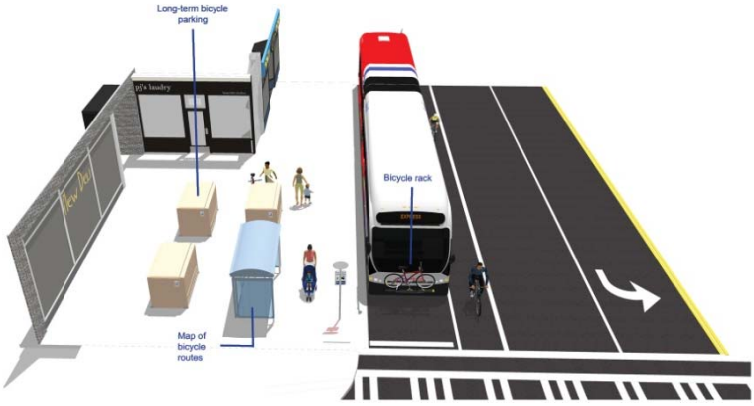
Materials and Maintenance

Regularly inspect the functioning of moving parts and enclosures. Change keys and access codes periodically to prevent access to unapproved users.

5.11.5 Bicycle Access to Transit

Description

Safe and easy access to transit stations and secure bicycle parking facilities is necessary to encourage commuters to access transit via bicycle. Bicycling to transit reduces the need to provide expensive and space consuming car parking spaces. Many people who ride to a transit stop will want to bring their bicycle with them on the transit portion of their trip, so buses and other transit vehicles should be equipped accordingly.



For staircases at bus or rail transit stations, bicycle access could be facilitated with bicycle staircase side ramps. These consist of narrow channels just wide enough to accommodate bicycle tires, installed below the hand rails of stair cases. Cyclists could place their bicycles onto the side ramps and walk them up or down the stairs, with the bicycles rolling within the channels. Examples of bicycle staircase side ramps can be found at the El Monte Bus Station and at BART's 16th Street Station.

Guidance

- Provide direct and convenient access to transit stations and stops from the bicycle and pedestrian networks.
- Provide maps, wayfinding signage and pavement markings from the bicycle network to transit stations.

Bicycle Parking

- The route from bicycle parking locations to station/stop platforms should be well-lit and visible.
- Signing should note the location of bicycle parking, rules for use, and instructions as needed.
- Provide safe and secure long-term parking such as bicycle lockers at transit hubs. Parking should be easy to use and well maintained.

Discussion

Providing bicycle routes to transit helps combine the long-distance coverage of bus and rail travel with the door-to-door service of bicycle riding. Transit use can overcome large obstacles to bicycling, including distance, hills, riding on busy streets, night riding, inclement weather, and breakdowns.

Additional References and Guidelines

- APBP. Bicycle Parking Guide 2nd Edition. 2010.
- FHWA. University Course on Bicycle and Pedestrian Transportation.
- Lesson 18: Bicycle and Pedestrian Connections to Transit. 2006.

Materials and Maintenance

Regularly inspect the functioning of long-term parking moving parts and enclosures.

5.12 Bikeway Facility Maintenance

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


Sweeping


Gutter to Pavement Transition


Roadway Surface


Drainage Grates

5.12.1 Sweeping

Description

Bicyclists often avoid shoulders and bike lanes filled with gravel, broken glass and other debris; they will ride in the roadway to avoid these hazards, potentially causing conflicts with motorists. Debris from the roadway should not be swept onto sidewalks (pedestrians need a clean walking surface), nor should debris be swept from the sidewalk onto the roadway. A regularly scheduled inspection and maintenance program helps ensure that roadway debris is regularly picked up or swept.

Guidance

Establish a seasonal sweeping schedule that prioritizes roadways with major bicycle routes.

- Sweep walkways and bikeways whenever there is an accumulation of debris on the facility.
- In curbed sections, sweepers should pick up debris; on open shoulders, debris can be swept onto gravel shoulders.
- Pave gravel driveway approaches to minimize loose gravel on paved roadway shoulders.
- Perform additional sweeping in the fall in areas where leaves accumulate.

Note - some separated bike facilities (cycle tracks) that employ curbs or other physical barriers for separation may be too narrow for a standard street sweeper, which requires a 10-foot wide clearance. If this is the case, arrangements need to be made for smaller equipment to be used on a regular basis to keep the facility clean.

5.12.2 Gutter-to-Pavement Transition and handling standing water

Description

On streets with concrete curbs and gutters, 1 to 2 feet of the curbside area is typically devoted to the gutter pan, where water collects and drains into catch basins. On many streets, the bikeway is situated near the transition between the gutter pan and the pavement edge. This transition can be susceptible to erosion, creating potholes, and a rough surface for travel. These areas can also be prone to retaining standing water during and after rains.

Guidance

Ensure that gutter-to-pavement transitions have no more than a ¼" vertical transition.

- Examine pavement transitions during every roadway project for new construction, maintenance activities, and construction project activities that occur in streets.
- Inspect the pavement two to four months after trenching construction activities are completed to ensure that excessive settlement has not occurred.
- Provide at least three feet of pavement outside of the gutter seam and four feet is preferred.
- When adding new bike facilities such as separated lanes, roundabouts, and traffic circles, check for potential drainage issues. Installing bioswales to capture runoff and avoid standing water in bike lanes is becoming a standard part of building bike facilities in bike-friendly communities such as Portland and Long Beach.

5.12.3 Roadway Surface

Description

Bicycles are much more sensitive to subtle changes in roadway surface than are motor vehicles. Various materials are used to pave roadways, and some are smoother than others. Compaction is also an important issue after trenches and other construction holes are filled. Uneven settlement after trenching can affect the roadway surface nearest the curb where bicycles travel. Sometimes compaction is not achieved to a satisfactory level, and an uneven pavement surface can result due to settling over the course of days or weeks. When resurfacing streets, use the smallest chip size and ensure that the surface is as smooth as possible to improve safety and comfort for bicyclists.

Guidance

Maintain a smooth pothole-free surface.

- Ensure that on new roadway construction, the finished surface on bikeways does not vary more than ¼".

- Maintain pavement so ridge buildup does not occur at the gutter-to-pavement transition or adjacent to railway crossings.
- Inspect the pavement two to four months after trenching construction activities are completed to ensure that excessive settlement has not occurred.
- If chip sealing is to be performed, use the smallest possible chip on bike lanes and shoulders. Sweep loose chips regularly following application.
- During chip seal maintenance projects, if the pavement condition of the bike lane is satisfactory, it may be appropriate to chip seal the travel lanes only. However, use caution when doing this so as not to create an unacceptable ridge between the bike lane and travel lane.

5.12.4 Drainage Grates

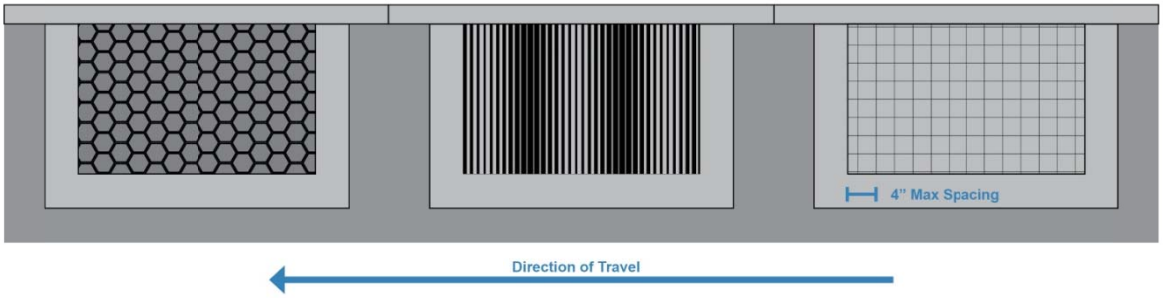
Description

Drainage grates are typically located in the gutter area near the curb of a roadway. Drainage grates typically have slots through which water drains into the municipal storm sewer system. Many older grates were designed with linear parallel bars spread wide enough for a tire to become caught so that if a bicyclist were to ride on them, the front tire could become caught in the slot. This would cause the bicyclist to tumble over the handlebars and sustain potentially serious injuries.

Guidance

Require all new drainage grates be bicycle-friendly, including grates that have horizontal slats on them so that bicycle tires and assistive devices do not fall through the vertical slats.

- Create a program to inventory all existing drainage grates, and replace hazardous grates as necessary – temporary modifications such as installing rebar horizontally across the grate should not be an acceptable alternative to replacement.



5.12.5 Bikeway Maintenance and Operations

Description

Motor vehicle traffic tends to "sweep" debris like litter and broken glass toward the roadway edges where it can accumulate in bicycle lanes. Maneuvering to avoid such hazards can cause a cyclist to fall. In this way, proper maintenance directly affects safety and street sweeping must be a priority on roadways

with bicycle facilities, especially in curb lanes and along the curbs themselves. Law enforcement can assist by requiring towing companies to fully clean up crash sites to prevent glass and debris from being left in place or simply swept to the curb or shoulder after collisions.

When any roadwork repairs are done by the City or other agencies, the roadway must be restored to satisfactory quality with particular attention to surface smoothness suitable for cycling. Striping must be restored to the prior markings, or new markings if called for in a project. Bicycles facilities also sometimes seem to "disappear" after roadway construction occurs. This can happen incrementally as paving repairs are made over time and are not promptly followed by proper re-striping. When combined with poor surface reconstruction following long periods out of service due to road work, bikeway facilities can be "lost," which can discourage cycling in general. Construction projects that require the demolition and rebuilding of adjacent roadways can cause problems maintaining and restoring bikeway function.

Construction activities controlled through permits, such as driveway, drainage and utility work can have an important effect on roadway surface quality where cyclists operate in the form of mismatched pavement heights, rough surfaces or longitudinal gaps in adjoining pavements, or other pavement irregularities. Permit conditions should ensure that pavement foundation and surface treatments are restored to their pre-construction conditions, that no vertical irregularities will result and that no longitudinal cracks will develop. Strict specifications, standards and inspections designed to prevent these problems should be developed. A five year bond should be held to assure correction of any deterioration that might occur as a result of faulty reconstruction of the roadway surface.

Bicycle facilities should be swept regularly, at least twice a month, and preferably more often for heavily traveled routes. Also, adjacent shrubs and trees should be kept trimmed back to prevent encroachment into the pathway or obstructing cyclists' views.

Guidance

Colored Pavement Materials:

- Waterborne Paints
    - Over the past 10 years, transportation agencies in the United States have gradually replaced conventional solvent paints with waterborne paints that have low Volatile Organic Compounds (VOC) and other newer pavement marking materials. Waterborne traffic paints are the most widely used and least expensive pavement marking material available. Glass beads are either pre-mixed into the paint or dropped onto the waterborne paint to provide retro-reflectivity.
    - Waterborne paints generally provide equal performance on asphalt and concrete pavements but have the shortest service life of all pavement marking materials. This paint type tends to wear off rapidly and lose retro-reflectivity quickly after being exposed to factors such as high traffic volumes. Although still a widely used material,

waterborne paint is also used as an interim marking material until they can apply something more durable.

- Regular Solvent Paint
  - This type of paint can be used universally for just about any pavement needing paint and is the least expensive. Sometimes additives such as reflective glass beads for reflectivity and sand for skid resistance are widely used to mark road surfaces. This is typically considered a non-durable pavement marking and is easily worn by vehicle tires and often requires annual re-application.
- Durable Liquid Pavement Markings
  - Durable Liquid Pavement Markings (DLPM) include epoxy and Methyl Methacrylate (MMA). Epoxy paint has traditionally been viewed as a marking material that provides exceptional adhesion to both asphalt and concrete pavements when the pavement surface is properly cleaned before application. The strong bond that forms between epoxy paints and both asphalt and concrete pavement surfaces results in the material being highly durable when applied on both pavement surfaces. These markings are highly durable and can be sprayed or extruded but generally require long no-track times.
- Thermoplastics
  - Thermoplastics are a durable pavement marking material composed of glass beads, pigments, binders (plastics and resins) and fillers. There are two types of thermoplastics: hydrocarbon and alkyd. Hydrocarbon thermoplastics are made from petroleum-derived resins; and alkyd thermoplastics are made from wood-derived resins. One of the added advantages of using thermoplastic is that the material can be re-applied over older thermoplastic markings, thereby refurbishing the older marking as well as saving on the costs of removing old pavement markings. Although thermoplastic materials usually perform very well on all types of asphalt surfaces, there have been mixed results when they have been applied on concrete pavements.

Paint Type Estimated Product Life Advantage Disadvantages:

- Waterborne
  - Paints 9-36 months * Inexpensive * Quick-drying * Longer life on low-volume roads * Easy clean-up and disposal * Short life on high-volume roads * Subject to damage from sands/abrasives * Pavement must be warm or it will not adhere.
- Regular
  - Solvent Paint 9-36 months* * Inexpensive * Quick-drying * Longer life on low-volume roads * Short life on high-volume roads * Subject to damage from sands/abrasives * Easy clean-up and disposal * Pavement must be warm or it will not adhere.

Durable Liquids for Pavement Markings:

- Epoxy
  - 4 Years* * Longer life on low-volume roads * More retro-reflective * Slow drying * Requires coning and/or flagging during application * Heavy bead application- may need to be cleaned off of roadway * High initial cost * Subject to damage from sands/abrasives
- Thermoplastic
  - 3-6 Years* * Long life on low-volume roads * Retro-reflective * No beads needed * Any temperature for application * Recommended use for symbols and spot treatments * Subject to damage from sands/abrasives * Cost prohibited if used for large scale applications * Shown to wear quickly in conflict areas * Life of pavement marking will depend on traffic volume, road condition and application time of year

Source:
NACTO. Urban Bikeway Design Guide. 2014.
FHWA. Durability and Retro-Reflectivity of Pavement Markings (Synthesis Study). 2008

Use of Green Paint:
One significant change is the FHWA's interim approval for the use of green colored pavement within bicycle lanes in mixing or transition zones, such as at intersections and in other potential conflict zones where motor vehicles may cross a bicycle lane. They are intended to warn drivers to watch for and to yield to cyclists when they encounter them within the painted area. FHWA studies have also shown that green bicycle lanes improve cyclist positioning as they travel across intersections and other conflict areas.

Jurisdictions within the State must notify Caltrans before proceeding with green bicycle lane projects because the agency is required to maintain an inventory, but since Caltrans has requested to participate in this interim approval, the process has been streamlined because FHWA experimental treatment protocol is no longer required.

Source:
NACTO. Urban Bikeway Design Guide. 2014.
http://mutcd.fhwa.dot.gov/resources/interim_approval/ia14/index.htm

6.0 FUNDING STRATEGIES

The federal and state government, along with regional and local governmental agencies, spend billions of dollars each year to fund transportation programs. These programs range from major highway and bridge projects to local street repair. Only a small percentage of these dollars is used for planning, developing, and constructing bike-related projects and programs. However, even though the percentage is small, tens of millions of dollars are made available on a yearly basis for funding active transportation projects for both biking and walking. While the competition for these funds is fierce, a well-crafted application to fund needed infrastructure and educational programs stands a good chance of being funded.

A major source of funding for bike and pedestrian projects is the Federally funded Moving Ahead for Progress in the 21st Century (MAP-2)1 Program. The Act was signed into law on July 6, 2012. The bill, which was reauthorized for FY 2014-2015, provides $25.2 billion dollars nationwide of which just under $2.4 billion is allocated to California. Eligible activities include:

- Transportation alternatives
- Recreational trails program
- Safe Routes to School Program
- Planning, designing, or constructing roadways with the right-of-way of former interstate routes for other divided highways.

Many federal and state grants require some level of matching funds. As a result most programs rely on more than one source of money. Developing a strategy to put together all of the required funds is important, as grants will not be awarded without specifying the sources of matching funds. The strategy may include matching a state grant with a federal grant, or the use of local or regional funds.
Many cities have hired a bike coordinator to not only help develop and oversee an effective bike program, but also to coordinate their funding efforts. These positions, which now often use the term active transportation to include both bike and walking, can help cities leverage their existing investments in street repair and maintenance as well as local returns from gas tax and developer fees. Cities such as Long Beach have brought in over $20 million dollars in bike and pedestrian-related funds over the past 10 years. Recently Orange County cities were awarded over $14 million dollars to fund bike and pedestrian projects between and FY 2015-2016. An active transportation coordinator can help your city obtain a portion of these active transportation funds.

For additional information, SCAG, OCTA and Safe Routes to Schools all have resources that can be used to help determine the most effective strategy to obtain federal, state and regional funds for active transportation projects.

To help agencies determine funding sources for projects along the proposed corridors, a summary by source type is provided with details regarding types of eligible projects, match requirements, and use.

6.1 Federal Programs

6.1.1 Partnership for Sustainable Communities

Partnership for Sustainable Communities is an interagency partnership between HUD, DOT and the EPA.

- HUD offers funding opportunities to help communities realize their own visions for building more livable, walkable, and environmentally sustainable regions.
- DOT offers funding opportunities to support more livable walkable communities.
- EPA offers grants to support activities that improve the quality of development and protect human health and the environment.

Grants are offered periodically and can be found at www.sustainablecommunities.gov/partnership-resources.

6.1.2 Department of the Interior – Land and Water Conservation Fund (LWCF)

The LWCF state assistance program provides matching grants to help states and local communities protect parks and recreation resources. This 50:50 matching program is the primary federal investment tool to ensure that families have easy access to parks and open space, hiking and riding trails, and neighborhood recreation facilities.

The program is administered through the National Parks Service. Grants are allocated on an as-requested basis. The state prioritizes and selects eligible projects for LWCF assistance. For more info, visit http://www.nps.gov/ncrc/programs/lwcf/manual/lwcf.pdf.

6.1.3 Rivers, Trails, and Conservation Assistance Program (RTCA)

This program, funded through the National Park service, provides technical assistance in the form of visioning, program planning, goal setting, and community outreach. In the past, these grants have been used to establish high-level plans for the Santa River Trail and the LA River. Project proposals are due August 1st of each year. For more information on these grants, see www.nps.gov/orgs/rtca/apply.htm

6.1.4 Community Transformation Grants

The Center for Disease Control (CDC), through their Community Transformation Grant (CTG) program, offers grants designed to "create healthier communities by making healthy living easier and more affordable where people work, live, learn and play." Active living is one focus of the grant program. An example project is promoting improvements in sidewalks and street lighting to make it safe and easy for people to walk and ride bikes. Class I and Class IV bike facilities are types of bike infrastructure that may be supported by the CTG program. For more information on these grants see www.cdc.gov/nccdphp/dch/programs/ communitytransformation/funds/index.htm

6.2 State Programs

6.2.1 Active Transportation Program (ATP)

California's Active Transportation Program was created in 2013 to encourage increased use of active modes of transportation, such as biking and walking. According to the California Transportation Commission (www.catc.ca.gov/programs/ATP.htm):

> *The ATP consolidates various transportation programs, including the federal Transportation Alternatives Program, state Bicycle Transportation Account, and federal and state Safe Routes to School programs into a single program to:*
>
> - *Increase the proportion of biking and walking trips,*
> - *Increase safety for non-motorized users,*
> - *Increase mobility for non-motorized users,*
> - *Advance the efforts of regional agencies to achieve greenhouse gas reduction goals,*
> - *Enhance public health, including the reduction of childhood obesity through the use of projects eligible for Safe Routes to Schools Program funding,*
> - *Ensure disadvantaged communities fully share in program benefits (25% of program), and*
> - *Provide a broad spectrum of projects to benefit many types of active transportation users.*
>
> *Program funding is segregated into three components and is distributed as follows:*
>
> - *50% to the state for a statewide competitive program,*
> - *10% to small urban and rural regions with populations of 200,000 or less for the small urban and rural area competitive program, and*
> - *40% to Metropolitan Planning Organizations (MPO) in urban areas with populations greater than 200,000 for the large urbanized area competitive program.*

For the Orange County area, the ATP is overseen by the Southern California Association of Governments (SCAG). For Fiscal Years 2014-15 and 2015-16, the area of Southern California governed by SCAG received a total of $74.3 million for funding bike and pedestrian projects of which about 25% ($18 million) was allocated to disadvantaged communities[2]. Of the total funding available in the SCAG region, 17 projects were funded in Orange County for a total of $13 million. The grants ranged from a low of $126,000 to a maximum of $2.6 million with a median of $475,000. Fifteen of the grants in Orange County were for infrastructure development and two were for planning.

[2] ATP guidelines prescribe that no less than 25% of overall program funds benefit disadvantaged communities, which are defined as having a median household income less than 80% of the statewide median, or among the most disadvantaged 10% in the state (according to the latest version of the CA Communities Environmental Health Screening Tool), or at least 75% of the public school students in the project area are eligible to receive free or reduced meals under the National School Lunch Program.

For ATP Cycle I matching funds of a least 11.47% were required for all projects except for projects predominantly benefiting a disadvantaged community, stand-alone non-infrastructure projects (for example community safety and bike education programs) and safe routes to school projects. The source of the matching funds was any combination of local, private, state or federal funds. Matching funds were required to be expended in the same project phase (permits and environmental studies; plans, specifications, and estimates; right-of-way capital outlay; support for right-of-way acquisition; construction capital outlay; and construction engineering) as the Active Transportation Program funding. The matching requirements for ATP Cycle II are subject to change pending finalization of the program's guidelines.

For fiscal year 2016-17 and 2017-18, the funding available for the SCAG region should be similar. The next round of grant submittals will be due in March 2015. The most current information on the ATP program can be found at www.catc.ca.gov/programs/ATP.htm

6.2.2 AB2766

Since 1991 local governments have received AB 2766 funds to implement programs that reduce air pollution from motor vehicles. AB 2766 specifies that a Motor Vehicle Registration fee surcharge of $6 per vehicle be collected by the Department of Motor Vehicles and given to the South Coast Air Quality Management District (SCAQMD) for disbursement. Of this fee, 40% goes to local governments. The local funds are designed to help cities meet requirements of the federal and state Clean Air Act.

The AB 2766 guidelines indicate that the design, development, and installation of bicycle routes, bikeways/bike paths and bike trail improvements are eligible for AB 2766 funding. The guidelines go on to specify:

> *Bike lanes, paths or routes are most effective when they reduce commute and non-recreational auto travel by encouraging and increasing the use of bicycles. A bike path must eliminate and/or decrease single commuter vehicle trips and miles traveled, while improving safety and accessibility. Bike paths strictly used for recreational activities will not qualify as an eligible project because there are no motor vehicle emission reductions or vehicular commuter trips reduced or eliminated.*

Other bike facilities that promote and facilitate the increased use of non-motorized transit are also eligible. This would include bike racks, lockers, signals, and bus racks; and the installation of bike storage units with park and ride facilities or at the end of bicycle trails. In addition, the purchase of electric or standard bicycles in lieu of gas powered vehicles for police officers, community service personnel, and community residents is eligible. For more on AB 2766 funding see www.aqmd.gov/docs/default-source/transportation/ab2766-motor-vehicle-subvention-fund-program/ab2766-resource-guide.pdf?sfvrsn=2

6.2.3 Climate Ready Grant Program – California State Coastal Conservancy

The purpose of the Climate Ready grant program is to help advance the planning and implementation of on-the-ground actions that will lessen the impacts of climate change on California's coastal resources. The Coastal Conservancy fund may include trails and other public access to and along the coast.

The stages of a project generally funded by the Coastal Conservancy include pre-project feasibility studies, property acquisition, planning (for large areas or specific sites) and design, environmental review, construction, monitoring, and, in limited circumstances, maintenance. For more information see www.scc.ca.gov/category/grants/

6.2.4 Greenhouse Gas Reduction Fund: Affordable Housing and Sustainable Communities program

The auction proceeds from the State's Cap and Trade Program are appropriated in the Greenhouse Gas Reduction Fund. A minimum of 50% of the funds must be used for affordable housing.

A portion of these funds will be made available for bicycle-related projects on a competitive basis through the Strategic Growth Council's Affordable Housing and Sustainable Communities program (AHSC). Eligible projects will include those that result in a reduction of greenhouse gas emissions by increasing accessibility of housing, employment centers, and key destinations via low-carbon transportation options (walking, biking and transit), resulting in fewer vehicle miles traveled (commonly known as transit-oriented development). At least 50% of these funds will be targeted at disadvantaged communities. For updates on the program see http://sgc.ca.gov/index.php

6.3 Regional & Local Programs

6.3.1 OCTA Bicycle Corridor Improvement Projects (BCIP)

In 2012, the OCTA Board of Directors authorized 10% of Federal Congestion Mitigation and Air Quality (CMAQ) funds that are currently authorized under MAP-21 to be set aside for bicycle and pedestrian projects that are "ready to go" as determined through competitive calls for projects.

Eligible applicants include the 35 local government agencies in Orange County. Eligible agencies must be able to receive federal funding through OCTA or must be able to provide authorizing resolutions and cooperative agreements from their controlling bodies or through Caltrans as a direct recipient of Federal Highway Administration (FHWA) funds.

In the 2014 funding cycle, $4.3 million dollars were allocated for bike and pedestrian projects with a minimum grant size of $100,000 and a $1 million maximum. However, projects that required more than $1 million could be segmented into smaller phases and submitted as individual projects. Projects that were prioritized as part of a multi-jurisdictional active transportation planning effort (such as this district

5 Bikeways Strategy) received up to 10 additional points for coordination. A minimum local match of 12% was required for each grant application.

The 2016 BCIP plan is currently under review by OCTA staff with announcements regarding the plan by early 2016. For more information about the BCIP see http://www.octa.net/BCIPcall.aspx

6.3.1 Developer Impact Fees

Under California law, developers can be charged a one-time fee to offset impacts of their project. Traffic mitigation fees, infrastructure improvement fees, and fees for improving sewer and water systems to accommodate new development are common examples of development impact fees. "Exaction" is a broader term for impact fees, dedications of land, and in-lieu fees that are imposed to fund public improvements necessitated by the proposed development. School facility fees, park land dedication requirements, and road dedications and improvements are all examples of exactions.

In order for these impact fees to be imposed, the responsible agency must:

1. Identify the purpose to which the fee is put;
2. Demonstrate a reasonable relationship between the fee and purpose for which it is charged;
3. Identify all sources and amounts of funding anticipated to be used to finance the incomplete improvements; and
4. Designate the approximate dates on which the above funding is expected to be deposited into the appropriate account or fund.

For more on the Developer Impact Fee program see the California Natural Resources Agency website www.ceres.ca.gov/planning/financing/chap4.html

San Francisco has used this fee to fund transportation projects ranging from buses and street cars to bike facilities. As of 2012 the development fee had generated over $100 million dollars to support transit-related projects. To find out more about the San Francisco program see http://www.metroplanning.org/news/newsletters/173

6.4 Private Programs

There are a variety of private sources that may be tapped for funding bike-related programs. Some of the more prominent sources are discussed below.

6.4.1 People For Bikes Grant Program

Formerly known as the Bikes Belong Program, PeopleforBikes (www.peopleforbikes.org) is a bike industry-sponsored non-profit that provides community grants as well as support for advocacy.

The PeopleforBikes Community Grant Program provides funding for important and influential projects that leverage federal funding and build momentum for bicycling in communities across the U.S. These projects include bike paths and rail trails, as well as mountain bike trails, bike parks, BMX facilities, and large-scale bicycle advocacy initiatives.

Since 1999, the program has awarded 272 grants to non-profit organizations and local governments in 49 states and the District of Columbia. Their investments total nearly $2.5 million and have leveraged $650 million in public and private funding. For more information on the grant program see www.peopleforbikes.org/pages/community-grants

People-for-Bikes also sponsors the Green Lane Project, which is aimed at helping cities build better bike lanes to create low-stress streets. The program focuses on protected bike lanes, which are on-street lanes separated from traffic by curbs, planters, parked cars, or posts.

The Green Lane Project hosts hands-on workshops and study tours for city leaders, provides technical and strategic assistance, and delivers targeted grants designed to get protected bike lanes on the ground.

For more information on the Green Lane Project including an excellent video on protected bike lanes see http://www.peopleforbikes.org/green-lane-project.

6.4.4 Kaiser Permanente Healthy Eating Active Living (HEAL) Program

For over 60 years Kaiser Permanente has offered grants to charitable and community based organizations.

According to the Kaiser Permanente website:

> *Our Community Health Initiatives take a prevention-driven approach to health, supporting policies and environmental changes that promote healthy eating and active living (often referred to as HEAL) in neighborhoods, schools and workplaces. Our work also addresses community economic development, environmental sustainability and neighborhood safety—key factors in promoting healthy communities. We work with community-based organizations and residents to translate their vision for healthy communities into visible, concrete changes—and ultimately healthier neighborhoods.*

Cities such as Long Beach have used HEAL grants as part of their bike program neighborhood outreach and education effort. The Long Beach grants were obtained through their Public Health Department. For more on Kaiser Permanente grants see http://share.kaiserpermanente.org/article/grants-overview.

7.0 APPENDICES

A. Sample Letter of Support

The following is an example of a letter of support that would be prepared by an individual city and submitted as part of a grant funding application.

Date
Funding Agency
Address
City, State, Zip

Subject: Letter of Support for Funding Grant Application for (insert Project name)

To Whom it May Concern:

The City of (insert name) is submitting this letter in support of the funding grant application submitted by (insert lead agency) for the (insert project name). This proposed bikeway project represents an important piece of the regional bikeway network in south Orange County. We recognize the benefits that the project will provide not only to (insert city name), but all cities within this section of the county.

This proposed project was identified as a focus corridor as part of the District 5 Bikeways Collaborative, a joint effort involving our city, the project applicant, the Orange County Transportation Authority (OCTA), and other neighboring local agencies. Our city was an active participant in the District 5 Bikeways Collaborative. This collaborative effort focused on regional bikeway planning and the identification of bikeway projects and improvements that would provide benefits throughout Orange County's Supervisorial District 5. The collaborative was one of many projects undertaken by OCTA to improve regional bikeways planning throughout Orange County.

Improving bikeway facilities within District 5 is a key priority for our city. Bikeway facilities help to provide our residents and commuters with alternatives to automobile travel and provide safe and convenient bikeways to encourage people to travel by bicycle. We enthusiastically support the consideration of the (insert project name) for funding through this program.

Sincerely,

City Contact
Title

B. Facilitation Efforts

Preparation of this report was a collaborative effort, with facilitation by OCTA of input from public stakeholders, agency staff, and elected officials. Preparation of the strategy included the following efforts.

Project Development Team (PDT) Summary

A project development team (PDT) was convened with planning and engineering representatives from each member agency within District 5, as well as OCTA, OCCOG, and project consultant team staff. The PDT met on multiple occasions to discuss project goals and objectives, opportunities and constraints, preliminary corridor alignments, and draft ranking criteria. Meetings were held at Laguna Hills Community Center (October 2013 & May 2014), Lake Forest City Hall (December 2013), San Juan Capistrano Council Chambers (April 2014), Laguna Beach City Hall (July 2014), and San Juan Capistrano Community Center (September 2014). Attendance at the PDT meetings ranged between 20-30 attendees. The PDT membership included the following representatives:

- City of Aliso Viejo – Shaun Pelletier
- City of Dana Point – Brad Fowler
- City of Irvine – David Law
- City of Laguna Beach – Scott Drapkin
- City of Laguna Hills – Ken Rosenfield, Humza Javed, and Katie Crockett
- City of Laguna Niguel – Edgar Abrenica
- City of Laguna Woods – Douglas C. Reilly
- City of Lake Forest – Carrie Tai
- City of Mission Viejo – Philip Nitollama and Greg Stones
- City of Rancho Santa Margarita – Anthony Viera and Nate Farnsworth
- City of San Clemente – Tom Frank
- City of San Juan Capistrano – Joe Mankawich and George Alvarez
- County of Orange – Khalid Bazmi, Joe Sarmiento, Sam Ahi, and Hany Ahmed
- Caltrans – Romeo Estrella and Marlon Regisford
- Transportation Corridor Agencies (TCA) – Valarie McFall
- OCTA – Charlie Larwood, Gary Hewitt, Carolyn Mamaradlo, Marlon Perry, Paul Martin, Nathan Wheadon

Focus Group Meetings

Focus group meetings were organized with PDT representatives to create smaller working groups consisting of groups of cities. During the focus group meetings, large-format boards were printed for brainstorming potential bikeway corridors. The printed materials included the identification of water and rail corridors, the transportation network, existing and proposed bikeways, major destinations, and other key features for consideration and collaborative brainstorming.

Focus group meeting #1 occurred on January 13, 2014 at the City of Mission Viejo with representatives from Mission Viejo, Lake Forest, Laguna Woods, Laguna Hills, Rancho Santa Margarita, County of Orange, and Caltrans. Focus group meeting #2 occurred on January 27, 2014 at the City of Dana Point with representatives from Dana Point, Laguna Beach, San Clemente, County of Orange, and Caltrans. Focus group meeting #3 occurred on January 30, 2014 at the City of Laguna Niguel with representatives from Laguna Niguel, Aliso Viejo, and County of Orange.

From the three focus group meetings, the "Potential Bikeway Corridors" inventory map was developed to identify potential corridors which agencies would like to develop in the future. From these potential corridors, the nine regional bikeway corridors were developed. Figure B-1 illustrates the potential bikeway corridors initially identified by the PDT members. While not all of these connections were ultimately designated on the recommended regional network, they may still be considered in localized planning and implementation efforts by the respective cities and County agencies.

These potential bikeway corridors can be identified and serve as local spur connections from the nine regional bikeway corridors and other bikeway facilities throughout District 5. These local spur connections will help build a larger bikeway network with additional connectivity to regional and local bikeway corridors as well as regional and local destinations and attractions.

C. Outreach

Media

Information regarding the District 5 regional bikeways was provided at www.octa.net/Share-the-Ride/Bike/Bikeways-Planning/Regional-Bikeways-Planning. The webpage includes a project overview, background, schedule, and a map illustrating the existing bikeways network in the project area along with the potential bikeway corridors in District 5. The webpage was updated regularly with project materials including meeting materials, meeting dates, and contact information. Additionally, outreach events schedules within the community were posted to the webpage to provide notification to the community. The project website includes a marketing contact from OCTA in the frame on the right with phone and email contact information provided.

PDT IDENTIFIED POTENTIAL BIKEWAY CORRIDORS

OCTA District 5 Bikeways Collaborative

KOA CORPORATION PLANNING & ENGINEERING

Source: OCTA

BIKEWAY CORRIDORS

- Potential Bikeway Corridors

LEGEND

- Transportation Center
- Rail
- Schools
- Colleges
- Parks / Open Space
- Waterbody
- City Boundary
- Supervisorial District 5

Figure B-1

Questionnaires

Questionnaire #1

An initial online questionnaire was distributed to gather input that would be useful for developing the regional bikeway corridor alignments and in consideration of the types of connections to serve. The results of this questionnaire were provided to the PDT and considered in developing the draft corridors. There were a total of 167 respondents through the OCTA webpage. Below are the results of the questionnaire:

1. How often do you ride your bicycle?		
Answer Options	**Response Percent**	**Response Count**
4-7 days a week	41.3%	69
2-3 days a week	31.1%	52
Once a week	13.2%	22
Less than once a week	14.4%	24
	answered questions	167
	skipped questions	0

2. Why do you ride your bicycle (check one that applies most often)?		
Answer Options	**Response Percent**	**Response Count**
To go to work/school	31.7%	52
To go shopping/run errands; For entertainment; To socialize	12.8%	21
To exercise; For recreation	55.5%	91
Other (please specify)		16
	answered questions	164
	skipped questions	3

3. How far do you usually ride your bike?		
Answer Options	**Response Percent**	**Response Count**
0-3 miles	14.5%	24
4-6 miles	18.7%	31
7-9 miles	12.7%	21
10 miles or greater	54.2%	90
	answered questions	166
	skipped questions	1

4. Which of the following do you use to ride your bicycle (check all that apply)?		
Answer Options	**Response Percent**	**Response Count**
Off street paths (e.g. sidewalks, trails, etc.)	80.2%	134
Residential streets or streets with a speed limit below 35 MPH	79.0%	132
Streets with a speed limit over 35 MPH and with a bike lane	70.7%	118
Streets with a speed limit over 35 MPH and no bike lane	46.1%	77
Other (please specify)		12
answered questions		167
skipped questions		0

5. What is the biggest challenge to bicycling in your neighborhood?		
Answer Options	**Response Percent**	**Response Count**
Steep hills	14.5%	22
High-speed traffic	32.9%	50
Long distances	0.7%	1
Lack of bicycle facilities (e.g. bike lanes, bike parking, etc.)	52.0%	79
Other (please specify)		30
answered questions		152
skipped questions		15

6. Have you ever been in an accident on or with a bike?		
Answer Options	**Response Percent**	**Response Count**
Yes	38.8%	64
No	61.2%	101
If yes, please describe (optional).		54
answered questions		165
skipped questions		2

If yes, please describe (optional).	
Number	**Response Text**
1	Hit & run in Laguna Beach. The driver sideswiped me then took off.
2	I have had 3 minor collisions with cars while on my bike and had one major solo crash. All within the last 9 yrs.
3	I was run off the road by an automobile, separated shoulder
4	Another cyclist riding the wrong way hit me head-on.
5	Mechanical failure

If yes, please describe (optional).	
6	A block of wood fell off a truck. I was biking on the road and I couldn't get out of the way. So I fell on the street and I feared getting hit from the cars behind me.
7	It was my own fault. Did not involve a car.
8	Twice years ago between J Serra and Avery (minor scrapes). Too many close calls to count.
9	Hit by a car twice. Once was my fault the second time I was in a painted bicycle lane in downtown Anaheim and I was cut off by a car.
10	Never a car/bike collision, because I ride like a driver. And I have been spared the bad fortune of being in the trajectory of an impaired motorist.
11	Driver ran a stop sign on T intersection.
12	Almost. The SE corner of Campus and Culver is an accident waiting to happen. Cars turning east to Campus tend to go without stopping or looking.
13	Too many close calls and aggressive or unaware drivers who drive to close to a bicyclist or sound their horns as they pass.
14	Hit by a truck (vehicle failed to yield). Hit a pedestrian who jaywalked (she was cited). Skidded on oil while turning.
15	A driver made an illegal maneuver coming from a stop and hit me on the side, while I was crossing the intersection with a green light.
16	I've been run down 2 times both knee , operations , uninsured , hit and run
17	I have not been hit by a car, but have had plenty of close calls with cars driving into the Class II bike lane and almost hitting me.
18	I have been grazed, (not too serious), by a car, on two separate occasions.
19	Since I'm 60, and have been riding most of my life, I've been in several serious ones. Fortunately none were life threatening.
20	children on the bike path stopping abruptly.
21	With another rider, cutoff, cracked helmet in half. No hand signals used by the offending rider.
22	Many times it is people in some type of motorized vehicle who is driving much too fast or turning carelessly with little to no regard of a bicyclists right of way
23	Slipping on wet roads and falling on mountain trails.
24	About 30 years ago I hit a sidewalk adjacent, raised planter (OK, I used to ride on sidewalks as a kid) and broke my ankle.
25	sideswiped on Hamilton bridge, followed and driven into curb on w16th in Costa mesa
26	DO YOU MEAN BIKE CRASHES? (THEY ARE USUALLY AVOIDABLE AND ARE NOT ACCIDENTS.) DURING 70 YEARS OF BICYCLING: - SEVERAL WITH STATIONARY OBJECTS. - MAYBE 4 WITH OTHER CYCLISTS - NEVER WITH A MOTOR VEHICLE.

If yes, please describe (optional).	
27	I rear-ended a truck that cut me off.
28	Hit by a car who turned in front of me without notification. No bike lane.
29	slipped on wet surface, fell, bruised hand
30	Hit by a car in South Carolina. Other crashes by myself or in races.
31	Car turning right did not look right and hit me and took off
32	Ran off the road by a car on Jamboree Blvd.
33	Motorist made a sudden right turn in front of me on Crown Valley Parkway and I collided with the vehicle.
34	I slipped on wet pavement and had skin abrasions in 2004
35	Car swerved into bike lane on Lambert Road in North Orange County and struck me. The car kept driving without stopping.
36	Car wanted to make a right hand turn and parked me into the curb. Car made an oncoming left hand turn trying to out run me in the intersection.
37	I have been hit by a truck, and thrown over the handlebars of my bicycle, among other accidents. I ALWAYS wear a helmet!
38	Was wearing a high visibility 3m scotchlite sweater and was hit by a car turning. He never even looked in my direction when pulling into the street. Pulled out right in front of me.
39	about 14 years ago, someone turning right against a red light as I was in the crosswalk, struck me, destroying my bike. Luckily, I rolled over the hood and landed on my feet. Driver took me to emergency care then to Jax Bicycle Center to buy me a new bike.
40	I have been twice struck by cars that were turning into shopping centers. In one of these hit-and-run accidents, I was thrown onto my knee, which resulted in hemorrhagic bursitis ligament strain, and a chondral fracture of the patella. As a result, I now have arthritis in that knee and underwent arthroscopic debridement 2 1/2 weeks ago. My life has been forever altered by a vehicle that came up from behind and suddenly cut across my path without warning.
41	on sidewalk, something jammed in my spokes
42	Many years ago (and not in California) I was riding in a designated bike lane when a car in the oncoming lanes turned left in front of me. I collided with the passenger-side of the car, went over the hood, and was saved from significant trauma by my helmet.
43	stopped too fast and fell off, trying to avoid turning vehicle in the right lane where I was going straight (thankfully, didn't collide with another vehicle or bike)
44	Hit from the rear while making a left hand turn on my bike.
45	Several. Only one involving a driver, in Corona Del Mar on PCH. Inattentive driver turned right suddenly in front of me and another biker after having just passed us seconds before.
46	Another cyclist hit me. Also a car almost hit me in the bike lane.

If yes, please describe (optional).	
47	the car driver was not looking and backed out of there drive way and hit me
48	I fell from my bike while transitioning from the street (bike lane) to an off street bike trail. The road surface, gutter, and curb created a situation in which caused my front tire to track in the gutter and not to the path smoothly causing me to lose control and fall.
49	I was hit by a car in an intersection and bumped into a car in a crosswalk. I almost get hit by a car every time I ride my bike!
50	was riding on sidewalk and car cut in front of me
51	I was riding in a fairly low-speed limit medium density residential area with shops and a car coming from a 25 mph residential area ran through a stop sign speeding. In order to avoid the car, which I judged was going over 30 mph, I knew I had to fall into the street and off my bike. So I got off my bike and hit the road and my bike rolled on top of me, but I avoided the car. I wasn't wearing a helmet. I managed to get by with a few scrapes and a bruised elbow. Since then, I am overly cautious and will bike slower and stop more frequently to avoid dangerous cars.
52	Hit by a car as it was turning on to PCH in Laguna Beach.
53	Fell off braking for a bunny crossing the path :-)
54	Taking a corner too quickly, touching wheels, and hit a street reflector

Other Comments	
Number	Response Text
1	I am interested in the Citizens Advisory Committee
2	Off street bike paths are needed desperately.
3	More dedicated trails for bikes and safe connections to Metrolink and more bus runs for bike racks
4	Why can't we place K rails on bike routes that parallel major roads
5	Vehicle speed limits are too high on most streets making for a dangerous combination when bicycles are put into the mix. There should be more traffic control police to slow things down!
6	We need more bike paths/lanes along the major streets. Sidewalks are cluttered with electrical boxes, street light boxes, power poles, etc.; sidewalks don't allow enough space for bike traffic.
7	great information and survey
8	I've heard talk of a bike/ pedestrian bridge being added to the west side of the existing train bridge over San Juan Creek behind SJC City Hall. The "Trail" on the east side of San Juan Creek from Doheny currently dead ends at the San Juan Creek/ Trabuco Creek terminus. Most people who ride that trail just carry their bikes over the train tracks (it's illegal, but MUCH safer than riding northbound Camino Capistrano into San Juan from the beach). If the trail was extended over San Juan Creek by a bridge it would alleviate the need to travel northbound on Camino Capistrano altogether. Thanks for your time.
9	Please keep working hard to improve cycling in north Orange County. Your hard work isn't going unnoticed.
10	Thanks for the great work. Orange County Cycle Paths could always be better and the obvious gaps and disconnects are frustrating ... but despite that they are a great amenity, and we should be grateful for what you do! Thank You
11	Creating safe and well-lit bike lanes to major centers such as CSUF, Fullerton College, Fullerton Transportation Center, Brea Mall, Honda Center, Angel Stadium etc., will encourage bicycle usage and relieve congestion and pollution and allow persons to consider this viable year-round option for commuting and travel. I am grateful for what has been done so far and would encourage more active work in this undertaking. Please make it safe and convenient for us to ride our bikes.

Other Comments	
Number	**Response Text**
12	Cycling for recreation or commuting is safe and FUN in Orange County! Spread the word about Safe Cycling by encouraging people to take the TS101 classes. Slow down and enjoy the ride!!!
13	Please install more Class I bikeways!!!
14	Thank you for supporting transportation by bicycle!
15	It's important to build bikeways now. My friends are dying on the road. Drivers don't like bike riders. We need a circular bike only path that actually circles Orange County and allows riders to enter the path and be safe from cars. We should work to do this now. We need to use the old railroad tracks.
16	Please start including bicycle facilities on all transportation projects. This is a zero emission transportation mode and needs to get priority funding.
17	We need more areas specifically for cyclists that are off road and safe, painted lines in the street do nothing to impede motorists from running over or into cyclists as most motorists do not even regard the bike lane as its own part of road.
18	Preserve and improve trail along east side of San Juan Creek from Camino Cap to Doheny Beach.
19	I would use my bicycle much more often for shopping if there were ways to get to even a few destinations, like Irvine spectrum, without competing with car traffic, especially at night.
20	Please consider a bikeway connection on Irvine Blvd between Tustin Ranch Road and Newport Blvd. Thank you!
21	I need A TUNE UP WITH NEW TIRES & TUBES.
22	By far the biggest hazard is highway overpasses with no bike path. Getting across highways safely on a bike is very difficult, and there are many of them in OC.
23	Santa Ana is one of the most unfriendliest bike cities I've ever known!
24	We need to get the word out to the community that riding is safe and fun. The best way to do that is have a ciclavia event in orange county. Close the streets somewhere on a Sunday and have a festival type event like in LA. How about downtown Santa Ana? Families, food trucks, music, art, bikes, corporate sponsors, etc. I am willing to help, but don't know who to contact or how to get started! Eric
25	Great Job OCTA!!!!
26	Need to study Amsterdam as that MAJOR EU city has more bikes than cars. And car traffic mixed with bike traffic.
27	none of this survey seems to be about South County, which is the worst place for bike riding at present. Few trails and almost none link to one another.
28	Please install a class 1 bike lane on the unused Pacific Electric Right of Way, which cuts through OC and bisects Garden Grove.
29	I drive and I ride. I share the road.
30	Give buses the capacity for more than two bicycles.
31	Consider reaching out to OC bike clubs to get more bike rider input.
32	I would ride to work if there was a safe trail or bike lane.
33	As long as people on bikes run stop signs & red lights; ride against traffic in the street; unpredictably ride on and off of the sidewalks... motorists are going to continue to disrespect and dislike us. Better public education and enforcement of the vehicle code for both bikes and cars is much needed.
34	Bikes and high speed cars just don't mix well. More truly dedicated bike trails, like the River Trail would be great.
35	There needs to be designated parking areas for landscapers and maintenance vehicles that do not impede bike traffic using designated bike lanes or paths. A turnout area for maintenance purposes needs to be created in greenbelt (similar to bus stops) that provides for the safety of the bicyclist and the maintenance crews working in the street.
36	I would like to help bring attention to drivers of bicyclists rights to share the road and navigate intersections with our safety as a number one priority. Secondly I could useful in helping develop bike trails and lanes to encourage pedestrian and bicycle routes for pedestrians also.
37	Like the fact that you are doing surveys to making biking safer.... too many cyclists are being killed.

Other Comments	
Number	**Response Text**
38	Long somewhat flat trails away from traffic are the best. A neurologist I know made me promise him that he would never, ever find me riding in traffic. I think the biggest problem riding in bike lanes is that cyclists tend to think that all the traffic is watching out for them. Not so true.
39	I live in Westminster and just to get out of the city is a huge hassle, McFadden and bolsa are TERRIBLE for bikes
40	We need more bike lanes in South Orange County, especially Mission Viejo, Laguna Niguel and Aliso Viejo. Thanks!
41	The City Council of Aliso Viejo is doing a lot to make Aliso Viejo very bike friendly, but Pacific Park, from the 73 to Wood Canyon Drive is not safe for bicyclists, in my opinion. The speed limit is 50, but most of the time there is little traffic and some drivers thunder through at 60 and even 70 mph. Furthermore, this stretch of Pacific Park is now a 4 lane street, but, in my opinion, it can be reduced to a 2 lane street; the bike lanes can be expanded and separated from traffic with a row of trees or shrubbery. With the beautiful views, this area can become great for bicyclists. For example, people can ride their bikes from their homes to the shopping mall on Aliso Creek, to the Aliso Viejo library, and to the different park areas.
42	Orange County's level of bike (un-?)safety is so severe I am too afraid to use city streets. It's just not worth it and there is such a large system of trails I don't really see the point. But this seriously limits the metropolitan area's ability to encourage alternative uses for transportation.
43	I don't live in the 5th District. It is the place to ride, when will you have a survey for the other districts? I want to ride my work from Tustin to Santa Ana. It's far too dangerous even though it's a straight shot via streets. Help!
44	Wahoo!

Questionnaire #2

A second questionnaire that asked respondents to identify corridors they would be most likely to utilize was distributed online, during outreach events, and at the second Roundtable event. The survey included a graphic showing the preliminary regional bikeway corridors for the respondents to select the top three regional corridors they would like to see studied further. A sticker survey was conducted during the Roundtable #1 meeting for the participants to select the top three corridors they would like to see studied further. The table below shows the results of the online and sticker survey.

Corridor	Online Questionnaire	Roundtable #1 Sticker Survey	Total Survey Score
PCH Corridor	82	14	96
Laguna Canyon Corridor	59	3	62
Aliso Creek Corridor	54	4	58
Muirlands/Cabot Corridor	35	12	47
Antonio/La Pata Corridor	18	5	23
San Juan Creek Corridor	18	4	22
El Toro/Alicia Corridor	20	1	21
Portola/Santa Margarita Corridor	17	2	19
Oso Parkway Corridor	9	4	13

Bikeways Roundtables

Two roundtables provided the opportunity for public input on the project. The first roundtable provided project information and a presentation was made on the potential corridors and the proposed ranking criteria. Public input was requested and a group discussion was facilitated. Large-format boards were provided describing each of the draft corridors. The second roundtable included a presentation focused on key changes since the first roundtable and the ranking of the nine regional bikeway corridors. Attendees included public stakeholders from bicycle advocacy groups as well as elected officials and community residents. Attendees at the roundtables were provided various opportunities to provide feedback including participating in the group discussion, provide comments on the boards directly, and through comment sheets.

Bikeways Roundtable 1: Laguna Hills Community Center

The first bikeways roundtable was conducted in Laguna Hills on Wednesday, May 28, 2014, at the Community Center to provide detailed information to members of the public and solicit input on the draft corridors and ranking criteria. Approximately 30 people attended. A presentation was given, discussing the regional context and background, with an overview of each draft corridor. Large-format boards were also provided to illustrate the alignments and characteristics of each draft corridor. The ranking criteria were summarized in the PowerPoint presentation. Input from stakeholders and the public helped refine and prioritize the corridors as well as identify non-engineering ideas for improving bicycling within District 5. Roundtable materials were provided at the workshop and on the OCTA website, which included the presentation given in PDF format, a project factsheet, the Draft Regional Bikeways Corridors Map, and the draft evaluation criteria.

Bikeways Roundtable 2: San Juan Capistrano Community Center

The second bikeways roundtable was conducted in San Juan Capistrano on Wednesday, September 17, 2014, at the Community Center to provide a quick summary of the refined corridors and ranking analysis and to discuss the next steps for the feasibility studies. Large-format boards were provided to illustrate the proposed bikeway corridors and the top three ranked corridors. A presentation was given, discussing the proposed corridors with changes identified as a result of the first bikeways roundtable. Roundtable materials were provided at the roundtable and on the OCTA website, which included the presentation given in PDF format, the Regional Bikeways Corridors Map, and the corridor ranking results.

D. Corridor Ranking Criteria

Corridor Ranking Criteria Definitions and Scoring

Since raw measures are in different units, they have been normalized to provide a "weighted score" in order to combine scores across the different scales. For example, the number of collisions per mile for a given corridor is transformed into a normalized score between 0 and 100 using the formula given below. To maintain consistency (100 is best), the maximum and minimum terms have been reversed if the scoring is done on a measure where lower values are more desirable.

$$\text{Normalized Value} = 100 \times \frac{\text{Actual value}}{\text{Maximum value in range}}$$

Below is a discussion of the criteria and weighting utilized in the ranking analysis.

1. **Level of Traffic Stress (LTS):** addresses perceived safety related to traffic volume, traffic speed and existing bikeway type. The foundation for the traffic stress analysis is based on The Mineta Transportation Institutes' Low-Stress Bicycle and Network Connectivity model. High-stress routes are prioritized for treatment. Weight: 1.0

    - Stress increases with the number of traffic lanes, traffic speed, and lack of existing bikeway facilities. LTS scores can range from 1 (low stress) to 4 (high stress).

STRESS CATEGORY	STRESS INDICATOR
LTS 1	Suitable for almost all cyclists, including children trained to safely cross intersections.
LTS 2	Suitable to most adult cyclists but demanding more attention than might be expected from children.
LTS 3	Suitable to many adults currently riding bikes in American cities.
LTS 4	Suitable to very few people, the "strong & fearless" cyclists who will ride in nearly any setting.

- The criteria for level of traffic stress (LTS) used on the District 5 Regional Bikeway Corridors were the following:

FACTORS	LTS 1		LTS 2		LTS 3			LTS 4			
Bike Facility	Class I	Class II	Class II	None or Class III	None or Class III	None or Class III	Class II	None or Class III	None or Class III	None or Class III	Class II
Number of Lanes	No effect	2	No effect	2-3	2-3	4-5	4 or more	2-3	4-5	6 or more	No effect
Speed (mph)	No effect	Up to 25	30	Up to 25	30	Up to 25	35	35 or more	30 or more	No effect	40 or more

(No effect) = Factor does not trigger an increase on this level of traffic stress.

- The LTS analysis scoring calculations of each corridor were derived by first identifying the LTS score of each street segment within a corridor. The distance of all street segments with the same LTS score (1-4) within a corridor were calculated in miles.
    - The magnitude of each LTS score (1-4) was calculated using the total distance of each LTS among the corridor (in miles), as shown in the formula below:
        - (LTS Score) x (Total Distance of LTS Among Corridor (miles))
    - The raw score for each corridor was calculated by adding the magnitude of each LTS score category and dividing that by the length of the corridor (in miles) as show in the formula below:
        - (Magnitude of all LTS score categories) / (Length of Corridor (miles))

2. **Reported Collisions:** addresses safety through five years of reported data, normalized by crashes per mile. Unlike automobile crashes, the lower volume of bike crashes and lack of robust, long term exposure data (i.e. number of bicyclists using each corridor) means that this dataset is less statistically sound than others. However, it is still commonly reported and easily understood. Weight: 1.0

   Crash data were obtained from the California State Wide Integrated Traffic Records System (SWITRS), which provides a statewide compilation of all vehicle, pedestrian and bicycle related crashes on public streets and highways.

- For each corridor, a 100-foot buffer was defined. All reported collisions for the five year period (2007-2011) were counted. The total reported collisions were divided by corridor length in miles. Corridors with higher collisions per mile are prioritized for treatment.

3. **Economic Efficiency:** measures the financial benefits associated with the corridor, normalized by the number of anticipated users, and divided by planning level construction cost estimates. Weight: 0.75

- Using National Cooperative Highway Research Program (NCHRP) Report 552 methods, ¼, ½, and 1 mile buffers are drawn around each corridor to obtain population and journey-to-work mode share data. The bike commute share rate is factored up to estimate the rate of all existing adult bicyclists (both commute and non-commute). This rate is applied to the population around the corridor to provide an estimated number of existing bicyclists. To estimate the number of new bicyclists induced by new bikeways, a multiplier is applied to the number of existing bicyclists. Based on these ridership levels, the cumulative financial value for annual mobility, health, recreation, and reduced auto use benefits is calculated.

- The assumptions in the NCHRP method are modified to more conservative values (for example, rather than assuming that a new corridor facility would result in usage by new riders 365 days per year, usage was estimated for only 12 days per year). Also, all benefit figures are calculated using the original dollar values rather than updated to 2015 values. These simplifications and conservative assumptions are considered appropriate given the high-level comparative nature of the assessment. The economic evaluation assumes a 30-year analysis period, 0.57% annual population growth rate and a 5% discount rate. The net present value (NPV) of benefits is divided by cost.

- The calculation methodology is comprised of the following categories of data and calculations to determine the benefit-cost ratio (BCR).

    - ***American Community Survey (ACS) Data*** – contains data used to determine the following information based on the ACS data and the NCHRP Report 552 methodology.
        - Total Population
        - Adult Population
        - Workers 16+
        - Bike Commuters (Bicycle Only)
        - Bicycle Mode Share (mean percentage within buffer)
        - Adult Population (not cumulative)
        - Commuters (Workers 16+)

    - ***Calculated Rates*** – contains the adult bicycling rates calculated using the ACS bicycle commute mode share (C) and the formula below provided in the NCHRP Report 552 methodology.

$$T_{\text{moderate}} = 0.4 + 1.2C$$

The table below summarizes the Benefit-Cost Analysis for the nine study corridors.

	Calculated Rates	EXISTING		NEW		Annual Mobility Benefits	Annual Health Benefits	Annual recreation Benefits	Annual Reduced Auto Use	Annual Combined Benefits	Project Life Combined Benefits (30 yrs)	Cost	Benefit-Cost Ratio
		Bike Commuters	Adult Bicyclists	Bike commuters	Adult Bicyclists	Bike commuters existing + new	New adults	New adults - new bike commuters	New bike commuters			Maintenance not included	
Corridor													
Aliso Creek Trail		578	1879	769	2044	$1,964,491	$261,586	$152,990	$109,369	$2,488,436	$37,757,162	$9,107,852	**4.5**
Quarter-Mile	1.9%	266	611	514	1,179								
Half-Mile	1.7%	184	515	205	571								
One Mile	1.3%	127	754	50	294								
Antonio/La Pata/Pico		131	528	139	527	$318,057	$67,416	$46,518	$19,781	$451,773	$6,153,177	$12,284,675	**0.6**
Quarter-Mile	0.8%	43	146	83	282								
Half-Mile	0.8%	30	133	34	148								
One Mile	0.7%	58	248	22	97								
Laguna Cyn Rd/El Toro/ Alicia		460	1194	356	1065	$948,965	$133,868	$83,219	$50,130	$1,216,183	$17,983,490	$11,170,302	**1.8**
Quarter-Mile	1.0%	64	253	124	488								
Half-Mile	1.2%	109	291	121	323								
One Mile	1.4%	287	650	112	254								
Laguna Canyon		50	160	45	134	$109,251	$17,197	$10,775	$6,339	$143,562	$2,060,800	$13,271,851	**0.2**
Quarter-Mile	0.9%	11	29	21	56								
Half-Mile	0.9%	12	38	13	42								
One Mile	0.9%	27	93	11	36								
Muirlands/Cabot/Camino Capistrano		865	2604	1055	2785	$2,460,708	$356,483	$207,626	$150,070	$3,174,886	$48,703,636	$8,182,863	**6.4**
Quarter-Mile	3.0%	352	821	680	1,584								
Half-Mile	2.6%	243	702	269	779								
One Mile	2.0%	270	1,082	105	422								
Oso Parkway		118	446	104	385	$268,429	$49,330	$33,728	$14,841	$366,329	$5,062,515	$6,148,519	**1.0**
Quarter-Mile	0.8%	25	89	47	172								
Half-Mile	0.8%	29	104	32	115								
One Mile	0.7%	65	253	25	99								
Pacific Coast Highway		216	631	226	693	$528,474	$88,729	$56,004	$32,224	$705,432	$10,110,333	$5,345,509	**2.2**
Quarter-Mile	0.9%	63	206	122	397								
Half-Mile	1.0%	62	181	69	201								
One Mile	1.0%	91	244	35	95								
Portola Santa Margarita		76	316	84	318	$189,685	$40,721	$28,080	$11,970	$270,456	$3,669,629	$7,239,154	**0.6**
Quarter-Mile	0.8%	25	86	48	165								
Half-Mile	0.8%	22	87	25	97								
One Mile	0.7%	29	143	11	56								
San Juan Creek Trail		323	898	407	975	$1,087,270	$124,793	$68,127	$57,936	$1,338,125	$20,878,928	$4,183,833	**5.2**
Quarter-Mile	3.8%	135	288	260	555								
Half-Mile	3.5%	102	252	114	280								
One Mile	2.7%	86	358	34	140								
TOTAL		**2814**	**8637**	**3182**	**8907**	**$7,875,330**	**$1,140,123**	**$687,067**	**$452,660**	**$10,155,182**	**$152,379,670**	**$76,934,558**	**2.2**

Note: Calculations above are based on the methodology described in the National Cooperative Highway Research Program Report 552

- ***Existing Adult Bicyclists*** – applies the calculated adult bicycling rates to the adult population to estimate the number of existing adult bicyclists.

- ***New Adult Bicyclists*** – applies multipliers for each buffer (1/4, 1/2, and 1-mile), provided in the NCHRP Report 552, to the calculated existing adult bicyclists values to calculate the number of new bicyclists.

- ***Annual Mobility Benefits*** – assumes monetary value for time people are willing to add to trips in order to use designated biking facilities ($4.08 for Class I and $3.60 for Class II). Annual commuter trips are calculated based on the number of existing and new bicyclists multiplied by 364.8 commute trips per year. This is more conservative (48wks/4days/1.9trips) than what is recommended in the NCHRP Report 552 (50x5x2). Then, the percentage of Class I vs. II trips are determined based on the percentage of existing conditions along the corridor.

- ***Annual Health Benefits*** – uses the annual per-capita cost savings from physical activity of $128 to calculate the annual health benefits of new adult bicyclists.
- ***Annual Recreation Benefits*** – uses the calculated new adult bicyclists, the calculated new bike commuters, the days per year of bike recreational use, and the "typical" day which is valued at $10, to calculate the Annual Recreation Benefit.

- ***Annual Reduced Auto Use*** – uses the calculated new bike commuters, the savings per mile, each way trip distance value, and the calculated commute trips per year to calculate the annual reduced auto use benefit for new bike commuters. Savings per mile and each-way-trip distance values were provided in the NCHRP Report 552 methodology.

- ***Combined Benefits*** – is the sum of annual mobility, health, recreation, and reduced auto use benefits.

- ***NPV Combined Benefit***s – uses a 30 year analysis period, an annual population growth rate of 0.57%, and a discount rate of 5% (values provided in the NCHRP Report 552 methodology) to calculate the NPV combined benefits.

- ***Cost*** – is the value calculated from the planning-level construction cost estimates calculated for each corridor, which do not include right-of-way, utility impacts, and maintenance costs.

- ***Benefit Cost Ratio (BCR)*** – uses the NPV combined benefits and the construction cost estimates to calculate the BCR.

4. **Trip Demand:** Based on the Bicycle Priority Index (BPI), a measure of population and employment density, land use, local schools, and transit that influences usage. Weight: 0.75

   - OCTA Bicycle Priority Index GIS output: score per acre. Higher numbers represent a higher estimated potential demand and therefore a higher priority for treatment. The BPI calculations use the origins and destination calculated values within a 1/4 mile buffer for each corridor.
   - The following data are used in the BPI calculations:

ORIGINS

FACTOR	MAX VALUE
Population Density (Base)	10
Population Growth (2035)	8
Population Density less than 18 years old (US CENSUS ACS)	8
Land-Use Mix	8
Bicycle to Work (US CENSUS ACS)	8
Bicycle Network Proximity (Existing)	8

DESTINATIONS

FACTOR	MAX VALUE
Employment Density (Base)	8
Employment Growth (2035)	8
Universities/Colleges (Enrollment)	8
Metrolink Rail Stations (AM Alightings)	8
Schools (Elementary, Middle, High School)	8
Parks, Local Retail/Public Services	4
Bus Stops (PM Trips)	6

   - The BPI is determined using the following formula for each corridor:
     - (Sum of Origin Values + Sum of Destination Values) / (Quarter-Mile Service Area (in acres))

5. **Public Support:** incorporates public priorities through a Public Demand Index. The public input was acquired through Roundtable #1 and online surveys. Combination of online survey questions regarding the selection of the top three desired corridors and the roundtable "sticker survey" votes. Weight: 0.5

6. **Physical Constraints:** A subjective assessment of freeway crossings, on-street parking impacts, channel crossings, railroad crossings, slope, the number of unsignalized street crossings, the need for roadway infrastructure/bridge or bridge crossings, and the need for roadway widening. Fewer constraints result in a higher score, as the corridor will be easier to implement. Weight: 0.5

- The scoring of each individual category was weighted differently by how significant the constraint would be. A total raw score and weighted score was then determined based on the sum of all individual category scores.
    - ***Freeway Crossings*** – measured by the number of freeway crossings that occur along the entire corridor.
    - ***On-street Parking*** – measured by the length (miles) of on-street parking along the entire corridor divided by the corridor length (miles).
    - ***Channel Crossings*** – measured by the number of channel crossings that occur along the entire corridor divided by the corridor length (miles).
    - ***Railroad Crossings*** – measured by the number of railroad crossings that occur along the entire corridor.
    - ***Slope*** – measured by the length (miles) of a roadway or bikeway facility having a slope of greater than 5% divided by the corridor length (miles).
    - ***Unsignalized Street Crossings*** – measured by the number of unsignalized crossings along the entire corridor divided by the corridor length (miles).
    - ***Need for Roadway Infrastructure/Bridge or Bridge Crossings*** – measured by the number of locations where roadway infrastructure or a new bicycle/pedestrian bridge or improved bridge crossings were needed throughout the corridor.
    - ***Need for Roadway Widening (for proposed facilities)*** – measured by the length (miles) of roadway widening needed for proposed facilities divided by the corridor length (miles).
    - ***Existing vs. Proposed Bikeways*** – measured by the ratio of existing versus proposed bikeway facilities of the entire corridor.

7. **Completes the Network:** This is measured by the number of intersections with other existing and proposed bikeways. Although partly captured in the BPI method, the number of links/crossings with existing or proposed bikeways (from CBSP and this project) is recalculated here as the BPI does not include the proposed corridors. Connections to Class 3 bikeways were not considered. Note that this is largely a function of length; therefore the number of connections has been divided by miles. Weight: 0.25
8. **Completes the Corridor:** the portion of the corridor that is already built to at least minimum Caltrans standards for the bikeway type that is proposed. A high ratio (near 100%) means that the corridor has no existing bikeways to build on. This helps to prioritize corridors which are already partially built. This factor is also part of the LTS Index. Weight: 0.25.

E. Corridor Cost Estimates – Detailed Summary

Cost estimates were prepared for each corridor to determine planning-level estimates and were used in the economic efficiency criteria. The costs utilized in the ranking analysis include new bicycle/pedestrian bridges, freeway interchange improvements, and construction costs, but do not include environmental clearance, design, utility impacts, right-of-way, or maintenance costs. The table below summarizes the planning-level cost estimates for each corridor.

The basis for the cost estimates are shown in the following table.

Item	Unit	Rate	Comment
Upgrade Existing Facility	Linear Foot	$0.30	Signs and other upgrades
Upgrade Class II to Separate Bikeway	Linear Foot	$100	Based on Long Beach Costs for upgrading to a Class I separated bikeway. Applied to corridors with high volumes.
New Class 1 Facility	Linear Foot	$150	Installation of new Class 1 Facility where no existing path exists. 10' path construction, striping, and amenities
New Class 2 Facility	Linear Foot	$11	Based on signing and striping of Class II facility where no existing facility exists.
New Class 2 Facility w/ Widening	Linear Foot	$300	Based on signing and striping, curb/sidewalk removals, new sidewalks and pavement for 4' widening in each direction where no existing facility exists.
New Class 3 Facility	Linear Foot	$2.50	Based on striping, bike pavements symbols, and wayfinding signs approximately every 800 ft
Intersection Signs	Each	$780	Bike Sign and Directional Arrow/Route Label
Major Intersection	Each	$50,000	Assumed Average Cost of Intersection Treatment
Grading/Retraining Wall	Linear Foot	$500	Assumes Grading and Approx. 6-8ft Retaining Wall in areas where Class 1 is being proposed in areas of steep existing grades.
Bridge Crossing	Square Foot	$80	Assuming 80 per SF for Bridge with a 12' Wide Bridge
New Bridge	Square Foot	$100	Assuming 100 per SF for construction of new Bridge
Roundabout	Each	$200,000	Based on Long Beach
Fwy Interchange Treatment	Each	$2,000,000	Rough cost for proposed treatment at interchange, which may involve ped/bike crossing signals at ramps, street and or bridge widening, etc.

The table below shows the cost breakdown for each of the nine corridors.

Corridor	Facility Improvements	Mileage	Cost
A: Pacific Coast Highway (PCH)	Class I (new/grading/retaining wall)	5.6	$6,967,000
	Class II (upgrade/new)	9.7	$1,901,190
	Class III (upgrade/new)	6.5	$19,696
	Intersection Signing		$12,480
	Major Intersection Improvements		$400,000
	Bridge Crossing		$590,400
	30% Contingency		$2,967,230
	Total	**21.8**	**$12,857,996**
B: Laguna Canyon	Class II (upgrade/widen)	7.8	$7,163,631
	Class III (upgrade)	1.0	$1,586
	Intersection Signing		$3,900
	30% Contingency		$2,150,735
	Total	**8.8**	**$9,319,852**
C: El Toro/Alicia/Laguna Canyon	Class I (upgrade)	0.5	$840
	Class II (upgrade/new/widen)	13.0	$8,175,112
	Class III (upgrade)	1.9	$3,051
	Intersection Signing		$11,700
	Major Intersection Improvements		$250,000
	Freeway Interchange Improvements		$2,000,000
	30% Contingency		$3,132,211
	Total	**15.4**	**$13,572,914**
D: Portola/Santa Margarita	Class I (new/grading/retaining wall)	0.6	2,080,000
	Class II (upgrade)	6.5	3,430,000
	Intersection Signing		8,580
	Major Intersection Improvements		50,000
	30% Contingency		1,670,574
	Total	**7.1**	**7,239,154**
E: Aliso Creek	Class I (upgrade/new/grading/retaining wall)	19.8	$6,986,420
	Class II (upgrade)	2.0	$3,240
	Intersection Signing		$16,380
	30% Contingency		$2,101,812
	Total	**21.8**	**$9,107,852**
F: Muirlands/Cabot/Camino Capistrano	Class I (upgrade/new)	7.0	$2,061,990
	Class II (upgrade/new)	8.0	$3,525,800
	Class III (upgrade/new)	3.6	$28,960
	Intersection Signing		$9,360
	Major Intersection Improvements		$150,000
	Bridge Crossing		$518,400
	30% Contingency		$1,888,353
	Total	**18.6**	**$8,182,863**

Corridor	Facility Improvements	Mileage	Cost
G: Oso Parkway	Class I (upgrade)	1.6	$2,610
	Class II (upgrade)	8.8	$4,670,000
	Intersection Signing		$7,020
	Major Intersection Improvements		$50,000
	30% Contingency		$1,418,889
	Total	**10.5**	**$6,148,519**
H: Antonio/La Pata/Pico	Class I (upgrade/new)	1.2	$181,530
	Class II (upgrade/new)	14.7	$6,985,700
	Class III (new)	1.9	$25,500
	Intersection Signing		$7,020
	Major Intersection Improvements		$250,000
	Freeway Interchange Improvements		$2,000,000
	30% Contingency		$2,834,925
	Total	**17.8**	**$12,284,675**
I: San Juan Creek	Class I (upgrade/new)	8.5	$2,162,093
	Intersection Signing		$6,240
	Major Intersection Improvements		$50,000
	Bicycle/Pedestrian Bridge		$1,000,000
	30% Contingency		$965,500
	Total	**8.5**	**$4,183,833**

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