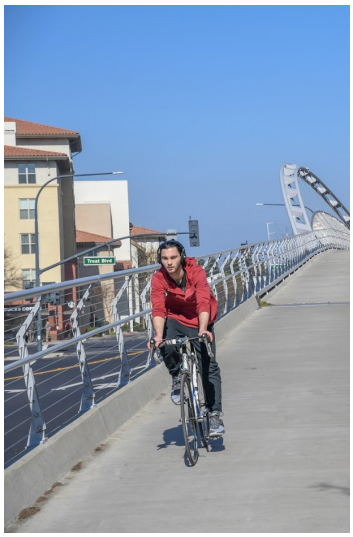

CONTRA COSTA

Countywide Bicycle and Pedestrian Plan

Appendix B

Strategic White Paper

CONTRA COSTA transportation authority

July 2018

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Prepared by Fehr & Peers

FEHR & PEERS

For

CONTRA COSTA transportation authority

Contra Costa Countywide Bicycle & Pedestrian Plan

Countywide Objectives & Plan Update
Strategic White Paper

September 2017

FEHR PEERS

CONTRA COSTA transportation authority

INTRODUCTION

This white paper identifies potential new strategies and approaches that the Contra Costa Transportation Authority (CCTA or the Authority) could incorporate into the update to its Countywide Bicycle and Pedestrian Plan (CBPP). These strategies and approaches reflect recent trends in bicycle and pedestrian planning. At this time the project team seeks input on the menu of strategies available for the update.

The paper is being released before a series of meetings with the Technical Advisory Committees of the Regional Transportation Planning Committees (RTPC TACs) and the planned online public town hall. These events will ask participants to provide feedback on the strategies presented in the paper to help frame the CBPP update contents and goals. It is also being posted on the CBPP Update website — keepcontracostamoving.net — for more general public review and comment. Your comments and suggestions will help the Authority update the CBPP to improve how it supports walking and bicycling in Contra Costa.

The Authority adopted its first Countywide Bicycle and Pedestrian Plan (CBPP) in 2003 and updated it in 2009. Those plans outlined the Authority's goals and policies for supporting and encouraging walking and bicycling in Contra Costa and the actions needed to achieve and carry out the goals and policies.

1. Expand, improve and maintain facilities for walking and bicycling
2. Improve safety for pedestrians and bicyclists
3. Encourage more people to walk and bicycle
4. Support local efforts to improve conditions for walking and bicycling
5. Consider and plan for the needs of pedestrians and bicyclists

The strategies and approaches discussed in the white paper could help the Authority achieve these goals.

CANDIDATE BEST PRACTICES FOR CONSIDERATION IN THE CBPP UPDATE

This white paper identifies 23 potential strategies that could be added to and integrated into the CBPP to achieve its goals. These strategies, some of which would support multiple goals, fall into the following categories: Collaborate, Prioritize, Innovate, Improve, Involve, and Track. Table 1 presents the specific strategies that fall under each category and which are described in more detail in the following sections.

Table 1: Best Practice Categories and Strategies

CATEGORY	STRATEGIES
COLLABORATE Work with the public and our partners to develop coordinated bikeway and pedestrian systems	1. Regional Backbone Bikeway Network Planning 2. Complete Streets Corridor Studies 3. Curbside Management with TNCs and Bus/Bike Interface
PRIORITIZE Identify the projects and strategies that have the most benefits	1. Project Prioritization Criteria for Funding 2. Establish Performance Metrics 3. Consider Equity in Funding Decisions 4. Mode Shift and VMT Reduction 5. Vision Zero and Systemic Safety
INNOVATE Support walking and bicycling through new approaches and techniques	1. Incorporate Best Practice Design Guidelines 2. Pedestrian Crossing Toolkit & Applications 3. Bicycle Parking Guidelines 4. Bike Share (and e-Bikes) 5. Bicycle Superhighways 6. Protected Intersection Treatments 7. Separated Bikeways (Class IV) 8. Pedestrian Hybrid Beacons and Rectangular Rapid Flashing Beacons 9. Accommodating Bicyclists & Pedestrians at Interchanges 10. Innovative Funding Strategies
IMPROVE Make the improvements	1. Quick-build Projects 2. Road Diets to Accommodate Bikeway Facilities
INVOLVE Work with the public and staff	1. Innovative Public Engagement Strategies 2. Technical Assistance for Local Jurisdictions
TRACK Check our progress on achieving our goals	1. Data collection and system monitoring (big data options)

COLLABORATE

Several strategies focus on how to improve collaboration among agencies and to better knit together the various non-motorized plans and policies in Contra Costa, with the goal of removing key barriers and providing comfortable access to regional destinations.

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COLLABORATE #1

REGIONAL BACKBONE BIKEWAY NETWORK

Recent bicycle transportation planning and research has focused on bicycle comfort to help understand bicycle facilities' potential for bicycle ridership and mode shift. The Level of Traffic Stress (LTS) methodology analyzes the comfort level (a measure of the quality of service) experienced by the typical cyclist on a given roadway by evaluating roadway and bikeway characteristics that cause stress, such as number of travel lanes, vehicle speeds and the percent of trucks in the vehicle mix (see Inset Figure below). The first LTS methodology was developed by transportation researchers in 2012 , and is based on Dutch bicycling standards and existing research in bicycle transportation.

LTS is also closely related to the Four Types of Cyclists theory (see Inset Figure below). This theory identifies four types of bicyclists — from "strong and fearless" to "no way, no how" — based on their willingness to bicycle. LTS measures the quality of a person's experience while bicycling. By reducing the LTS on roadways, and especially at intersections, low-stress bicycle networks can broaden the appeal of bicycling, especially for "Enthused and Confident" and "Interested but Concerned Cyclists," who represent the largest share of the population in most areas.

Today, LTS evaluation is helping jurisdictions plan networks of on-street and off-street bikeways where people of all ages and all abilities can feel comfortable riding, including young bicyclists and those who may be new to bicycling. One strategy for expanding low stress bikeways is to develop a "Backbone Network." Backbone networks —interconnected bicycle facilities with low-stress ratings (LTS 1 or LTS 2) — overcome the barriers created by high-stress arterial and collector roadways. Ensuring that intersection treatments are low-stress and comfortable is critical to creating a low-stress backbone network.

1 Methodology available here:
http://transweb.sjsu.edu/PDFs/research/1005-low-stress-bicycling-network-connectivity.pdf
2 Roger Geller, "Four Types of Cyclists," undated.
https://www.portlandoregon.gov/transportation/article/264746

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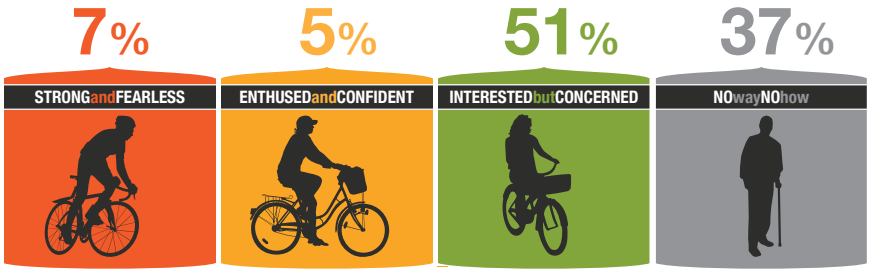
COLLABORATE #1:
REGIONAL BACKBONE BIKEWAY NETWORK

THE FOUR TYPES OF BICYCLISTS



LEVEL OF TRAFFIC STRESS

Level of traffic stress (LTS) is a way to evaluate the stress a bike rider will experience while riding on the road. It is used to categorize roads by the types of riders above who will be willing to use them based on:

Number of Travel Lanes | Speed of Traffic | Number of Vehicles | Presence of Bike Lanes | Width of Bike Lanes | Presence of Physical Barrier

LTS 1 Most children can feel safe riding on these streets.

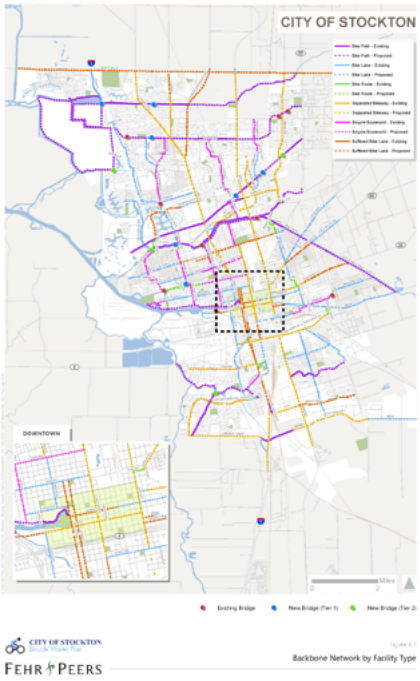
LTS 2 The mainstream "interested but concerned" adult population will feel safe riding on these streets.

LTS 3 Streets that are acceptable to "enthused and confident" riders who still prefer having their own dedicated space.

LTS 4 High-stress streets with high speed limits, multiple travel lanes, limited or non-existent bikeways, and long intersection crossing distances.

Best Practice Example

In Northern California, Fremont, Pleasanton, and Stockton have recently developed backbone networks as part of their active transportation plan updates. In Stockton, the City's draft Bicycle Master Plan proposes a citywide Backbone Network of low-stress facilities (see Inset Figure to the right) that seek to bridge the major gaps that prevent citywide travel. By doing a before/after analysis of neighborhood connectivity, the City was able to ensure equity of investments in bicycle facilities citywide.



Applying the Strategy

At a countywide scale, a backbone network could focus on a series of low stress routes that connect to major destinations and across major barriers. The Authority would then give priority for funding to projects on this network.

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COLLABORATE #2

COMPLETE STREETS CORRIDOR STUDIES

In the Complete Streets approach, all streets would be planned, designed, operated, and maintained to enable safe, convenient and comfortable travel and access for all users, regardless of their age, ability or mode of travel. A roadway designed as a complete street would consider the needs of pedestrians, bicyclists, motorists, delivery vehicles, and transit riders.

Agencies across the United States — from the national to the local level — have adopted the Complete Streets approach. The State of California, for example, requires local jurisdictions to incorporate it into their General Plans. Agencies adopting this approach would incorporate it into their design, implementation, and funding strategies. Implementing a Complete Street is relatively easy when designing and constructing a new street; the more common task of retrofitting an existing roadway, however, is more difficult. The roadway's right-of-way is usually constrained, and any changes will involve many stakeholders: elected officials, city departments, transit agencies, and the general public.

Each Complete Street is unique and must reflect the context of its particular community. One Complete Street might include bike lanes while another might include a cycletrack. One Complete Street might include a roundabout and another a protected intersection. One might narrow travel lanes and another implement a road diets. The components included, or not included, will need to reflect the specific conditions and users of that street. A Complete Street in a rural area, for example, will look quite different from a Complete Street in a highly urban area, but both are designed to balance safety and convenience for everyone using the road.

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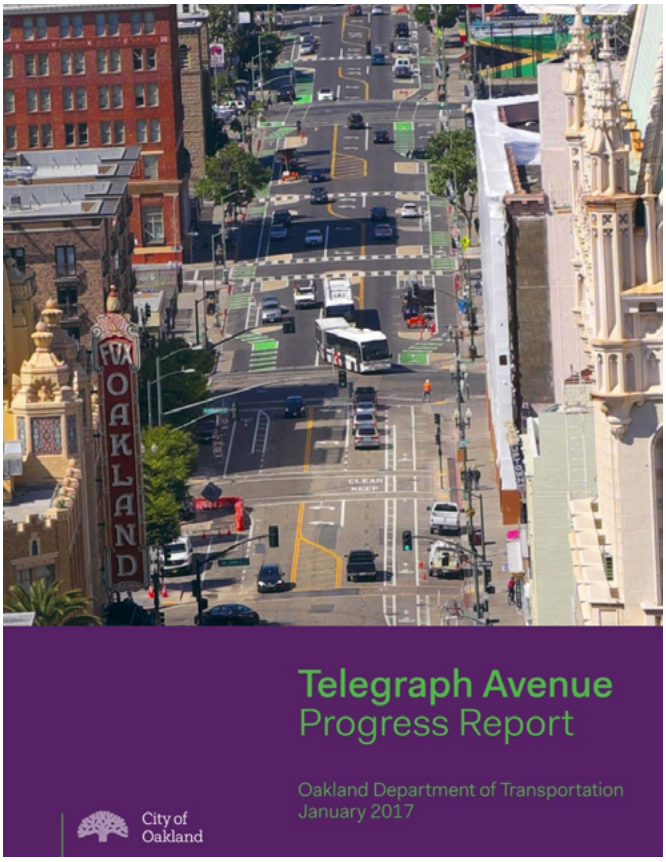
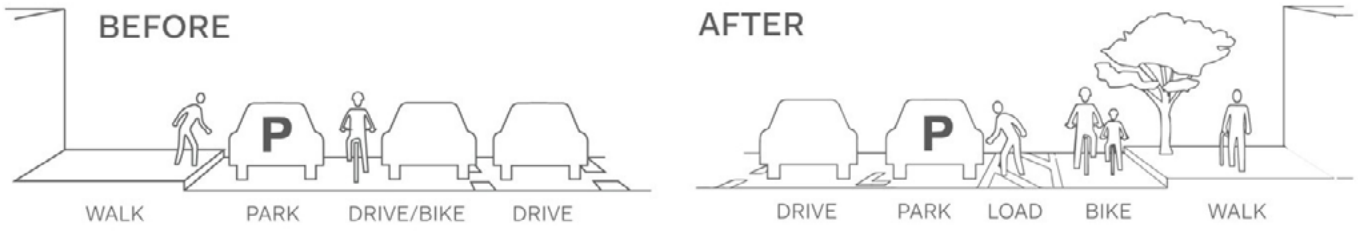
COLLABORATE #2:
COMPLETE STREETS CORRIDOR STUDIES



Cover-Telegraph Avenue Progress Report,
Oakland Department of Transportation, January 2017

Best Practice Example

Telegraph Avenue in Oakland, California, is an important street for all travel modes and serves many neighborhoods between Downtown Oakland and the City Limit with Berkeley. In 2013, the City of Oakland initiated the planning process for the Telegraph Avenue Complete Streets, which included many community meetings, agency stakeholder input, and technical analysis to help weigh alternatives and trade-offs. The final plan, adopted in 2014, featured Oakland's first cycle track and a major road diet (see Inset Figure below) to calm traffic and improve conditions for pedestrians, bicyclists and transit, as well as motor vehicles. After installing interim improvements such as lane striping and a parking-separated bikeway, the City completed the Telegraph Avenue Progress Report (see Inset Figure above), which documented major safety and comfort gains and led to iterative design improvements. The City is currently working to design and install long-term comprehensive streetscape improvements.



Telegraph Avenue Progress Report, Oakland Department of Transportation, January 2017

Applying the Strategy

The CBPP could include a list of high priority complete street corridor studies for Contra Costa and/or could recommend complete street project checklist requirements for CCTA funding.

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COLLABORATE #3

CURBSIDE MANAGEMENT WITH TNCS AND BUS/BIKE INTERFACE

With the increasing concern for all users of a roadway and the growth of transportation network companies (TNCs) like Uber and Lyft, demands for curbside pickups, drop-offs and dwell times are growing dramatically.

Potential users of the curbside:

- Drivers, both TNC and non-TNC
- Parked vehicles and electric vehicle (EV) charging
- Bicycles and bicycle infrastructure
- Pedestrians and crossing infrastructure
- Couriers and delivery vehicles
- Local businesses
- Mobile vendors
- Transit and transit infrastructure
- ADA-access
- Emergency services
- Taxis, transportation network companies (TNCs), and shuttles
- Parklets and streetscape

Jurisdictions will need to inventory, assess, enhance, and prioritize curb spaces to meet the multi-modal demands at the curb in a safe and efficient way. The need to resolve curbside conflicts will only grow as modal options and preferences change. Thus, curbside management is also about anticipating future trends; in particular as autonomous vehicles further disrupt the transportation landscape.

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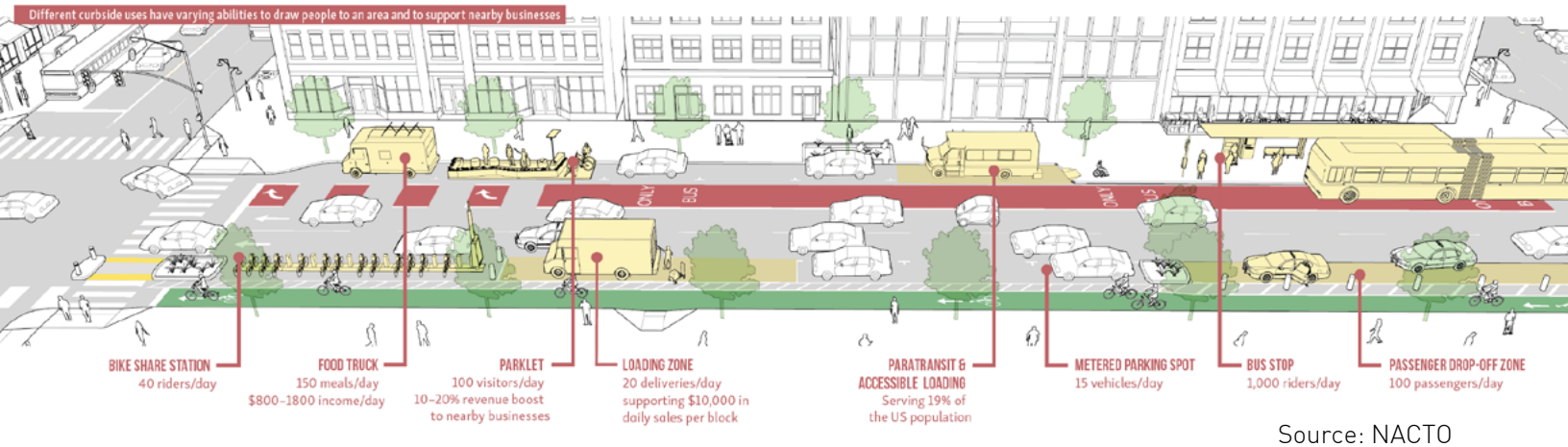
COLLABORATE #3:
CURBSIDE MANAGEMENT WITH TNCS AND BUS/BIKE INTERFACE



Source: NACTO

Best Practice Example

In May 2017, NACTO released a draft white paper, Curb Appeal: Curbside Management Strategies for Improving Transit Reliability. Revised in August 2017 after a peer review process, the white paper profiles cities across the US that are managing curbspace to prioritize high capacity on street modes. The cities are using five broad approaches:

- Strategically using curbside space to prioritize transit movement (featuring Seattle's right-of-way policy)
- Managing other curbside users to clear the way for transit (featuring Brooklyn's commercial loading and delivery zones)
- Measuring how a street works to most effectively manage it (featuring San Francisco's SFpark dynamic parking pilot)
- Using curbsides to prioritize transit movement (featuring red bus lanes in Chicago and San Francisco and peak hour transit lanes in Brooklyn), and
- Looking beyond the corridor and beyond the curb at larger city-wide strategies (featuring parking strategies in Austin and Portland)

The paper set the stage for a future ITE-NACTO practitioners' guide that is focusing on gap identification, strategy selection, and prioritization.

Applying the Strategy

Because the Authority doesn't directly manage streets, it would focus on supporting jurisdictions in their management of this important space. The update would focus on key resources needed and the benefits for multi-modal safety in reducing curbside chaos. Future efforts could include a Contra Costa inventory and strategy on the topic or funding allocated to the local jurisdictions to create curbside management strategies.

PRIORITIZE

With limited funds available for transportation improvements of all sorts, the Authority and other agencies must decide which projects, among a range of good projects, should be funded. The following potential strategies outline new options for making the Plan more explicit in setting priorities, from establishing a prioritized funding list to allocating funding using prioritization criteria and grant requirements. The following approaches are not mutually exclusive; the Authority could take an approach that incorporates aspects of one or more of them.

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PRIORITIZE #1

PROJECT PRIORITIZATION CRITERIA FOR FUNDING

Currently, the CBPP includes a set of funding prioritization criteria the Authority will apply to pedestrian, bicycle and trail facilities and other infrastructure projects:

- Safety
- Range of users
- Countywide or regional significance
- Destinations served
- Other latent demand criteria (density, land use mix, percent zero-auto households, etc.)
- Connectivity
- Feasibility
- Integration with other projects
- Matching funds
- Public support:

These criteria have been used to evaluate applications for Measure J funds, with weighting applied by the Authority's Countywide Bicycle and Pedestrian Advisory Committee.

Project prioritization is a critical step in developing the implementation plan for Active Transportation Plans (ATPs), or in any case where several important projects or programs compete for staff time or funding. Jurisdictions can develop prioritization frameworks in several ways, and can employ a diverse set of weighted criteria (see Table 2). For example, prioritization criteria and their relative weights can be determined by high-level decision makers, such as mayors, agency directors, or city or agency boards of supervisors, and/or by community members through public outreach and engagement activities. Most jurisdictions will select a focused set of criteria based on their unique priorities, which may be informed by how grant funding applications are scored, as well as community values. In addition, the project prioritization process and criteria selected are often linked to project-specific performance measures.

PRIORITIZE #1:
PROJECT PRIORITIZATION CRITERIA FOR FUNDING

Table 2. Sample Prioritization Criteria

Common Grant Funding Criteria	Additional Potential Criteria (Community Selected)
Socio-economic Equity / Benefit to disadvantaged communities	Spatial Equity / Connects or balances projects between different areas
Mode Shift / Potential for increased walking and bicycling, especially among students	Demand / Support large numbers of people walking and biking
Safety / Potential for reducing the risk of pedestrian and bicyclist fatalities and injuries	Safety / Reported collisions or perceptions of safety (e.g. Level of Traffic Stress) at a given location
Network Connectivity / Closing gaps and addressing barriers	Backbone Network / Focus on implementing low-stress backbone network
Community Support / Directly requested by local communities	Access to Destinations / Increases access to employment, schools, services, parks, shopping areas, etc.
Public Heath / Outreach and promotion of healthy communities	Access to Priority Development Areas / Increases access to PDAs, high-density employment and/or housing
Cost-effectiveness / Prioritize "cheap, quick, effective" treatments (such as restriping for road diets)	Transit Access / Increases access to transit
Funding / Leveraging additional funding sources	Non-infrastructure Efforts / Focus on parking, education, enforcement, encouragement, etc.

Best Practice Example

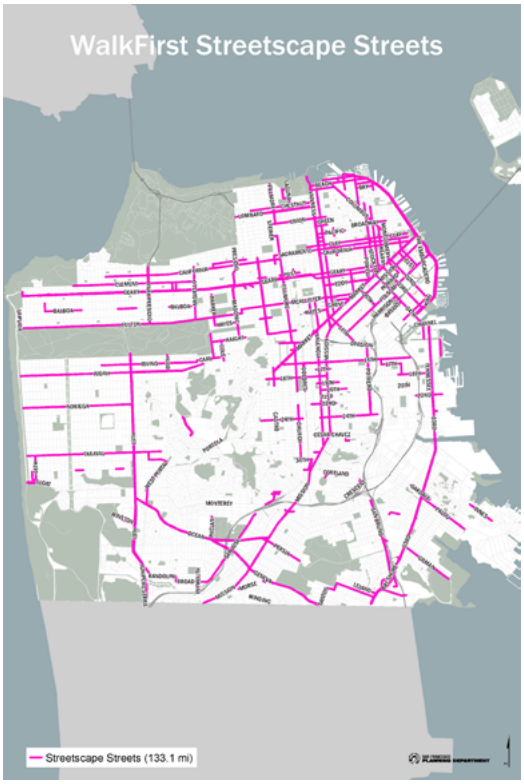
As part of the San Francisco Streetscape Prioritization project in 2014, the project team held a charrette with key stakeholders from selected City agencies. The group reviewed three investment scenarios that directly addressed three distinct sets of priorities for identifying the most important locations for streetscape improvements on the City's Streetscape Street Network:

1. Invest Where People Walk: focus investment on locations with a high level of pedestrian activity.
2. Tap into Economic Potential: focus investment on locations with a large number of underutilized buildings yet a high level of recent business growth.
3. Target Physical Deficiencies: focus investment on locations with poor pedestrian infrastructure and environment, based on an approximated version of the San Francisco Department of Public Health Pedestrian Environmental Quality Index (PEQI).

Feedback from the scenario planning charrette helped guide the development of the selected investment strategy, which combined different elements from the original three scenarios. Inset Figure X presents the blocks prioritized for future streetscape improvements using the selected investment strategy.

Applying the Strategy

The CBPP could include a prioritized list of projects for Contra Costa and/or could update its funding prioritization criteria to evaluate local projects.



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PRIORITIZE #2
ESTABLISH PERFORMANCE METRICS

Performance measures enable us to evaluate projects quantitatively, and help communities understand how well their projects and programs further the goals of their plans. Planning and designing for pedestrians and bicyclists increasingly requires performance measures to help prioritize projects, evaluate appropriate facility types, and track project progress over time. The current focus on quantitative measurement of active transportation projects is fairly new, and resources and standards available for this type of assessment are less established than those for vehicles (e.g. Level of Service (LOS)).

Meaningful and context-sensitive performance measures dedicated to bicycling and walking are valuable for many reasons, including:

- Demonstrating the value of pedestrian and bicycle projects to citizens and elected officials
- Tracking the success of an active transportation program, policy, or facility
- Informing smarter investment through data-driven measures of success
- Complying with federal, state, and MPO funding requirements
- Producing a better built environment for walking and bicycling
- Providing information to engage a broad set of stakeholders in project and program identification and prioritization
- Capturing the value of new and innovative datasets and data collection methods for the active transportation field

Active transportation performance measures are important for assessing the current state of bicycling and walking conditions and for tracking the change of these conditions over time. They can help a jurisdiction set quantifiable goals for bicycling and walking, guide a jurisdiction on how to achieve these goals, and help document when the goals have been met. Through the use of active transportation performance measures, a jurisdiction can evaluate and adopt customized policies and plans to implement projects that enhance active transportation safety, mobility, equity, and accessibility.

PRIORITIZE #2:
PROJECT PRIORITIZATION CRITERIA FOR FUNDING

Best Practice Example

In 2016, the Alameda County Transportation Commission (Alameda CTC) released a first-of-its-kind Countywide Multimodal Arterial Plan (MAP). This plan relies on a quantitative, data-driven and highly technical approach to identify short- and long-term multimodal improvements along a 1,200 mile Arterial Network. The MAP includes a number of multimodal performance measures used to evaluate existing conditions, identify potential improvements, and prioritize projects. Unlike LOS, the traditional transportation performance measure, which shows how efficiently motor vehicles travel, the MAP measures were chosen to describe the traveler's experience.

For example, to evaluate the traveler's experience for pedestrians and bicyclists, MAP rated segments on the study arterial network on pedestrian and bicycle comfort indexes. The pedestrian comfort index is based on pedestrian facilities and auto traffic characteristics, and the bicycle comfort index is based on the concept of Level of Traffic Stress (LTS), which is discussed in detail in the Regional Backbone Bikeway Network Planning section (see Inset Figure below).

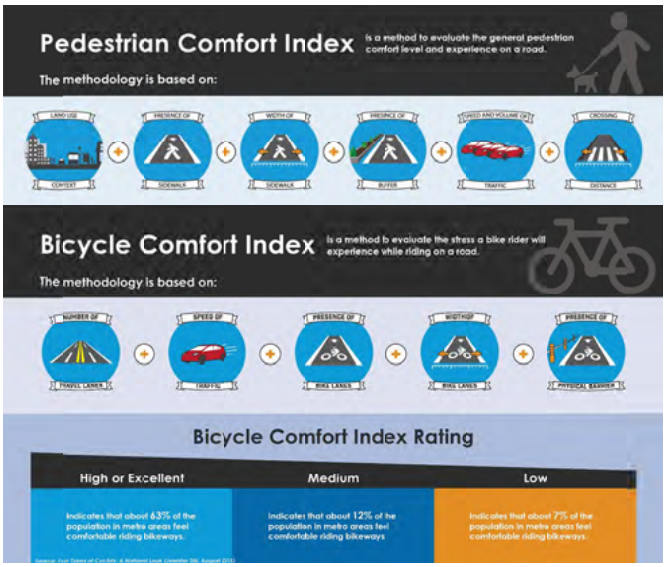

Table 3. Performance Measures by Goal

Goal	Performance Measure
Health and Safety	Collisions
	Personal Security
	Public Health
Multimodal	Network Quality
	Transit Access
	Facility Use
Equity	Coverage
	ADA Access
Education	Programs
	Key Staff
	Information
Access	Built Environment
	Connectivity
Infrastructure	Street Network
	Network Quality
	Supportive Facilities
	Financial Investment
	Maintenance
Economic Development	Sales
	Property Value
	Societal Costs and Benefits
Placemaking	Public Art and Events
	Community Investment
	Landscaping

Applying the Strategy

With this strategy, the CBPP would define performance metrics for active transportation projects that are funded by CCTA, and require applications to demonstrate these and monitoring programs to evaluate them.

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PRIORITIZE #3

CONSIDER EQUITY IN FUNDING DECISIONS

Equity in transportation seeks fairness in mobility and accessibility to meet the needs of all community members. A central goal of transportation equity is to facilitate social and economic opportunities through access to affordable and reliable transportation options based on the needs of the populations being served, particularly populations that are traditionally underserved. Equity is often framed in terms of social equity or spatial equity.

- Social or socio-economic equity refers to serving populations of different socio-economic status, and usually populations that have been traditionally underserved.
- Spatial or geographic equity focuses on serving different populations across an area, in terms of where they are geographically located.

Increasingly, public agencies around the country are identifying equity as a key priority. For example, at the state level, Caltrans Active Transportation Program (ATP) grant proposals can earn 10 equity-oriented points (of 115) based on for 1) if the project is located within a disadvantaged community, and 2) the extent to which the project benefits members of a disadvantaged community. In the Bay Area, the Metropolitan Transportation Commission (MTC), now requires that countywide transportation plans include an equity analysis, with a focus on minority, low-income, and other underserved communities.

Equity is incredibly broad – it does not fit into one single discipline, or analysis type. Equity can be incorporated into bicycle and pedestrian planning efforts through a variety of lenses, including:

- Engineering and Design, e.g. tailoring infrastructure to community needs and preferences
- Project Prioritization, e.g. prioritizing investments based on socio-economic characteristics, mode share, concentration of zero-vehicle households, where there have been few investments in the past
- Encouragement and Education, e.g. diverse and non-English programming, meeting people where they are, understanding community-specific barriers to bicycling
- Enforcement, e.g. ensuring enforcement does not build upon existing, biases or criminalize walking and biking incorrectly
- Evaluation, e.g. assessing equity-related performance metrics such as network coverage and ADA accessibility

PRIORITIZE #3:
CONSIDER EQUITY IN FUNDING DECISIONS

Best Practice Example

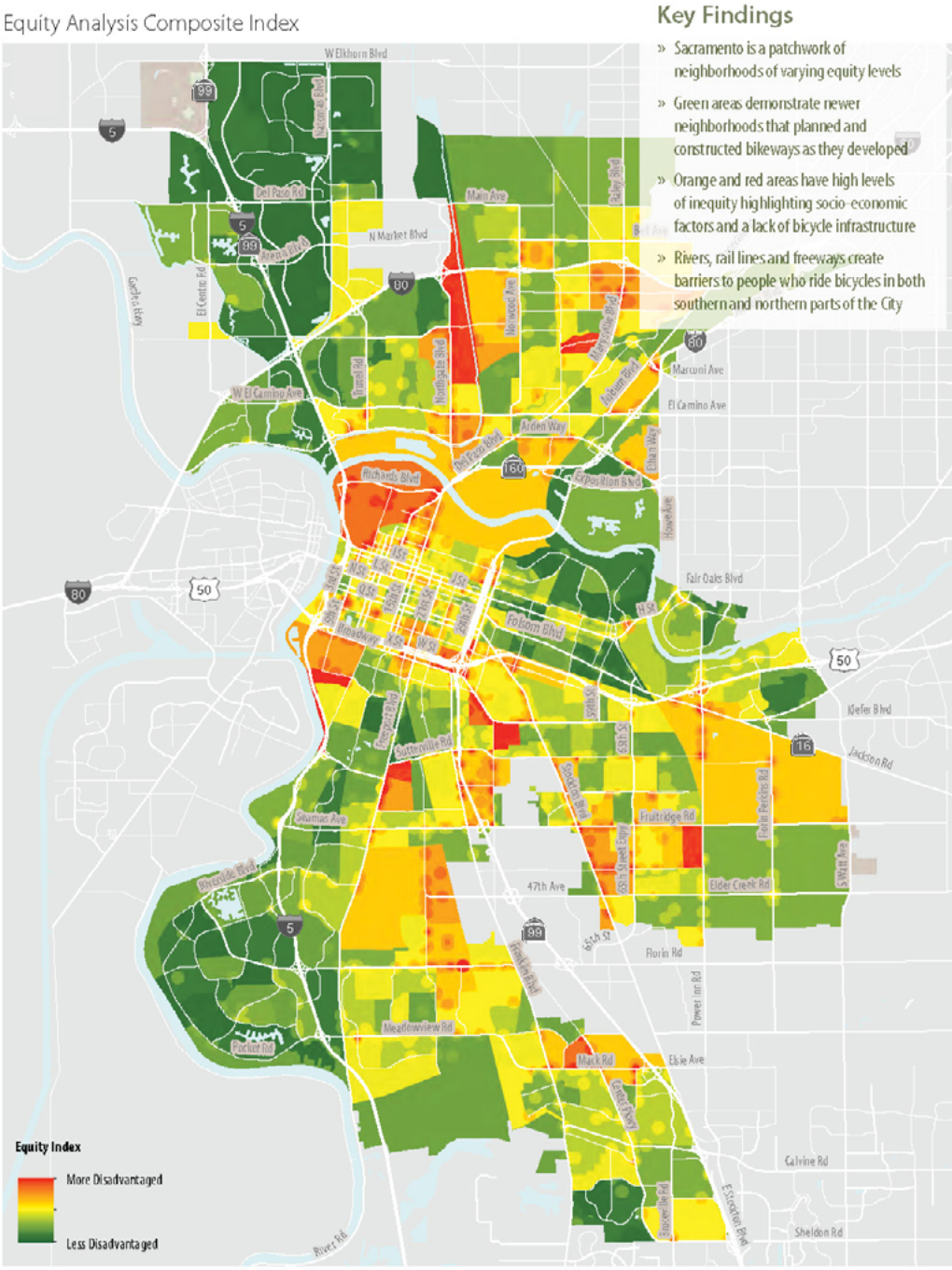
For the Sacramento Bicycle Master Plan Update prepared in 2016, the project team developed a project-specific composite equity index map to help guide improvement recommendations in historically disadvantaged and underserved areas of the City. The following metrics were used to develop the composite index score Citywide:

- Percent of Households 200 Percent Below the Poverty Line
- CalEnviroScreen2.0 score[3]
- Percent of Households that Bicycle to Work
- Percent of Households with Zero Auto Ownership
- City-wide Bicycle Collision Densities

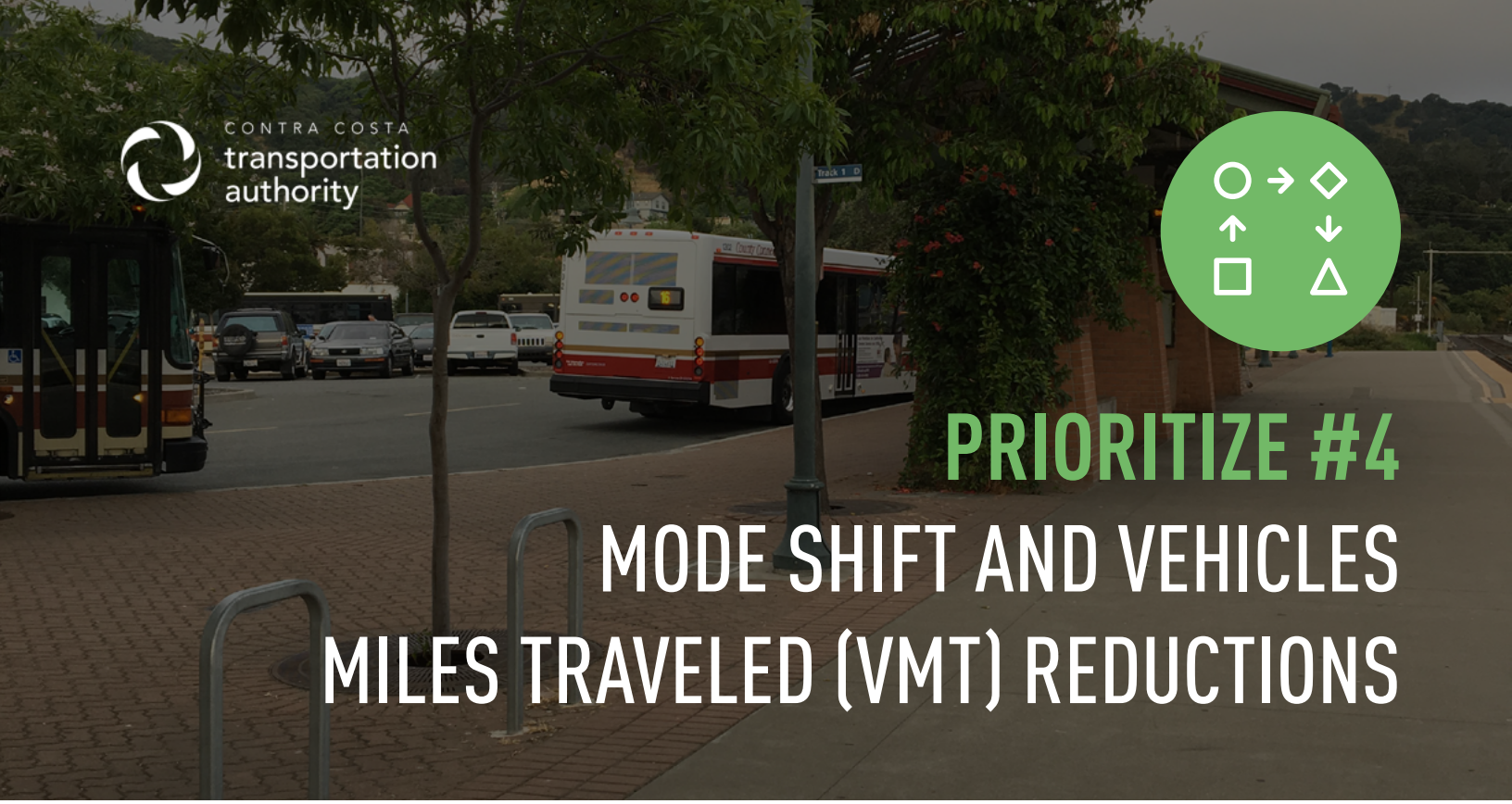
Inset Figure X presents the results of this analysis, which not only increased understanding of the existing socioeconomic conditions within the City, but also helped prioritize planned bicycle facilities and improve bicycle accessibility for all city residents.

Applying the Strategy

The CBPP could identify key projects that enhance equity through the Plan update, or could require equity analysis and measurement for new grant applications.



3 The CalEnviroScreen2.0 score was developed by the California Environmental Protection Agency (CalEPA) to help identify disadvantaged communities for the purposes of cap-and-trade funding. It provides statewide scoring metrics at a census tract level, including environmental and social economic disparities ranging from drinking water contaminants to air pollution.



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PRIORITIZE #4

MODE SHIFT AND VEHICLES MILES TRAVELED (VMT) REDUCTIONS

Senate Bill (SB) 743 fundamentally changed how transportation impacts are analyzed under the California Environmental Quality Act (CEQA). The bill eliminated the use of auto delay, level of service (LOS), and other similar measures of vehicular capacity or traffic congestion in determining significant impacts.

Through SB 743, the legislature intended to:

1. Ensure that the environmental impacts of traffic, such as noise, air pollution, and safety concerns, continue to be properly addressed and mitigated through the California Environmental Quality Act.
2. More appropriately balance the needs of congestion management with statewide goals related to infill development, promotion of public health through active transportation, and reduction of greenhouse gas emissions.

As a result, SB743 will likely shift the types of projects receiving negative declarations for transportation. Previously, the types of projects least likely to have transportation impacts were developments in areas where transportation facilities operated at LOS A – C (i.e., no significant congestion in the surrounding area). Under SB743, the types of projects least likely to have transportation impacts will be infill projects in central, transit-adjacent locations, which may already have significant traffic congestion. Active transportation plans and projects are also likely to be granted environmental clearance through a streamlined review process under SB 743.

In addition to streamlined environmental review, SB 743 will likely encourage the construction of active transportation projects that reduce VMT. These projects could then be used as VMT mitigation for other transportation and land use development projects. To both leverage and support active transportation-related VMT reductions, transportation and land use development projects could pay into a nexus fee program, based on their contribution to increased VMT, to fund active transportation improvements linked to VMT reductions.

PRIORITIZE #4:
MODE SHIFT AND VEHICLES MILES TRAVELED (VMT) REDUCTIONS

Best Practice Example

One recent example of a VMT-based fee program that incorporates active transportation projects is the Westside Mobility Plan in Los Angeles. In 2015 the project team conducted a nexus analysis and developed a VMT-based fee program by amending two specific plans: the Coastal Transportation Corridor Specific Plan (CTCSP) and the West Los Angeles Transportation Improvement and Mitigation Specific Plan (WLA TIMP). The amendments developed a mechanism for funding transportation improvements that would mitigate the cumulative impacts of new development, which include transit, bicycle, and pedestrian oriented improvements in addition to the more traditional roadway and signalization improvements. Transportation improvements were targeted toward producing fewer auto trips and decreasing VMT by increasing multimodal transportation options and promoting best practices in transportation demand management. After establishing the nexus between new development and the need for new and expanded transportation facilities and programs, the study calculated the Transportation Impact Assessment (TIA) fees to be levied for each type of new land use. The TIA fees developed are based on each land uses proportionate use of transportation facilities and support the development and implementation of transit, bicycle and pedestrian oriented improvements that reduce VMT. More information is available at http://www.westsidemobilityplan.com/.

A best practice example of regional travel demand modelling that evaluates VMT reductions associated with active transportation investments comes from the Southern California Association of Governments (SCAG). In 2015, the project team developed a quick response tool to enhance their regional travel model's sensitivity to active transportation investment, and quantify resulting VMT reductions. This post-processing tool quantifies changes in walking and biking trips associated with land use changes and new active transportation facilities (e.g. installing bicycle lanes and sidewalks). Tool development included a detailed literature review to identify and quantify key variables that influence walking and bicycling. One important application is that the tool can be used to evaluate and test alternative scenarios. VMT reductions associated with active transportation network improvements can then be assessed and quantified by comparing regional VMT results across different alternatives.

Applying the Strategy

CBPP update efforts could coordinate with other city, County and CCTA efforts related to SB 743, including updates to the Regional Transportation Mitigation programs, to ensure opportunities for pedestrian and bicycle significance criteria and funding streams are identified and captured.

CEQA refers to the California Environmental Quality Act. This statute requires identification of any significant environmental impacts of state or local action including approval of new development or infrastructure projects. The process of identifying these impacts is typically referred to as the environmental review process.

LOS refers to "Level of Service," a metric that assigns a letter grade to network performance. The typical application in cities is to measure the average amount of delay experienced by vehicle drivers at an intersection during the most congested time of day and assign a report card range from LOS A (fewer than 10 seconds of delay) to LOS F (more than 80 seconds of delay). The amount of delay is calculated relative to the amount of time to traverse the intersection if a vehicle is the sole vehicle on the road, and it arrives at a green light.

VMT refers to "Vehicle Miles Traveled," a metric that accounts for the number of vehicle trips generated plus the length or distance of those trips. For transportation impact analysis, VMT is generally expressed as VMT per capita for a typical weekday. For instance, the 2012 average daily VMT per capita for the nine county Bay Area region was 15.3 miles per person per day.

CONTRA COSTA transportation authority

PRIORITIZE #5

VISION ZERO AND SYSTEMIC SAFETY

Vision Zero is a strategy to eliminate all traffic fatalities and severe injuries, which often takes a systematic, data-driven approach to understanding and improving traffic safety. Systemic safety analysis is a proactive, data-driven approach to addressing transportation safety.

Vision Zero begins by acknowledging that traffic deaths and injuries are preventable, which refocuses local actions to proactively predict and prevent future problems, rather than only addressing current ones. Successful Vision Zero programs apply a robust, data-driven, and systematic approach to identify the leading causes of traffic injuries and then identify efficient and cost-effective engineering countermeasures to overcome those challenges.

The Figure to the right illustrates the critical steps to launching and maintaining a successful Vision Zero program, which major California cities such as of San Francisco, Los Angeles, and Sacramento, have employed.

In 2015, Caltrans introduced funding for the Systemic Safety Analysis Report Program (SSARP). It encourages local agencies to systematically evaluate roadway networks and to help identify high benefit-cost ratio safety projects. The program helps local agencies perform collision analyses, identify safety issues on their roadway networks, and develop a list of systemic, low-cost countermeasures. Local agencies can then submit identified countermeasure projects to the Highway Safety Improvement Program (HSIP) and other safety programs for funding consideration.

VISION ZERO PROCESS

FEHR + PEERS

PRIORITIZE #5:
VISION ZERO AND SYSTEMIC SAFETY

Best Practice Example

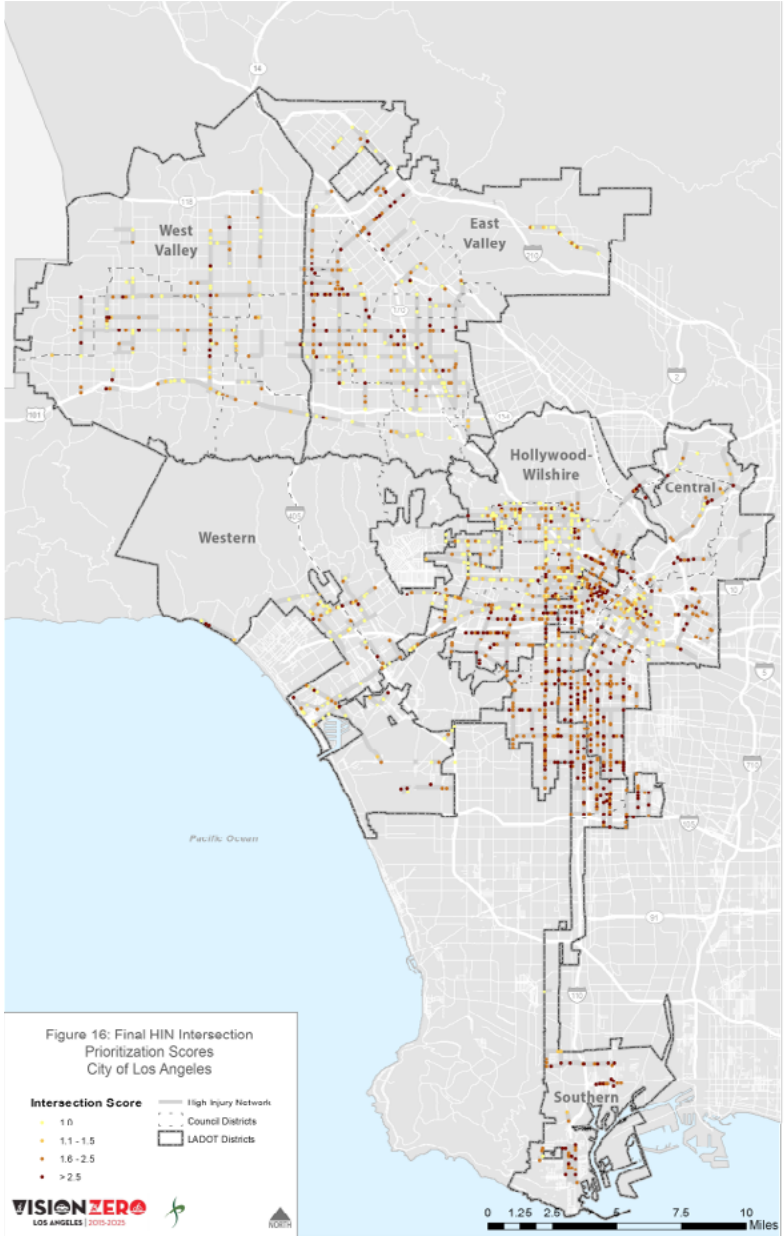
Achieving Vision Zero is one of the core goals of the City of Los Angeles Department of (LADOT). In 2015-2016, LADOT applied a robust, data-driven analysis of the city's roadway collisions and the primary factors that contribute to them to identify the primary causes of traffic injuries and the areas of the City with the greatest need for safety improvements, and then matched those needs with efficient and cost-effective engineering countermeasures.

This analysis was built from a single, comprehensive database that included both collision information and the key environmental factors surrounding each collision, such as roadway network characteristics, demographics, and land uses. Targeting high-injury streets for improvement can lead to the highest and best use of funds. The rigorous statistical model used, beyond what other cities currently use, a range of variables that together explained the presence of severe and fatal collisions. The collision data and environmental factors were used to create "collision profiles" or "collision typologies" which describe the "who, where, when and how" of collisions.

This scenario planning process helped city staff and stakeholders determine how to most effectively spend their dollars. In collaboration with LADOT staff and stakeholders of the City of Los Angeles Vision Zero Task Force, the City identified an investment strategy to guide the prioritization of Vision Zero projects and programs over the next five years.

Applying the Strategy

The CBPP could include language to adopt Vision Zero as a goal for Contra Costa. It could also establish, in particular, the database framework that a Vision Zero action plan could build from to create context-based collision profiles and associated countermeasures.



LA Vision Zero Intersection Prioritization

INNOVATE

In the years since the 2009 CBPP, the pedestrian and bicycle research and design fields have evolved and many new tools and techniques are available for use in Contra Costa. This section of strategies focuses on opportunities to adopt innovations.

CONTRA COSTA transportation authority

INNOVATE #1
INCORPORATE BEST PRACTICE DESIGN GUIDELINES

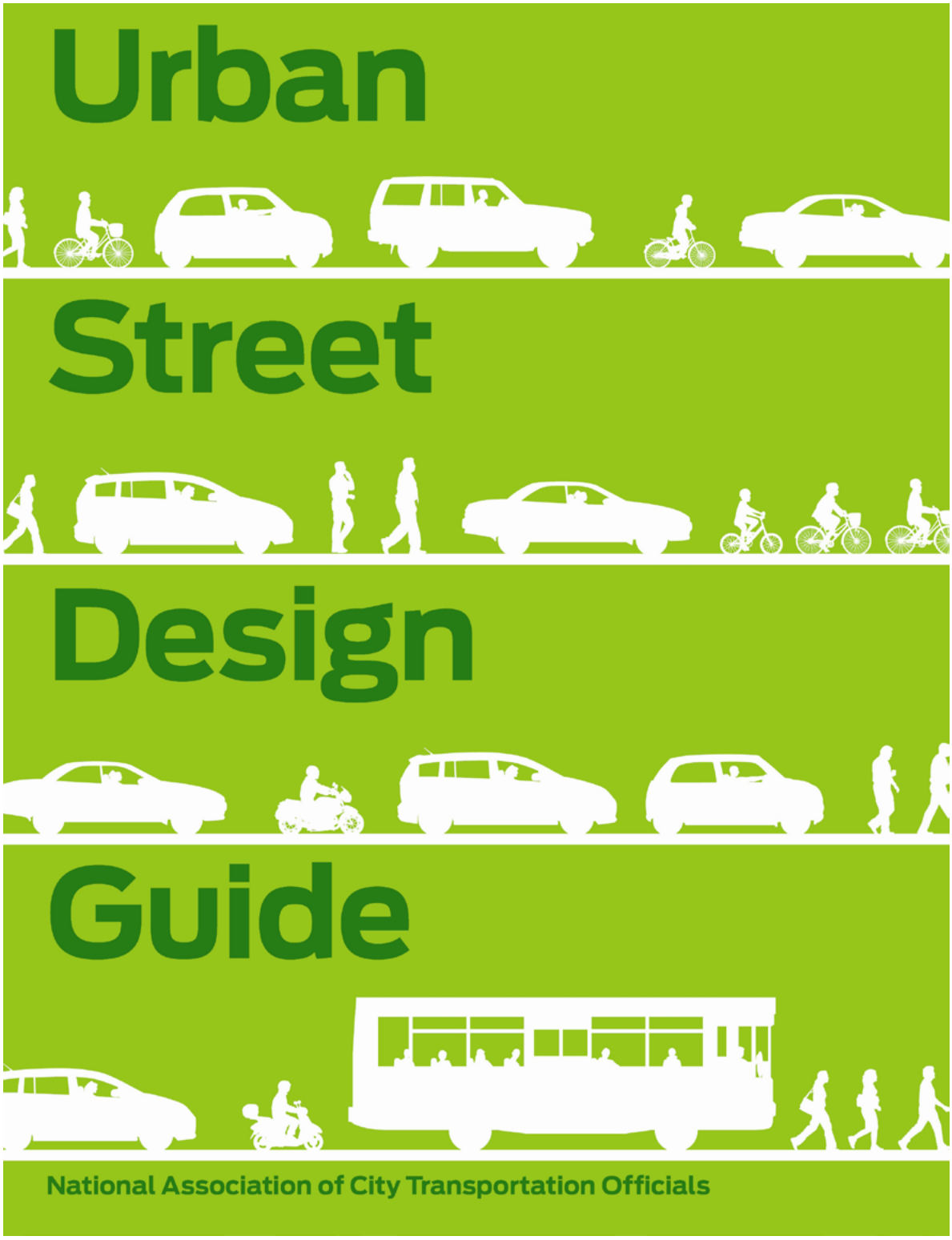
The landscape for bicycling has changed dramatically over the past ten years, with a variety of new bicycle planning tools and innovative designs tested in the San Francisco Bay Area and across the United States and North America. Since some jurisdictions in Contra Costa County refer to the CBPP in the absence of having their own bicycle and pedestrian plans, the CBPP should reference the most up-to-date and best practice design guidelines. Numerous best practice design guidelines now detail the state of the practice in bicycle facility design, including:

- NACTO Urban Bikeway Guide, 2nd Edition
- NACTO Urban Streets Design Guide
- NACTO Transit Street Design Guide
- NACTO Urban Street Stormwater Guide
- AASHTO Guide for the Development of Bicycle Facilities, 4th Edition
- Caltrans Highway Design Manual Chapter 1000 Bicycle Transportation Design
- Caltrans Class IV Bikeway Guidance
- Federal Highway Administration (FHWA) Separated Bicycle Lane Planning and Design Guide
- MassDOT Separated Bike Lane Planning and Design Guide
- CROW Design Manual for Bicycle Traffic 2017
- ITE Recommended Practices on Accommodating Pedestrian and Bicyclists at Interchanges
- Association of Bicycle and Pedestrian Professionals' (APBP) Bicycle Parking Guidelines, 2nd Edition

Applying the Strategy

The CBPP could endorse these national best practices, which would help to encourage their use in jurisdictions throughout Contra Costa and incorporate them, where applicable, into the CBPP policies.

INNOVATE #1:
INCORPORATE BEST PRACTICE DESIGN GUIDELINES



NACTO Urban Street Design Guide, 2nd Edition

FEHR PEERS

CONTRA COSTA transportation authority

INNOVATE #2

PEDESTRIAN CROSSING TOOLKIT AND APPLICATIONS (CROSSWALK SELECTION)

Well-marked pedestrian crossings accomplish two main goals: they warn drivers of the presence of pedestrians, and they provide a safe, defined space for pedestrians.

A pedestrian safety strategy can help a jurisdiction make decisions about where basic crosswalks (two stripes) can be marked; where crosswalks with special treatments, such as high visibility crosswalks, flashing beacons, and other special features, should be employed; and where crosswalks will not be marked due to safety concerns resulting from volume, speed, or sight distance issues. Pedestrian safety at signalized intersections can be achieved through a variety of treatments including geometric changes, signal timing modifications and operational adjustments such as protecting turns and adding pedestrian only phases.

Many tools are available to optimize pedestrian safety at crossings. The key is to decide which measures are appropriate in which locations. The first step in identifying a candidate crosswalk location is to identify the places people walk now, places where people would like to walk (homes, schools, parks, commercial establishments, etc.), and around transit stops. This information leads to the second step, i.e., identifying the locations where marked crosswalks other pedestrian crossing improvements are needed. These improvements should focus on creating a convenient, connected, and continuous walking environment. The third step is to identify those crossings that would benefit from high visibility crossing treatments such as additional pedestrian crossing signs and signals.

Many tools are available to improve pedestrian crossing visibility and safety. Choosing the right tool should be based upon an initial field survey and guidance about the type of treatments appropriate on various streets and under various conditions such as pedestrian demand, number of travel lanes, posted speed and average daily traffic.

FEHR PEERS

INNOVATE #2:
PEDESTRIAN CROSSING TOOLKIT AND APPLICATIONS (CROSSWALK SELECTION)

Best Practice Example

The Oakland Walks! 2017 Draft Pedestrian Master Plan Update took the full range of pedestrian treatments and consolidated them into a Safety Toolkit that can be used to address pedestrian safety throughout the City. In addition to using a flowchart method for identifying improvements at crosswalks, Appendix C of the Plan details benefits, constraints, and appropriate applications of improvements for the following types of infrastructure:

- Signalized Intersections;
- Marked Uncontrolled Crosswalks at Two-Way Stop-Controlled Locations; and
- Marked Uncontrolled Crosswalks at Midblock Locations.

Applying the Strategy

The CBPP could add toolbox of innovative pedestrian treatments and design guidelines as part of its best practices guidelines. It would also feature a sample crosswalk policy, for local jurisdiction consideration in adopting.

Pedestrian Safety Guide and Countermeasures Selection System, FHWA

CONTRA COSTA transportation authority

INNOVATE #3
BICYCLE PARKING GUIDELINES

Providing secure bicycle parking is often overlooked as an important way of encouraging bicycling. This includes bicycle parking both for end-of-trip and home-storage needs and for commuting and recreation. A wide array of bicycle parking types is available today; selecting the most appropriate type depends on how the parking is likely going to be used, i.e., as short-term parking for shopping and visitors or long-term parking for commuters, employees or residents.

Short-term parking (often referred to as Class II) serves people leaving bicycles for two hours or less. While short-term bicycle parking must be secure, the emphasis is on convenience and accessibility. Long-term parking (Class I) is for bicycle parking needs of longer than two hours, such as for employees during work or at people's homes. Because users of long-term parking favor greater security and protection from the elements over convenience, they are typically willing walk further to parking.

Short-term bicycle parking is generally provided with bike racks. Bike racks should be:

- Widely distributed and close to destinations
- Economical so that racks can be provided in sufficient quantities and locations
- Low maintenance to ensure that racks remain useable without high costs for maintenance
- Easy to understand and use
- Rack design to support both the wheel and the frame
- Placed in a well-lighted and visible location to ensure bicycle security
- Located on the sidewalk or in on-street bike corrals

On-street bicycle rack

On-street bicycle parking corral

Bicycle locker

FEHR PEERS

INNOVATE #3:
BICYCLE PARKING GUIDELINES

A bicycle parking policy, or guidelines, could lay out where different facilities are best suited. They could also encourage installing parklets, which are sidewalk extensions that provide more space and amenities for people using the street. Usually parklets are installed in one or more on-street parking spaces. Parklets may be a permanent installation of landscaping, public seating or restaurant space or may be a temporary installation for special event such as National Park(ing) Day.

Long-term bicycle parking can include bicycle lockers, bicycle cage or rooms, bicycle stations, and monitored bicycle parking. Jurisdictions with parking codes that require businesses and multi-family residences to provide long-term parking for employees and residents, respectively, will likely have greater levels of bicycle use.

Piedmont Ave Parklet (2012)

Fruitvale Ave Parklet

Best Practice Example

The recent Downtown Parking Strategy & Implementation Plan for the City of Pleasanton, CA, assessed available bicycle parking and, using feedback from the local jurisdiction and input from the public, recommended converting some on-street parking spaces into bicycle parking corrals. While one car could normally utilize such a space, the City was able to accommodate up to 10 bicycle parking spaces. Bicycle corrals also allow cyclists to park in highly visible areas where security concerns about bicycle being stolen are reduced with more eyes on the area from street-facing businesses.

Applying the Strategy

The CBPP could include a sample bicycle parking policy and/or guidelines, for adoption or customization by the local jurisdictions. It could also prioritize funding bicycle parking at key regional destinations.

Source: Spokemore Consulting, Carol Levine

CONTRA COSTA transportation authority

INNOVATE #4
BIKE SHARE (AND E-BIKES)

Over the last decade, cities throughout the U.S. and the world are putting in place new bike share systems. As of 2014, these systems were operating in five continents, 50 countries and over 700 cities. In most bike sharing systems, an individual "borrows" a bicycle on a very short term basis and returns the bicycle to the same or another bike sharing station. Some new dockless systems do not require stations at all, allowing riders to leave bicycles almost anywhere. Bike share allows users to make the trip from point A to point B without the cost of owning a bicycle or hassle of having a bicycle available for that trip. Costing varies by system but all encourage use for short transportation trips (about 30 minutes).

E-bike sharing is also becoming more common. The e-bike, or electric bike, integrates an electric motor with a regular bicycle. Some e-bikes have a motor that only assists the rider's pedal-power; others have a more powerful system, closer to a moped, while retaining the ability to be pedaled by the rider. E-bikes extend the cycling range for the user, make cycling in cities with difficult topography easy, and enable cycling at a faster speed without the need for a shower at the destination.
Siting bike share stations is a critical issue. Siting must consider surrounding land use, the density of stations and how the stations are situated in the streetscape and supported by street treatments that pinpoint and protect stations and provide needed wayfinding. Some general principles for bike share siting include:

- Easy access
- Good visibility
- Operationally feasible
- No conflicts with pedestrian travel, transit stops, or other major streetscape features such as fire hydrants, loading bays, utility boxes or poles, or landscaping
- Best results with stations located an 3-5 minute walking distance of one another

In addition, stations must connect to key destinations within the reach of bicyclists via a safe, well-developed system of bicycle facilities.

4 NACTO Bike Share Station Siting Guide: https://nacto.org/wp-content/uploads/2016/04/NACTO-Bike-Share-Siting-Guide_FINAL.pdf

Photo: Madison, WI Bike Share

INNOVATE #4: BIKE SHARE (AND E-BIKES)

Best Practice Example

In the San Francisco Bay Area's Bikeshare system, now known as Ford GoBike, people can pick up a bicycle at a multitude of stations located in San Francisco, the East Bay, and San Jose. The system is expanding to cover a greater reach of these areas to provide better mobility options in these more urban hubs and adjacent residential areas. Ford GoBike can also be integrated with Clipper Card, the Bay Area's regional transit pass, to address first-/last-mile connectivity. Ford GoBike also provides discounted memberships to those that qualify for the San Francisco Municipal Transportation Authority's Lifeline Pass, CalFresh, or PG&E CARE utility discount for $5 per month, which reduces the barriers to entry for lower-income residents of the Bay Area.

Applying the Strategy

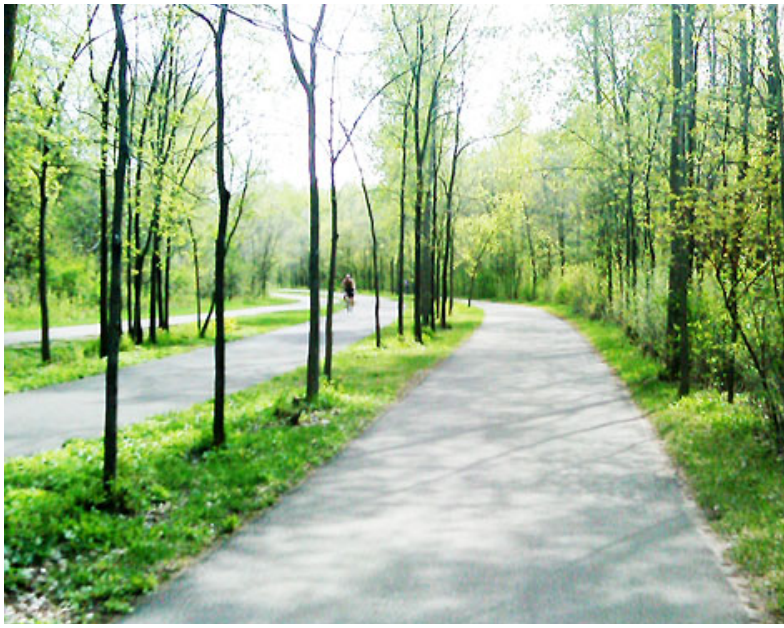
Bike share is not currently available in Contra Costa. E-bike usage was just permitted on the Iron Horse Trail. The CBPP can take on these key issues – of bike share program and e-bike expansion – and frame the ideal aspects of a program in Contra Costa.

CONTRA COSTA transportation authority

INNOVATE #5
BICYCLE SUPERHIGHWAY

Bicycle Superhighways, also referred to as a super cycleways, cycleways, veloways, or greenways depending on the context, are premium quality bicycle corridors with bicycle traffic partially or fully separated from vehicle and pedestrian traffic. They are designed to accommodate high volumes of bicycle commuters, typically for distances over four miles; with few or no at-grade crossings with the street network, bicyclists experience less delay and have higher travel speeds. These features, combined with wide rights-of-way, smooth pavement, and high-quality lighting, and ideally few pedestrians allow for few interruptions and expedited bicycle travel between regional destinations.

Prominent examples of Bicycle Superhighways can be found in many European locations such as the Netherlands, Denmark, United Kingdom, and Germany. Slightly adapted versions of Bicycle Superhighways have been constructed in Minneapolis and Chicago. European Bicycle Superhighways tend to vary in their development and design parameters, while most US examples exist in defunct rail corridors. Perhaps the best American example is the N. Cedar Lake Regional trail in Minneapolis, part of which is essentially a divided highway for bicyclists, with a separate path for eastbound and westbound cyclists and a third paved way for pedestrians.



Cedar Lake Regional Bike Trail, Minneapolis.
Source: Long Term Travel Enlightenment
http://travelenlightenment.net/the-cedar-lake-regional-bike-trail-minneapolis/

INNOVATE #5:
BICYCLE SUPERHIGHWAY

Best Practice Example

Chicago's "606," or Bloomingdale Trail, is the first of its kind in the City. It provides three miles of grade-separated bicycle travel through four of Chicago's most diverse neighborhoods. Similar to other US models, the trail was originally an elevated rail right-of-way, purchased in tandem with surrounding private property by the City of Chicago and now managed by Chicago Department of Transportation (CDOT), the Chicago Parks District and the Trust for Public Land.

The trail opened in 2015 and has approximately 30 feet of right-of-way, with designated space for walking, bicycling, and parks. For the majority of the trail, there is a 10-foot paved two-way bicycle travel corridor with 2 feet on each side provided for pedestrians. This seemingly narrow right-of-way slows bicycle travel and allows for safe mixed-flow travel at approximately 12 mph. The trail has extensive bicycle wayfinding signage, as well as bicycle racks, seating and lookout areas throughout.

Applying the Strategy

As a component of a backbone network of facilities, the CBPP could designate one or more superhighways, based on facility design characteristics and options for low-stress crossings, and prioritize funding for improvements necessary to develop a bicycle superhighway.

Chicago Bloomingdale Trail-Photos courtesy of Wall Street Journal, Matthew Gilson
Minneapolis Midtown Greenway-Photos courtesy of Simon Blenski, City of Minneapolis Public Works

CONTRA COSTA transportation authority

INNOVATE #6

PROTECTED INTERSECTION TREATMENTS AND APPLICATIONS

Intersections are often the most dangerous parts of the transportation system for bicyclists and pedestrians. Protected intersections give bicyclists and pedestrians with additional separation and protection from vehicles and are one way of accommodating one-way cycle tracks at intersections. Modeled after Dutch intersection design, these intersections feature corner refuge islands that put the stop bar for bicyclists ahead of the stop bar for vehicles, set back the bicycle crossings approximately one car length from the adjacent travel lane, allow for two-stage left-turns and allow for free right turns (see Inset Figure).

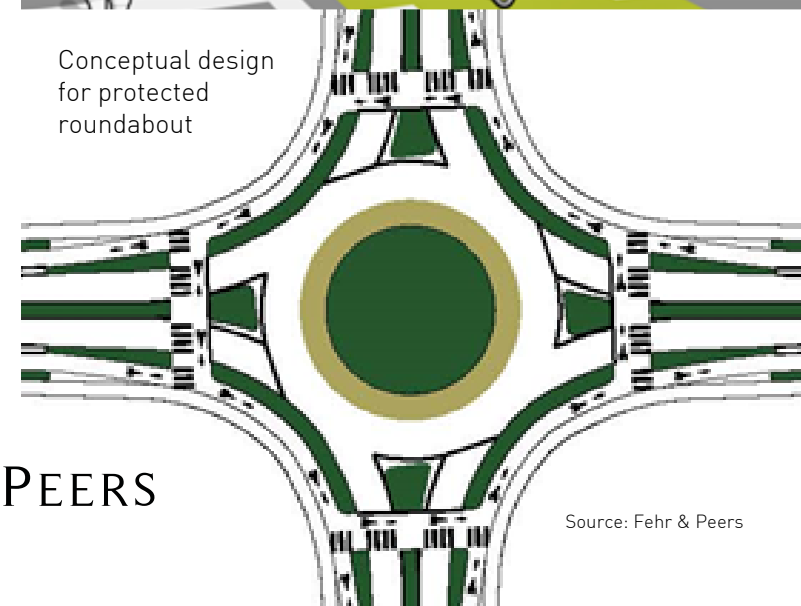
They have three major benefits:

1. Improving sightlines between right-turning drivers and bicyclists and providing bicyclists protection from right-turning vehicles with raised median islands
2. Providing protected queuing areas for bicyclists to facilitate left-turns and remove right-turning bicyclists from all auto conflicts
3. Reducing crossing distances for both bicyclists and pedestrians

Bicycle and pedestrian planners are also developing concepts for protected roundabouts. The Inset Figure to the right presents one conceptual design as an example.

Example protected intersection showing how pedestrians, bicyclists, and drivers use the intersection.

Source: MassDOT Separated Bikeway Guide



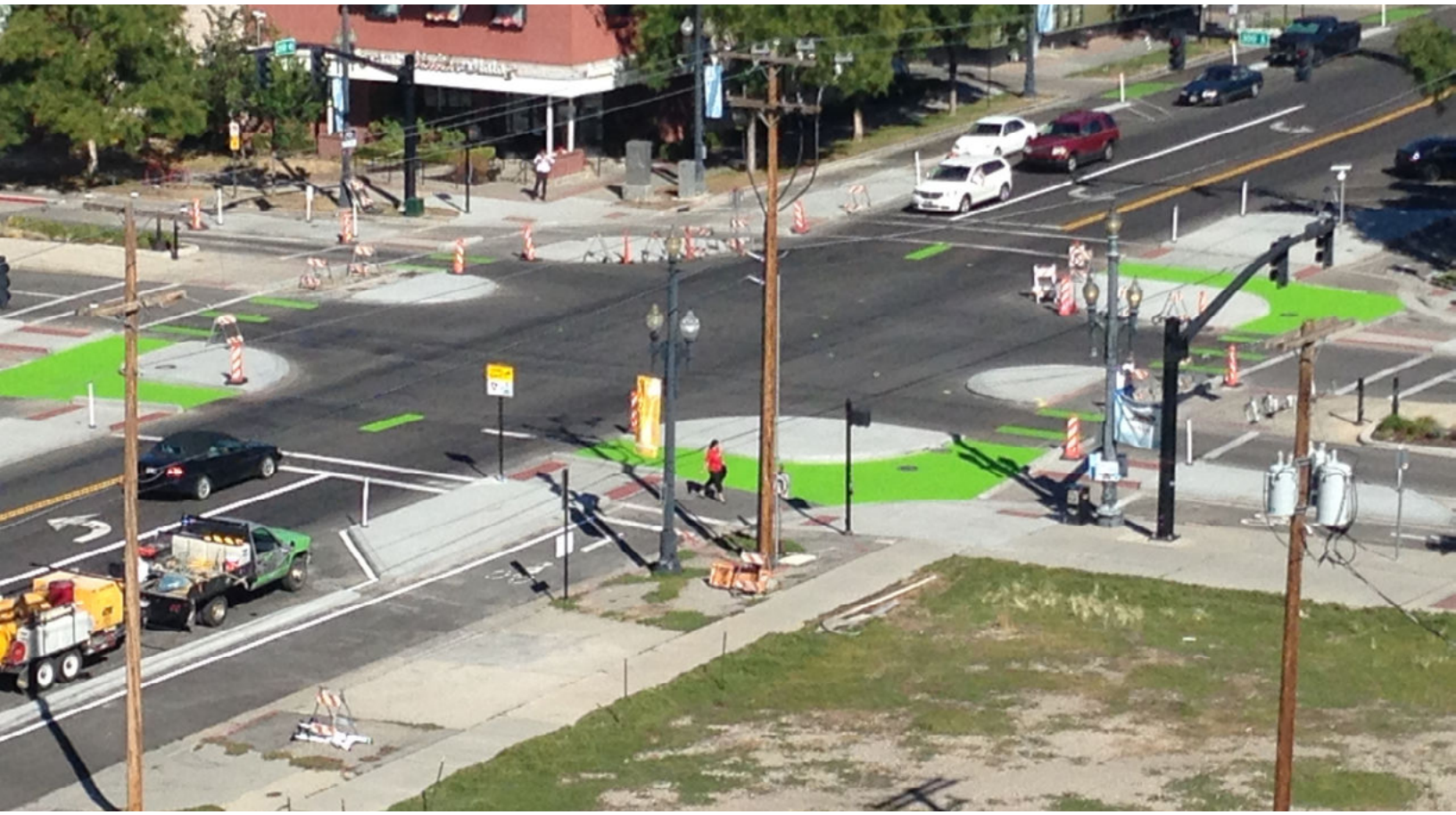
Conceptual design for protected roundabout

Source: Fehr & Peers

FEHR PEERS

INNOVATE #6:
PROTECTED INTERSECTION TREATMENTS AND APPLICATIONS

Salt Lake City's first protected intersection at 300 South and 200 West



Source: Courtesy of Salt Lake City's Transportation

Best Practice Example

Salt Lake City's protected intersection treatment at the intersection of 300 South and 200 West is considered one of the best practice examples of the treatment in the U.S. (see Inset Figure). Completed in October 2015, the protected intersection in downtown Salt Lake City connects two Class IV separated bikeway facilities and allows bicyclists to easily make left-turns, minimize bicycle-driver turning conflicts, and improve pedestrian crosswalks.

In the San Francisco Bay Area, several cities such as Berkeley and Fremont are planning to install protected intersections in the next five years.

Applying the Strategy

In support of a low-stress backbone network for Contra Costa, the CBPP could identify guidelines for where protected intersections could be built, such as at the intersection of two separated bikeways, and prioritize funding for them. Local jurisdictions could use the same guidelines to identify specific candidate locations for protected intersection.

CONTRA COSTA transportation authority

INNOVATE #7

SEPARATED BIKEWAYS (CLASS IV)

A Class IV Bikeway (also referred to as a separated bikeway or cycletrack) is for the exclusive use of bicycles and includes a physical separation between the bikeway and through vehicular traffic. The physical separation can be provided via grade separation, flexible posts, inflexible physical barriers, landscaping, planters or on-street parking. Class IV Bikeways are differentiated from standard and buffered bike lanes by the physical separation. They are differentiated from Class I bike paths by being closer to the adjacent roadway and only for bicycles.

Class IV Bikeways can be either one-way or two-way facilities; two-way facilities are generally preferred only in certain situations, such as on one-way streets or where connecting to a bicycle bridge. In these situations, they should only be considered for lower speed (35 mph or less) roadways. The design of Class IV facilities can integrate bicyclists with turning motor vehicle traffic at intersections or can be more fully separated.

Adding a Class IV Bikeway to an existing roadway may reduce or eliminate existing vehicular travel lanes, shoulders, or parking and may convert a portion of a wide sidewalk to become the cycle track. Local jurisdictions must include local businesses, residents, and advocacy groups in deciding which features are to be included in the street modification. In addition, roadways with many driveways are not appropriate for Class IV bikeways since the physical separation between the lane and the cycle track makes cyclists less visible to traffic turning into or out of the driveway.

Because Class IV Bikeways offer bicyclists a greater sense of comfort and usability, they have the potential to increase the number of bicyclists on the roadway. Two key design elements must be addressed: (1) pedestrians in the cycle track, and (2) appropriate intersection treatments. First, the adjacent pedestrian walkway must be designed to discourage pedestrians from inadvertently walking or loitering on the cycle track; this endangers both the pedestrians and the bicyclists. Second, intersections pose a potential hazard to bicyclists and are a specific challenge to the design and operation of a Class IV Bikeway. While in some cases grade-separated crossings are most desirable, they are not possible in most urban settings which is where Class IV cycle tracks are located. The usability and safety of the Class IV Bikeway depends heavily on the techniques used at intersections particularly the conflict with right-turning vehicles but also including crossings with pedestrian facilities. As such, intersection design should minimize conflict points between the Class IV Bikeway and crossing motor vehicle and pedestrian traffic. This can be accomplished with the installation of protected intersections or individual techniques using special signal phases, queuing areas, signage, striping, and pavement markings.

INNOVATE #7:
SEPARATED BIKEWAYS (CLASS IV)

One-way Class IV, San Francisco
Source: Carol Levine, Spokemore Consulting

Two-way Class IV, Redondo Beach.
Source: Caltrans Design Information Bulletin (DIB) Number 89

Best Practice Example

In 2016, the City of Berkeley evaluated the feasibility of, designed, and installed a road diet and separated bikeway facility on Fulton Street in response to a bicycle-related collision. The Fulton Street Corridor Bikeway Study & Design project converted an existing three lane one-way roadway to a two-lane roadway with Class IV bicycle facility along a two-block stretch of Fulton Street near the UC Berkeley campus. The innovative design installed a one-way buffered bike lane and a one-way parking-protected cycle track along this segment, which is presented in the Inset Figure below. Hailed as one of the quickest bicycle project implementations, the project team completed project planning, design, and installation within three months.

Applying the Strategy

The CBPP could include design guidelines for Class IV bikeways and prioritization criteria to fund their installation. It could also provide specific funding for quick build projects, including before and after evaluation efforts.

Fulton Street Protected Bikeway Design, by Block
Source: Fehr & Peers

CONTRA COSTA transportation authority

INNOVATE #8

PEDESTRIAN HYBRID BEACONS AND RECTANGULAR RAPID FLASHING BEACONS

Please note: as of the writing of this Plan Update, the interim approval by the FHWA for use of the RRFB has been rescinded due to patent concerns associated with the device. Current installations may remain through their useful life, but future installations should follow FHWA guidance regarding alternative devices or document design exceptions as necessary.

The **Pedestrian Hybrid Beacon (PHB)**, also known as the High intensity Activated CrossWalK or HAWK, is a pedestrian-activated warning device located on the roadside or on a masthead over midblock pedestrian crossings. (At least two pedestrian hybrid beacon faces must be installed for each approach). The PHB is used to warn and control traffic at an unsignalized location to assist pedestrians in crossing a street at a marked crosswalk. The beacon head is dark until activated by the pedestrian by an easy to reach button. It displays a red indication to drivers when activated, which creates a gap in traffic for pedestrians to cross the roadway.

The PHB provides an important traffic control option in areas that do not have the pedestrian traffic to warrant a full pedestrian signal. The alternating red signal heads allow vehicles to proceed once the pedestrian has cleared the intersection, thereby reducing vehicle delay and improving vehicle traffic flow.

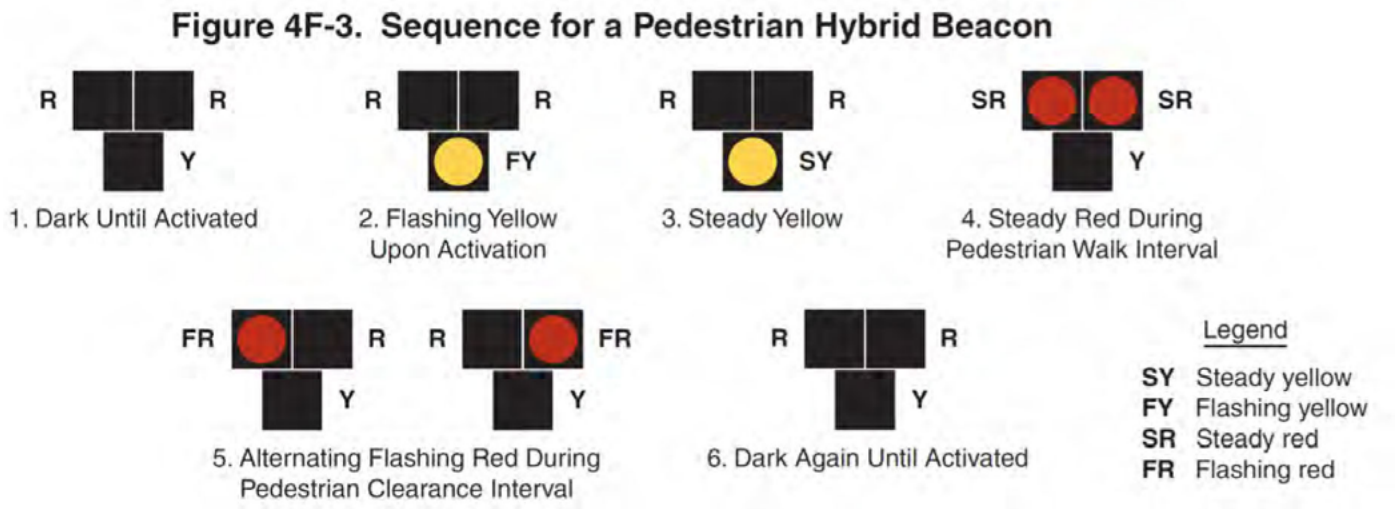
The **Rectangular Rapid Flashing Beacon (RRFB)** is a countermeasure (generally less expensive than the PHB) for increasing yielding to pedestrians at marked crosswalk. These warning beacons supplement standard pedestrian crossing and school crossing warning signs at pedestrian crossings across uncontrolled approaches. The device consists of high intensity yellow beacons (with a similar flash pattern to those installed on emergency vehicles) mounted on the pedestrian crossing signs. This device, although not in the MUTCD, has received interim approval from the FHWA (Interim Approval (IA) 11)[5]. California DOT has requested and received Interim Approval for all jurisdictions in the State.

5 RRFB https://mutcd.fhwa.dot.gov/res-interim_approvals.htm

Pedestrian Hybrid Beacon
Source: FHWA Office of Pedestrian Safety

FEHR PEERS

INNOVATE #8:
PEDESTRIAN HYBRID BEACONS AND RECTANGULAR RAPID FLASHING BEACONS



Sequence for a Pedestrian Hybrid Beacon. Source: CA MUTCD, Part 4

Best Practice Example

In early 2014, a PHB was proposed at a mid-block location on a busy arterial in Union City, CA. This is one of the first implementations of a PHB in California. The location was between two signalized intersections, but too far from either signal to prove convenient for those walking from one side of the street (Alvarado-Niles Road) to the other. Desire lines for crossings are strong, with thriving commercial/retail uses on each side of the street. Unfortunately, collisions involving pedestrians were historically occurring on this roadway segment, some of them fatal. After a safety study was conducted that recommended a PHB at this location, the City successfully secured Federal Highway Safety Improvement Program (HSIP) funds to design and install a PHB, curb extensions, and a median fence to discourage crossings outside of the PHB area.

Applying the Strategy

The CBPP could include these devices in the design guidelines. (The Authority recently approved funding for the construction of a HAWK in Pinole.) The Plan could match the devices to across barrier connections (ABC) locations and/or Vision Zero collision profiles to include a list of high priority installation sites.

Rectangular-shaped rapid flash LED beacon system
Source: FHWA MUTCD

INNOVATE #9

ACCOMMODATING BICYCLISTS & PEDESTRIANS AT INTERCHANGES

Best practice recommendations for new and retrofits include:

- Eliminate free-flow right turns, using positive control such as stop signs and signals
- Ramp terminals should intersect local roads at right angles, reducing the speed at which the turns are made
- Mark crosswalks where ramp terminals intersect local roads
- Provide adequate lighting
- Use only single right-turn lanes
- Design for direct connections
- Right-turn slip lanes should use tighter angles
- Use appropriate warning signage
- Avoid single-point urban interchange (SPUI) designs
- Stripe bicycle lanes, install a buffer zone where bicyclists would travel between moving vehicles for more than 200 feet, and dash bike lanes before the on-ramp begins, as is recommended for intersections
- Use color treatments for bike lanes to highlight merges and transitions
- Provide high visibility striping and directional curb ramps for all crosswalks
- Provide sidewalk buffers
- Provide optional ramps from bicycle lanes for sidewalk/crosswalk access, especially where complex weaves or long travel between adjacent traffic lanes is otherwise required for bicyclists
- Use stop signs or signals for pedestrian crossings
- Provide advance limit lines at multi-lane crosswalks
- Provide pedestrian-scale lighting where appropriate
- Design ramp geometries to encourage slower vehicle speeds until past crosswalks
- Design crosswalks to be as short as possible without deviating excessively from pedestrian desire lines
- Define a weaving zone (as opposed to a specific location) where bicyclists can decide when to merge safely across vehicle lanes

Sources: Bicycle and Pedestrian Safety Needs at Grade-Separated Interchanges, New Jersey Bicycle and Pedestrian Resource Center: http://www.bikewalktwincities.org/sites/default/files/Interchange_final_report_FINAL_080508.pdf
Recommended Design Guidelines to Accommodate Pedestrian and Bicycles at Interchanges, ITE- to purchase, go to http://ecommerce.ite.org/IMIS/ItemDetail?iProductCode=RP-039A

6 Bicycle and Pedestrian Safety Needs at Grade-Separated Interchanges, New Jersey Bicycle and Pedestrian Resource Center- http://www.bikewalktwincities.org/sites/default/files/Interchange_final_report_FINAL_080508.pdf

INTERCHANGES

Crossing a freeway interchange for a pedestrian or bicyclist is often a challenging experience; these locations are often a key barrier to increased walking and bicycling. Pedestrians and bicyclist face many barriers at these locations[6]:

- Discontinuous facilities
- Free-flowing and high speed entry and exit ramps
- Insufficient lighting
- Unmarked crossings
- Poor sight distance
- Lengthy crossing distances

Recent research has led to new best practices for mitigating existing unsafe conditions (see sidebar). Fully retrofitting existing interchanges, however, can be costly. Where cost is an issue, bicycle lanes, colored bicycle lane treatments, high visibility striping for crosswalks, advance limit lines at multi-lane crosswalks and other lower cost recommendations should be considered.

FEHR PEERS

INNOVATE #9:
ACCOMMODATING BICYCLISTS & PEDESTRIANS AT INTERCHANGES

Best Practice Example

In winter 2011, the Santa Clara Valley Transportation Authority began construction on the U.S. 101 and Tully Road interchange in San Jose, CA. The project was designed to construct various mainline and ramp improvements with a specific focus on improving safety for all modes of transportation through the interchange. Ramps were realigned to signalize vehicular movements in order to provide protected pedestrian signal phasing a crosswalks. Visibility at the crosswalks was also improved by shortening the crosswalk distance and better meeting pedestrian desire lines.

Applying the Strategy

The CBPP could incorporate the recent ITE Recommended Practice on Accommodating Pedestrians and Bicyclists at Interchanges in the design guidelines. Projects could also be identified and prioritized for key interchanges in Contra Costa.

INNOVATE #10

INNOVATIVE FUNDING STRATEGIES

Funding for improving and maintaining the transportation system has long been a challenge for city, county and regional jurisdictions. Active transportation projects have faced additional challenges because most transportation funding in the past has been focused on constructing new arterials, highways and freeways. While in recent years, funding options for bicycle, pedestrian and transit systems have grown, challenges remain to fund the projects needed to provide a safe, comprehensive system of bicycle and pedestrian facilities.

Currently, a variety of separate programs help fund active transportation improvements in Contra Costa, including:

- **Measure J** sets aside transportation sales tax revenues specifically for active transportation through the Transportation for Livable Communities and Pedestrian, Bicycle and Trail Facilities programs. In addition, other funding provided for maintenance and arterial improvements have helped deliver active transportation facilities.
- **SB 1: The Road Repair and Accountability Act** includes funding a new Active Transportation Program as well as funding for transportation research, planning grants, and maintenance and rehabilitation of roadways.
- The **State Active Transportation Program**, established in 2013, consolidated existing federal and state transportation programs including the Transportation Alternatives Program (TAP), Bicycle Transportation Account (BTA), and State Safe Routes to School (SR2S), into a single program with a focus to make California a national leader in active transportation.
- The **Highway Safety Improvement Program (HISP)** is a Federal-aid program to States for the purpose of achieving a significant reduction in fatalities and serious injuries on all public roads.
- MTC's **One Bay Area Grant (OBAG) Program** provides federal funding to support the development of walkable, transit-focused Priority Development Areas in the Bay Area and encouraging active transportation in the region.

INNOVATE #10:
INNOVATIVE FUNDING STRATEGIES

Local jurisdictions and districts have their own funding that they use to construct and maintain bicycle and pedestrian facilities within their districts. These funds can come from gas tax subventions, sales tax revenues, impact fees and a number of other sources.

Many of the programs listed above are innovative in their own right. The question is how take advantage of other opportunities and to create new strategies to fund active transportation improvements. One strategy is to implement bike and pedestrian facilities as part of other projects (e.g. striping bike lanes after a roadway repaving project, or ensuring complete streets design during a freeway interchange reconstruction). Another strategy could be to identify and add bicycle, pedestrian and transit projects as part of traffic impact fee project lists and as part of project-specific EIR mitigation measures. Another might be meld the calls for projects for separate programs into a single coordinated application process; this was done for the most recent OBAG program in both Alameda and Contra Costa.

Applying the Strategy

The CBPP could encourage the implementation of bike and pedestrian facilities as part of other projects; identify and add bicycle, pedestrian and transit projects as part of traffic impact fee project lists or EIR mitigation measures; and/or meld the calls for projects for separate programs into a single coordinated application process. The CBPP could also identify applicable grant sources and streamline data and resources for County jurisdictions in support of local pursuits.

IMPROVE

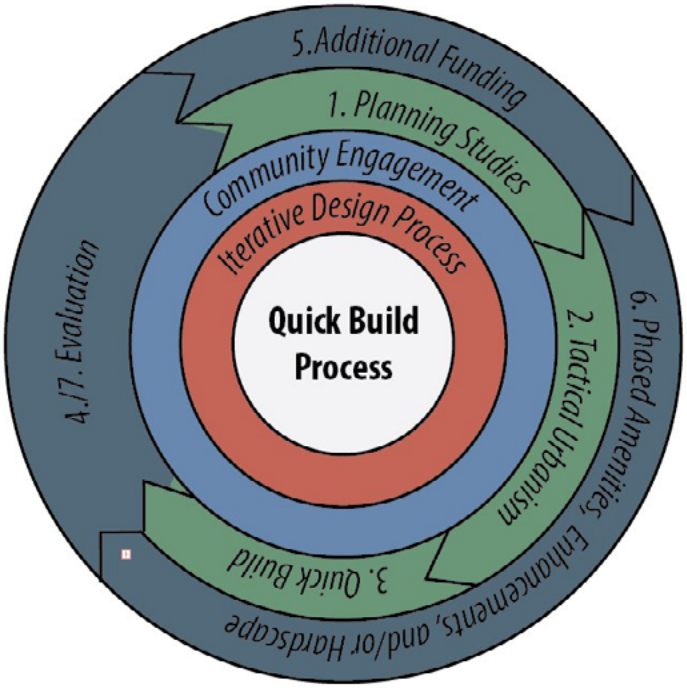
The following strategies focus on implementation techniques that deliver pedestrian and bicycle facilities more quickly.

IMPROVE #1
QUICK-BUILD PROJECTS

Complete streets design has evolved rapidly in the last five years with resources and guidance testing the limits of engineering practice and pushing forward innovative solutions to serve all ages and abilities. Robust public engagement can generate excitement and support around complete streets, but as the push to innovate increases, the stakes and expectations for improvements have become ever higher. Securing funding, developing construction documents and construction can take a significant amount of time, which can kill momentum and public excitement generated during the planning process. In addition, projects often emerge from a core safety concern, and that concern continues while the project awaits implementation. To overcome this gap, many cities have looked to "quick build" projects (which is synonymous with the term "interim design") to pilot innovative designs efficiently, using materials that can easily be modified and adapted.

These projects use low-cost materials, typically "paint- and plastic-" based, which allow projects to be installed quickly and inexpensively from a construction standpoint. They are typically much more cost-effective than traditional projects that rely on concrete and other hardscape materials and often require substantial roadway modifications to maintain storm water drainage. While quick build projects may last many years, iterative design is always in play and evaluation is key to demonstrate benefits and areas for improvements. Where projects do not meet their goals and expected outcomes, installations can be modified or, if needed, easily removed. The quick build approach also facilitates project phasing, extending improvements over longer distances or adding hardscape improvements as additional funding is available. The common quick build process is described in the circle diagram below.

IMPROVE #1: QUICK-BUILD PROJECTS



Best Practice Example

The Telegraph Avenue Complete Streets Plan (described in the Complete Streets Corridor Studies Section) in Oakland offer insights into how to build successfully on complete streets momentum, pivoting efficiently from plan to project using quick build designs. The City took a two-prong approach to implementing the plan's vision for a major road diet and cycle track: (1) in the near-term, install an interim design project using more readily available resources, and (2) in the long-term, secure grant-funding to extend the project and install more comprehensive streetscape improvement. The City completed ten blocks of paint-only improvements through the scheduled repaving program, reducing the number of vehicle lanes from five to three, installing a parking-separated bikeway, and striping new high-visibility crosswalks and painted islands.

After nine months, the City completed the Telegraph Avenue Progress Report, which documented major safety and comfort gains, and allowed the City to treat benefits and trade-offs objectively through quantifying performance metrics. The Progress Report and community feedback on the project led to iterative design improvements, such as installing flex-hit posts to deter illegal parking and provide consistent vertical separation for the bicycle lane.

Concurrent with the interim design installation and updates, the City was able to secure multiple highly competitive grants such as from the Caltrans Active Transportation Program (ATP) and Caltrans Highway Safety Improvement Program (HSIP) to double the extents of the project and install bus stop, signal, and hardscape improvements.

Applying the Strategy

The CBPP can include information on "how to" implement quick builds. It could also propose projects for quick build demonstration, and prioritize funding quick build projects and/or final build of a successful quick build.

Telegraph Avenue Complete Streets – Quick Build Cycle Tracks (Oakland, CA)

CONTRA COSTA transportation authority

IMPROVE #2

ROAD DIETS TO ACCOMMODATE BIKEWAY FACILITIES

A road diet is a transportation planning technique whereby the number of travel lanes on a roadway cross-section is reduced to achieve other roadway improvements. This allows jurisdictions to reallocate roadway space based on changing local priorities and roadway capacity. One of the most common applications of a road diet is to improve safety for other modes of travel. For example, a four-lane two-way road may be reduced by one lane in each direction to add or enhance:

- Bicycle travel with bike lanes or cycle tracks
- Pedestrian travel with new sidewalks or wider sidewalks
- Landscaping with new or wider installations on the outer edge of the roadway
- Center medians to accommodate landscaping and/or left-turn lanes
- Transit service with transit-only bus lanes or trackways
- Center turn lanes
- Two-way center turn-lanes

Under most conditions tested, road diets have minimal effects on vehicle capacity, because left-turning vehicles are moved into a common two-way left-turn lane.(1,2) However, for road diets with average daily traffic (ADT) above approximately 20,000 vehicles, traffic congestion is more likely to increase to the point of diverting traffic to alternate routes. Traffic diversion can often be handled with the use of traffic calming measures on parallel streets to discourage traffic from diverting from the main road. Traffic flow on the main road can also be benefitted by replacing traffic signals with roundabouts. Dedicated left-turn lanes will also reduce traffic delays.

Road diets are considered by many to be beneficial for pedestrian and bicycle traffic and will promote increased levels of both modes along the 'dieted' roadway. Besides the obvious benefits of a road diet, i.e., new or enhanced bicycle and pedestrian facilities, significant ancillary positive impacts can result from a road diet project such as:

- Lowered vehicle speeds
- Reduced crash rates
- Dedicated left-turn pockets
- Reduced crossing distances for pedestrians
- Pedestrian refuge islands on center medians
- Improved transit operations
- Economic benefits for businesses on the roadway

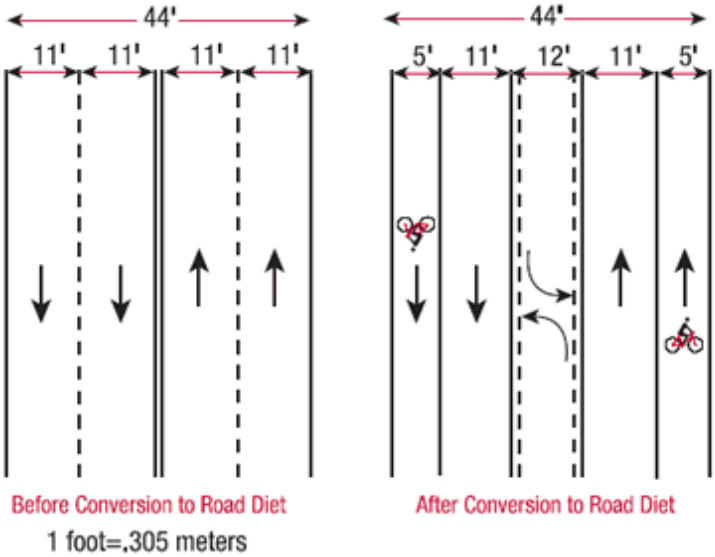
IMPROVE #2:
ROAD DIETS TO ACCOMMODATE BIKEWAY FACILITIES

Best Practice Example

Many Central Valley cities have started embracing the road diet to implement bikeway projects in built-out areas of their cities. In Modesto, CA the City designed a project on College Avenue to transform the roadway into a bicycle friendly corridor. This was accomplished by designing a road diet to reduce the number of travel lanes from 4 to 3 and installing bicycle lanes or parking protected bicycle lanes depending on the location.

Applying the Strategy

The CBPP could suggest ADT thresholds for road diets in Contra Costa and identify roadways potentially eligible based on this criteria and a demonstrated safety need.



Road Diet Cross-section, Summary Report: Evaluation of Lane Reduction "Road Diet" Measures and Their Effects on Crashes and Injuries, FHWA

Road Diet to Implement Parking Protected Bike Lanes on College Avenue in Modesto, CA.
Source: Michael Sacuskie, cal.streetsblog.org

INVOLVE

This series of strategies stresses the importance of public outreach and engagement during the Plan development.

INVOLVE #1
INNOVATIVE PUBLIC ENGAGEMENT STRATEGIES

More innovative public engagement strategies have sought to move away from traditional evening meetings, and instead "meet people where they are," through "pop-up" events and "living preview" demonstration projects. One benefit to this type of approach is capturing the attention of a broader range of community members, including those who may not already be interested in biking and walking issues.

- Pop-up events and mini-workshops typically set up tables or a booth with relevant materials at community venues such as shopping areas, farmers markets, and popular walking and bicycling facilities. Another approach is to walk busy areas with clipboards and relevant materials to talk one-on-one with community members.
- "Living Preview" project installations use the tactical urbanism approach of demonstration projects with inexpensive materials and volunteer support. For example, sample bicycle and pedestrian treatments could be installed at a specific location to create a three-dimension model of the proposed improvement (e.g. pedestrian bulbouts, parklets, separated bikeways, bike lane gap closures, and/or other tools that may be of interest to community members but may also be new and possibly controversial).

Another important trend is leveraging online tools and media to reach a broader audience. Tools include:

- Online Townhalls/Forums
- Online Surveys (including statistically
- Interactive Web Mapping Tools
- Social Media Engagement

INVOLVE #1:
INNOVATIVE PUBLIC ENGAGEMENT STRATEGIES

Best Practice Example

In 2013, the Yellow Brick Road project team, which consisted of the City of Richmond, consultants, and a local community organization, developed a "Living Preview" installation to create a real-world, three-dimensional model of proposed improvements for four blocks in the Iron Triangle neighborhood. The artful and community-driven transportation safety improvements included a roundabout, bike lanes, and a protected walkway. The 48-hour temporary installation was a powerful public engagement tool to show residents just how transformative reinvestment in the neighborhood could be. It also served to physically demonstrate the improvements for citizens and officials. The Richmond Fire Department used the preview as an opportunity to drive their vehicles through the roundabout and traffic circle, testing the paths for emergency vehicles and adjusting curb radii "on the fly." The City of Richmond later received several grants, including the Caltrans Environmental Justice Transportation Planning Grant and Caltrans Active Transportation Program, to help fund long-term improvements.

Applying the Strategy

As part of the CBPP Update scope, pop up events have been completed countywide. An online survey was also completed. The CBPP could call for living preview events as part of the plan rollout and/or to field test any key project.

Yellow Brick Road Living Preview Project Installation (Richmond, CA)

CONTRA COSTA transportation authority

INVOLVE #2
TECHNICAL ASSISTANCE FOR LOCAL JURISDICTIONS

The following technical assistance programs are included to provide the CCTA with some ideas of programs offered by other MPOs as well as potential bicycle and pedestrian-related technical assistance programs for the CCTA and Contra Costa cities.

Sustainable Communities Technical Assistance Program, Alameda CTC

http://www.alamedactc.org/app_pages/view/13552

The Alameda CTC Sustainable Communities Technical Assistance Program (SC-TAP) offers local jurisdictions on-call consultant expertise primarily for projects that are located in priority development areas (PDAs) or growth opportunity areas (GOAs). SC-TAP is intended to enable implementation of local complete streets policies, transit supportive land use projects, or bicycle and pedestrian improvement projects.

The technical assistance provided by SC-TAP includes:

- Feasibility studies for pedestrian, bicycle and trail, and circulation projects.
- Support for public outreach to plan and implement complete streets policies including assistance for downtown specific planning.
- Technical assessments of parking amenities and park-and-ride facilities.

FHWA Road Diet-related Technical Assistance

https://safety.fhwa.dot.gov/road_diets/

FHWA is offering State DOT's FREE Road Diet related Technical Assistance. This assistance includes any activities that advance Road Diets within your state. As examples, technical assistance requests may include:

- Reviewing State's Draft Road Diet policy or guidance documents;
- Road Diet workshops;
- Development of a Road Diet presentation aimed at either leadership or the general public;
- Animations demonstrating how Road Diets improve safety;
- Providing design guidance about unusual Road Diet configurations;
- Providing examples of other Road Diets around the country that are similar to the requestor's Road Diet; and
- Providing guidance about Road Diet implementation including selecting candidate locations, capacity constraints, public outreach response, evaluation metrics, EMS, slow moving vehicles, cost, or funding.

INVOLVE #2:
TECHNICAL ASSISTANCE FOR LOCAL JURISDICTIONS

California LTAP Center and Local Assistance Training
http://www.dot.ca.gov/hq/LocalPrograms/training.html
http://californialtap.org/

The Caltrans Division of Local Assistance offers subsidized training classes for local agencies on the federal-aid process, infrastructure management, worker and work site safety, and workforce development. These classes are offered by Caltrans through the Local Technical Assistance Program (LTAP) Center and the Cooperative Training Assistance Program (CTAP). These programs are intended to provide resources and subsidized, practical training for transportation professionals in California's cities, counties, and regional transportation agencies. Caltrans currently partners with two universities to provide local agencies with this training.

California's LTAP center, on behalf of Caltrans through Sacramento State's College of Continuing Education, offers classes and resources for local agencies, including detailed training on the federal-aid process. These classes, primarily taught by current and former Caltrans employees, include the Federal Aid Series and Resident Engineers Academy.

Caltrans partners with UC Berkeley, Institute of Transportation Studies to provide a Tech Transfer program (http://www.techtransfer.berkeley.edu/) offering technical classes, such as Traffic Engineering and Operations, Traffic Control and Work Zone Safety, Infrastructure Design, Pavement Design and Maintenance, Transportation Planning, Funding and Environment, Project Development, Pedestrian Facility Design, Bicycle Transportation, Complete Streets, and Multimodal Transportation.

Active Transportation Program (ATP) Training
http://www.dot.ca.gov/hq/LocalPrograms/atp/training.html

These materials were developed in a collaborative effort by Caltrans, the Local Government Commission, California Bicycle Coalition, California Walks, and Rails to Trails Conservancy as part of a workshop series conducted to help provide technical assistance to smaller agencies and disadvantaged communities to support the development of impactful active transportation plans, programs and projects that can successfully compete for ATP funding. The focus of these materials is on the elements that make for a high quality bicycle or pedestrian plan, project, or program.

California Active Transportation Resource Center
http://caatpresources.org/
In 2013, California created the Active Transportation Program (ATP) with the goal to encourage increased use of active modes of transportation such as walking and biking throughout the state. The ATP provides funding to communities throughout California to support infrastructure and education projects to further these goals.

The Active Transportation Resource Center's (ATRC) mission is to assist California's communities, tribal areas, and schools with resources, technical assistance, and training to help implement active transportation projects.

The ATRC is funded by an ATP grant to the California Department of Transportation - (Caltrans). Caltrans and the ATRC have also partnered with the California Department of Public Health (CDPH) and the Sacramento State College of Continuing Education (CCE) to assist in providing the resource center needs.

Sustainable Transportation Planning Grant Program
http://www.dot.ca.gov/hq/tpp/grants.html

The Sustainable Transportation Planning Grant Program was created to support the California Department of Transportation's (Caltrans) current Mission: Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability.

These grants may be used for a wide range of transportation planning purposes, which address local and regional transportation needs and issues. Grants are intended to promote a balanced, comprehensive multimodal transportation system with an emphasis on transportation sustainability. The implementation of these grants should ultimately lead to the adoption, initiation, and programming of transportation improvements. The Caltrans Division of Transportation Planning provides the following transportation planning grants:

- Strategic Partnerships
- Sustainable Communities

Applying the Strategy

As with prior countywide plans, CCTA may consider making technical support available to local jurisdictions in support of this plan's implementation. The CCTA Safe Routes to School Plan included a Technical Assistance program that provided site assessments for 17 schools throughout Contra Costa. Each school had a walking audit with a consultant team to discuss issues and opportunities surrounding each campus. Recommendations and initial concepts were then developed to help each school and jurisdiction apply for grant funding or include the project in a Capital Improvement Program. This type of strategy could be included in other planning projects or developed as a standalone program which jurisdictions can request involvement in.

TRACK

Measuring the outcomes of the strategies is critical. Suggestions for tracking the effectiveness of pedestrian and bicycle policies and treatments are presented in this section.

CONTRA COSTA transportation authority

TRACK #1

DATA COLLECTION AND SYSTEM MONITORING (BIG DATA OPTIONS)

When considering or planning for a bicycle or pedestrian project, a considerable amount of data may be needed to make an informed decision as to the feasibility and/or benefit of the project. This data will also be critical to formulate the best design of the project. The more involved a project might be, such as with a road diet or separated bike lane project, more extensive data collection will be required. Data to be collected might include:

- Land use patterns including traffic generators and destinations
- Traffic counts including mode splits, demand, and travel patterns
- Speed data
- Crash data particularly for incidents involving pedestrians and bicyclists
- Roadway geometry and cross-sections including pedestrian zones
- Inventory of traffic controls and pavement conditions
- On-street parking inventory and utilization of both autos and bicycles
- Transit routes and stops
- Surveys of neighborhood residents and/or roadway users
- Big Data: Strava Metro Data – Recreational running and cyclists frequency maps
- Big Data: Streetlight Data – Cellphone data used to assess large-scale travel patterns

Once the project is completed and some time has passed for the modifications to become familiar to users, monitoring the project operations is critical. Additional data collection and surveys may be needed to measure the success of the project by answering these and other important questions:

- Is the project operating as intended?
- Has the project been as successful as envisioned during the planning stages?
- Has the infrastructure held up since installation or is maintenance required?
- What other elements should be added to boost success?
- How should future installations be modified?

Specifics to measure the effectiveness of a bicycle or pedestrian project include:

- Increase in the mode share for bicyclists, pedestrians and transit users while reduction in mode share of autos and demand for auto parking
- Utilization of the new facility
- Reduction in crashes involving bicyclists and pedestrians
- Reduction in motor vehicle traffic, vehicle speeds, parking demand, and transit use
- Perceived benefit or cost to roadway users, local businesses, and residents

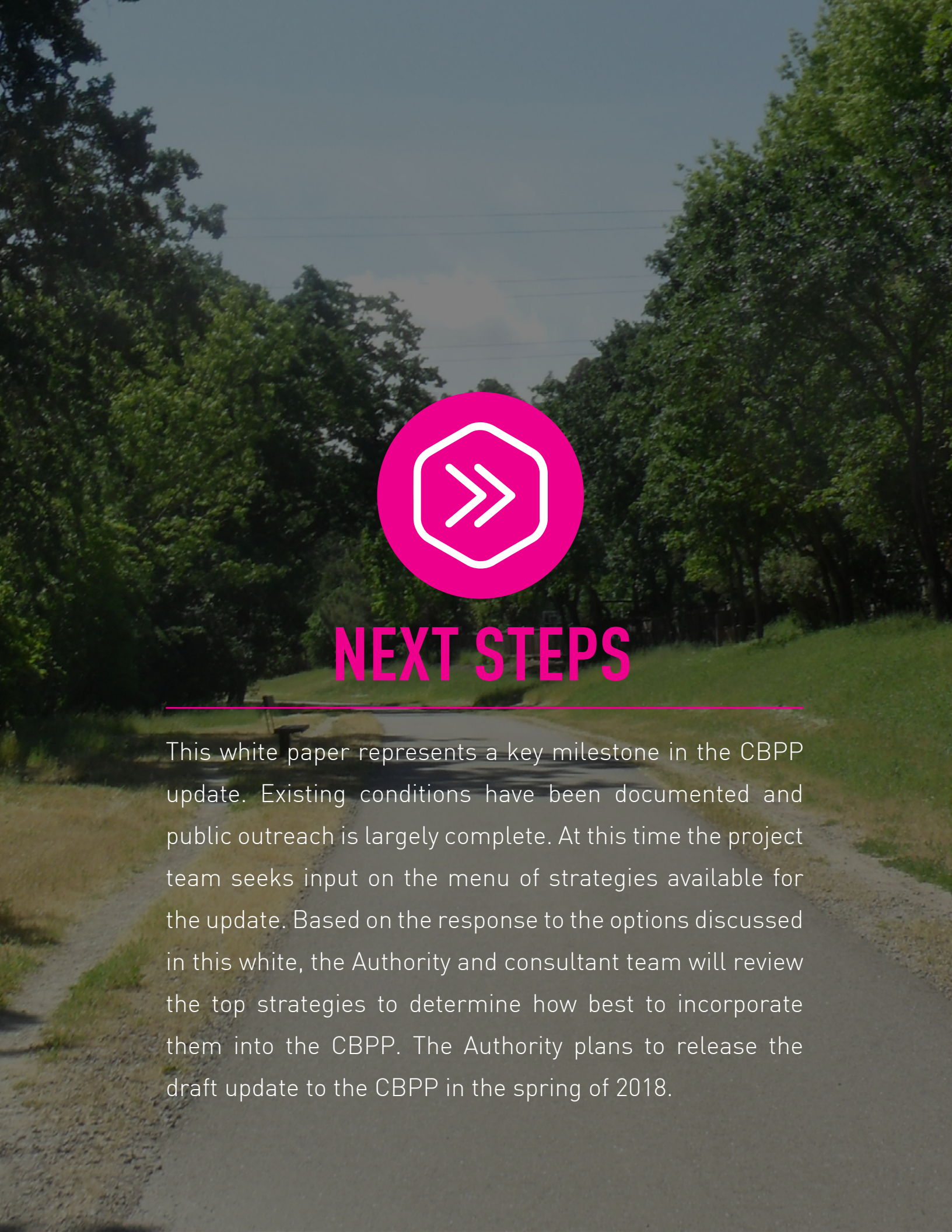
TRACK #1:
DATA COLLECTION AND SYSTEM MONITORING (BIG DATA OPTIONS)

Best Practice Example

Alameda County Transportation Commission, which is partnering with the Authority, has begun a study to assess future changes to the San Pablo Avenue corridor. This study is using Streetlight Data ("Big Data") to understand the effects of cut-through traffic using the corridor. This data will allow the local agencies to be able to prioritize the percentage of the traffic volumes that are local-serving versus those that do not stop within the corridor. Bicycle and pedestrian projects can use this data to assess the implementation of a road diet and potential reductions in capacity. Jurisdictions can make value judgements on whether to plan for the capacity of the local-users and design roadways to fit their needs or those of the through-travelling public.

Applying the Strategy

The CBPP could include an origin-destination summary via Big Data on key arterials that are identified as complete streets. This data could help support a road diet on major roads where the presumption is that all of the traffic is local (and therefore aware of and shopping at local stores).



NEXT STEPS

This white paper represents a key milestone in the CBPP update. Existing conditions have been documented and public outreach is largely complete. At this time the project team seeks input on the menu of strategies available for the update. Based on the response to the options discussed in this white, the Authority and consultant team will review the top strategies to determine how best to incorporate them into the CBPP. The Authority plans to release the draft update to the CBPP in the spring of 2018.