



TOWARD AN
**ACTIVE
CALIFORNIA**
STATE BICYCLE+PEDESTRIAN PLAN

Technical Report

PERFORMANCE MEASURES

California Department of Transportation

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Executive Summary

The California State Bicycle and Pedestrian (CSBPP) Performance Measures white paper describes and recommends several performance measures that align with CSBPP's goals and objectives. These measures are for evaluating system performance, not for identifying or prioritizing individual transportation projects. Each measure's strengths and weaknesses are discussed, data needs are identified, and calculation methodologies are suggested. This white paper organizes the full list of potential performance measures according to the CSBPP's four objectives, indicated below:

- **Safety:** Reduce the number, rate, and severity of bicycle and pedestrian involved collisions
- **Mobility:** Increase walking and bicycling in California
- **Preservation:** Maintain a high quality active transportation system.
- **Equity:** Invest resources in communities that are most dependent on active transportation and transit

The following performance measures (see Table 1) are recommended based on the priorities of the CSBPP as well as the availability of data required to track the measure. Short-term measures are those that can be tracked immediately, whereas long-term measures require additional data gathering or data processing.

Table 1 Recommended Short and Long-term Performance Measures

Performance Measures
Short-Term Performance Measures
1. Number of bicycle and pedestrian fatalities and serious injuries over 5 years
2. Percent of trips accomplished by walking
3. Percent of trips accomplished by bicycling
Long-Term Performance Measures
4. Bicyclist and pedestrian crashes per unit of exposure (e.g. miles traveled) over 5 years (crash rates)
5. Total number of bicyclist trips or bicycle miles traveled
6. Total number of pedestrian trips or pedestrian miles traveled
7. Percent of bicycle-permitting SHS mileage by Level of Traffic Stress (LTS) grade
8. Percent of bicycle and pedestrian facilities with a good condition rating*
9. Percentage of bicycle and pedestrian facilities on state highways meeting established maintenance standards

* *Toward an Active California* includes a strategy to define these condition ratings, to be led by the Division of Maintenance

Other Performance Measures Considered

Several potential performance measures were identified and evaluated for feasibility of implementation and usefulness. Some measures are not immediately feasible given available data or are lower priority, but may be considered in the future or for more focused study. A comprehensive list of potential performance measures, including the measure description, challenges for reporting the measures, and the calculation methodology are discussed in section 3.

1. Introduction

This white paper recommends bicycle and pedestrian performance measures for inclusion in Toward an Active California. The white paper reviews potential performance measures for consideration, identifies the benefits and limitations of these measures, and recommends short-term and long-term performance measures to track progress towards meeting California's state bicycle and pedestrian objectives.

The report includes:

- An overview of performance-based planning and bicycle and pedestrian performance monitoring
- A list of potential performance measures based on category and objective
- A discussion of the CSBPP goals and objectives
- A recommended list of short-term and long-term performance measures that address those objectives.

Taken together, these elements will provide a framework for assessing progress toward the goals of the CSBPP.

Performance-Based Planning

In recent years, many state departments of transportation (DOTs), regional, and local agencies have moved toward greater planning for and investment in walking and bicycling. This increased investment has led to a greater need to demonstrate accountability and transparency through performance management. The overall goal of performance management is to develop objective, outcome-oriented, and defensible investment strategies that help track progress toward meeting established system goals. Performance management assists decisions makers and stakeholders by evaluating the effectiveness of investment decisions and their subsequent impact on users of the transportation system. Figure 1.1 identifies the Federal Highway Administration framework for performance-based planning and programming within the traditional planning process.

Figure 1.1 Performance-Based Planning Framework



Source: FHWA Performance-Based Planning and Programming Guidebook¹

The first step in performance based planning is defining a strategic direction that guides decisions about policies and investments. This step involves developing system goals and objectives that describe a desired end state and the performance measures used to assess progress toward meeting those goals.

State DOTs use performance measures to help benchmark and measure progress towards meeting statewide goals of safety, health, economic development, and others. Additionally, State DOTs are required to establish performance targets and assess how they are using federal funds to meet goals established in the Federal Highway Safety Improvement Program (HSIP).² The Federal Highway Administration (FHWA) issued a new rule in spring 2016 that requires States and metropolitan planning organizations (MPO) to set targets for the number and rate of highway death and injuries, including those involving pedestrians and bicyclists.³ State DOTs and MPOs are also required to consider active transportation users in statewide

¹ Performance-Based Planning and Programming Guidebook. US Department of Transportation, Federal Highway Administration. 2013. http://www.fhwa.dot.gov/planning/performance_based_planning/pbpp_guidebook/

² FHWA Issues Final Performance Management Measures for Highway Safety. American Association of State Highway and Transportation Officials. 2016. <https://www.tsp2.org/2016/03/21/fhwa-issues-final-performance-management-measures-for-highway-safety/>

³ <https://www.transportation.gov/briefing-room/fhwa%E2%80%99s-new-safety-performance-measures-including-bicycle-pedestrian-safety>

planning documents including long-range transportation plans (LRTPs) and Metropolitan Transportation Plans (MTP).⁴

Performance measures are used in a variety of applications and different types of measures can assist agencies in selecting the appropriate measures for their specific objectives:

- **Performance monitoring:** Many agencies track progress towards their goals over a specific period of time using performance measures. This may include setting targets or benchmarking agency performance against peer agencies. Through annual reporting and data analysis, agencies can provide a high-level snapshot to the public that identifies progress in agency actions.
- **Scenario evaluation:** Scenario evaluation includes the consideration of various future scenarios that are based on potential land use decisions and investments that could occur through a period of time or in the future. Scenarios can be evaluated using performance measures that consider the impacts of policies and/or transportation investments.
- **Project prioritization:** Agencies can use a data-driven, transparent and objective process that supports decision making and aligns with agency goals. Given constrained funding for transportation investments, an objective and quantifiable project prioritization process can help build credibility and support accountability.
- **Alternatives comparison:** Performance measures provide data-driven evidence of the impact of a decision or action. Alternatives comparison is used at the local jurisdiction level in planning and project development to help inform selections of projects with the greatest impact.

The focus of performance measures for Toward an Active California is on measuring progress over time. However, additional efforts may incorporate bicycle and pedestrian measures into project prioritization and related efforts.

Policy Context

At the federal level, there is a comprehensive focus on reducing bicycle and pedestrian fatalities. Recent U.S. DOT initiatives include the *Safer People, Safer Streets Initiative*, which develops tools that encourage safety in and around streets, and the *Mayors' Challenge for Safer People and Safer Streets*, which works with Mayors and elected officials to advance safety and accessibility goals in their respective jurisdictions.

MAP-21 Performance Goals

Performance-based planning has been used as part of statewide transportation planning to evaluate the progress of investments, policies, and programs toward meeting goals and objectives. Moving Ahead for Progress in the 21st Century (MAP-21) was the first federal surface transportation law to set performance measures and targets (see Table 2). Enacted in 2013, MAP-21 provided a two-year reauthorization of surface transportation programs. The Fixing Americas Surface Transportation (FAST) Act, signed into law in late 2015, provides full funding authorization for five years of surface transportation programs, through Fiscal Year (FY) 2020. The FAST Act continues the focus on a performance management approach as implemented in MAP-21, making few changes to the national performance measure framework established in MAP-21.

⁴ Guidebook for Developing Pedestrian and Bicycle Performance Measures. US Department of Transportation Federal Highway Administration. 2016: https://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/performance_measures_guidebook/page01.cfm

Table 2 National Performance Goals (MAP-21)

Goal	Description
Safety	To achieve a significant reduction in traffic fatalities and serious injuries on all public roads
Infrastructure condition	To maintain the highway infrastructure asset system in a state of good repair
Congestion reduction	To achieve a significant reduction in congestion on the National Highway System
System reliability	To improve the efficiency of the surface transportation system
Freight movement and economic vitality	To improve the national freight network, strengthen the ability of rural communities to access national and international trade markets, and support regional economic development
Environmental sustainability	To enhance the performance of the transportation system while protecting and enhancing the natural environment
Reduced project delivery delays	To reduce project costs, promote jobs and the economy, and expedite the movement of people and goods by accelerating project completion through eliminating delays in the project development and delivery process, including reducing regulatory burdens and improving agencies' work practices

Source: US Department of Transportation, Federal Highway Administration⁵

Safety Measures

In spring of 2016, FHWA published the Highway Safety Improvement Program (HSIP) and the Safety Performance Management Measures (Safety PM) Final Rules (23 CFR 490) to implement the MAP-21 performance management requirements for safety. A key element of the rule includes a focus on reducing deaths and injuries among people walking and bicycling. The new rule includes the following performance measures with five-year rolling averages for:

- Number of Fatalities
- Rate of Fatalities per 100 Million Vehicle-Miles Traveled (VMT)
- Number of Serious Injuries
- Rate of Serious Injuries per 100 million VMT
- Number of Non-motorized Fatalities and Non-motorized Serious Injuries.

The new rule requires states to report on the number and rate of all traffic fatalities and serious injuries, as well as combined non-motorized pedestrian and bicycle injuries and fatalities. States and MPOs are also required to set targets for each of these measures each year as part of the HSIP. The measures are intended to help states evaluate their progress in addressing safety issues on public roads, including non-motorized fatalities and serious injuries. MPOs have the option to either: 1) agreeing to plan and program projects that contribute towards the accomplishment of the State DOT HSIP target or 2) committing to a quantifiable HSIP target for the MPO area.⁶

⁵ MAP-21 Performance Management Factsheet. US Department of Transportation, Federal Highway Administration. <https://www.fhwa.dot.gov/map21/factsheets/pm.cfm>

⁶ MPO Safety Performance Measures Fact Sheet. US Department of Transportation, Federal Highway Administration. http://safety.fhwa.dot.gov/hsip/spm/docs/mpo_factsheet.pdf

Best Practices

The FHWA's recently released, *Guidebook for Developing Pedestrian and Bicycle Performance Measures*, outlines the following recommended best practices:⁷

- Identify community goals and priorities. Stakeholder and public engagement should be a cornerstone for establishing community-based goals and priorities.
- To the extent possible, collect complete and continuous data to monitor performance over time. The less complete the available data, the more challenging it is to make the case for new policies and increased funding for bicycle and pedestrian facilities.
- Identify the application of the performance measure and whether it will be used for a reporting function to make decisions.
- Identify the geography of analysis for each performance measure:
 - Local – city, town, and some county jurisdictions
 - Regional – MPOs, transit agencies, and other regional planning agencies
 - State – State departments of transportation or commissions
- Identify the land use type and density for analysis. Classifications could range from rural, to suburban to urban.

Following USDOT, AASHTO, and other agency efforts to develop performance measures, *Toward an Active California* focuses on outcome measures instead of output measures. Output measures track the completion of proposed actions, such as miles of bicycle lanes built. Outcome measures track progress toward a desired outcome, such as increased rates of bicycling as an indicator of improved active transportation mobility. While it is important to track actions and ensure completion of proposed projects, focusing on outcomes is especially important to ensure that the actions provide the intended benefits.

In addition to the outcomes identified in *Toward an Active California*, it is also useful to consider the societal benefits that may accrue from the more immediate transportation outcomes. Active transportation can have benefits for public health (e.g., reduced obesity), sustainability (e.g., reduced vehicle miles of travel or greenhouse gas emissions), and the economy (e.g., increased tourism revenue). These are key motivating outcomes for this plan, but the performance measures defined in this report focus on the immediate transportation outcomes that Caltrans and its partners can directly influence to help achieve those broader societal outcomes.

⁷Guidebook for Developing Pedestrian and Bicycle Performance Measures. US Department of Transportation Federal Highway Administration. 2016:
http://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/performance_measures_guidebook/pm_guidebook.pdf

2. Potential Performance Measures

There are many ways to measure system performance. The appropriate performance measures should (a) reflect the agency's goals; and (b) be measurable over time. This section presents a broad list of bicycle and pedestrian performance measures for consideration in current and future efforts. The potential performance measures are organized into seven categories: Accessibility/Equity, Economy, Mobility/Connectivity, Preservation, Recognition, Safety/Public Health, and Sustainability/Livability (see Table 3). Most measures are described in greater detail in the FHWA's *Guidebook for Developing Pedestrian and Bicycle Performance Measures*.

Table 3 Potential Performance Measures for Consideration

Category	Description	Example Performance Measures
Accessibility/ Equity	Evaluate a system's overall accessibility, including its ability to accommodate residents with unique circumstances, such as people with disabilities and traditionally underserved populations.	Access to community destinations
		Adherence to accessibility laws
		Crossing opportunities
		Density of destinations
		Network completeness
		Population served by walk/bike/transit
Economy	Evaluate a system's contribution to economic growth.	Transportation-disadvantaged population served
		Access to jobs
		Job creation
		Land value
Mobility/ Connectivity	Evaluate a community's ability to connect its people, businesses, visitors and environment.	Retail impacts
		Average travel time
		Average trip length
		Connectivity index
		Delay
		Level of service
		Mode split
Preservation	Evaluate progress toward preservation and maintenance of a high quality active transportation system	Person throughput
		Route directness
		Volume
		Miles of pedestrian/bicycle facilities
		Presence, width, and condition of bicycle and pedestrian facilities

Category	Description	Example Performance Measures
Safety/Public Health	Evaluate the safety of the transportation system and the extent to which it supports public health.	Adherence to traffic laws
		Bicycle miles traveled
		Bicyclist or pedestrian collisions per mile traveled (or other exposure measure)
		Number of bicycle/pedestrian fatalities
		Number of bicycle/pedestrian serious injuries
		Pedestrian miles traveled
		Perceived safety of walking /bicycling
		Bicycle level of service / Bicycle compatibility index
Sustainability/Livability	Evaluate the system's impact on the environment and overall quality of life.	Bicycle level of stress
		Land consumption
		Street trees
		Utilization of walking for short trips and biking for short trips (% of all trips)
Recognition	External rankings or awards given to the state or community based on their efforts to improve bicycling or walking.	Vehicle miles traveled (VMT) and GHG Impacts
		Bicycle friendly communities
		Bicycle friendly state ranking
		Walk friendly communities

State Bicycle and Pedestrian Performance Measures

Several other states have developed statewide active transportation plans and associated performance metrics. Tables 4 and 5 present the statewide bicycle and pedestrian performance measures used in Oregon and Washington State, respectively.

Table 4 Oregon Bicycle and Pedestrian Plan Performance Measures

Category	Performance Measures	Description
Safety	Number of pedestrian fatalities (five-year average)	Average annual number of pedestrians killed in crashes with motor vehicles over a five-year period.
Safety	Number of pedestrian and bicycle serious injuries (five-year average)	Average annual number of pedestrians and cyclists seriously injured in crashes with motor vehicles over a five-year period
Safety	Perceived safety of walking and bicycling	Percent of the public that feels safe walking and bicycling in their community.
Accessibility	Pedestrian access to transit	The percent of streets within ½ mile of a transit stop that have sidewalks.
Data	Identifying data needs for pedestrian and bicycle performance measures	ODOT, in consultation with local jurisdictions and other agencies when appropriate, will complete the Data Key Initiative by December 31, 2020
Safety	Perceived safety of bicycling	Percent of the public that feels safe bicycling in their community.
Utilization	Utilization of walking or biking for short trips	Percent of commute trips less than 20 minutes that are accomplished by walking or biking

Source: Oregon Bicycle and Pedestrian Plan, 2016⁸

⁸ Oregon Bicycle and Pedestrian Plan. Oregon Department of Transportation, 2016:

https://www.oregon.gov/ODOT/TD/TP/BikePed/Attachment1_OregonBicycleandPedestrianPlan.pdf

Table 5 Washington State Bicycle and Pedestrian Plan Performance Measures

Category	Description
Preservation	<ul style="list-style-type: none"> Documented use of state and local Paths and Trails expenditures (RCW 47.30). Addition of bicycle and pedestrian facilities to the WSDOT Maintenance and Accountability Plan.
Safety	<ul style="list-style-type: none"> Number of law enforcement officers receiving training on bicyclist and pedestrian rights and responsibilities per year. Track the ratio of citations issued to motorists, pedestrians, and cyclists. Number of annual bicyclist and pedestrian involved collisions (fatal and non-fatal). Track Washington metro areas rank and other US cities for pedestrian safety. Percentage of pedestrian and bicyclist fatalities for at-risk groups (Ages 0-14 and 71+). Number of unmarked vs. marked/signed/signalized crossings within cities. Percentage of state population affected by locally adopted bicycle helmet ordinances. Number of students receiving pedestrian and/or bicycle safety education or skill training
Mobility	<ul style="list-style-type: none"> Net total linear miles of designated bicycle facilities (bike lanes and shared use paths). Net total linear miles of sidewalks on state routes within cities. Number of cities and counties with bicycle and/or pedestrian plans (should include measurable goals and project lists). Percentage of students walking or bicycling to Washington schools. Percentage of trips and miles traveled by bicycling and walking. Bicycle and pedestrian user counts on state highways, major arterials, trails, and related bicycle miles traveled.
Health and Environment	<ul style="list-style-type: none"> Net total linear miles of designated bicycle facilities (bike lanes and shared use paths). Net total linear miles of sidewalks on state routes within cities. Number of cities and counties with bicycle and/or pedestrian plans (should include measurable goals and project lists). Percentage of students walking or bicycling to Washington schools. Percentage of trips and miles traveled by bicycling and walking. Bicycle and pedestrian user counts on state highways, major arterials, trails, and related bicycle miles traveled.
Stewardship	<ul style="list-style-type: none"> Number of state, regional and local transportation personnel receiving design training. Portion of state, regional and local transportation agencies with adopted ADA Transition Plans and Implementing ADA Transition Plans. These plans identify locations where the transportation system is not accessible to people with physical challenges, people pushing baby carriages, or people with other limitations to mobility. Percentage of transportation plan and project teams that include bicycle and pedestrian representatives

Source: Washington State Bicycle Facilities and Pedestrian Walkways Plan⁹

⁹ Washington State Bicycle Facilities and Pedestrian Walkways Plan. Washington State Department of Transportation. 2008. <http://www.wsdot.wa.gov/NR/rdonlyres/F061CF6D-7B96-4E61-BF20-50EAF2716997/0/BikePedPlan.pdf>

Regional Bicycle and Pedestrian Performance Measures

This section provides example bicycle and pedestrian performance measures used by regional agencies in California.

MTC

The Metropolitan Commission (MTC) serves as the metropolitan planning organization (MPO) for the nine-county San Francisco Bay Area. The MTC has identified three bicycle and pedestrian performance targets in its long-range transportation plan, Plan Bay Area:

- Reduce by 50 percent the number of injuries and fatalities from all collisions (including bike and pedestrian)
- Increase the average daily time walking or biking per person by 70 percent (for an average of 15 minutes per person per day).
- Increase non-auto mode share by 10 percentage points (to 26 percent of trips)¹⁰

SCAG

The Southern California Association of Governments (SCAG) is the MPO for six counties in Southern California: Imperial County, Los Angeles County, Orange County, Riverside County, San Bernardino County, and Ventura County.

SCAG has identified six bicycle and pedestrian related performance measures in their 2016-2040 Regional Transportation Plan/Sustainable Communities Strategy (2016 RTP/SCS).¹¹

- Collision/accident rates by severity by mode: Collision rate per 100 million vehicle miles by mode and number of fatalities and serious injuries by mode (all, bicycle/pedestrian)
- Physical activity-related health measures: Physical activity/weight related health issues and costs
- Mode share of walking and bicycling for work trips, non-work trips and all trips
- Active transportation hazard: Breakdown of population by demographic group for areas that experience the highest rates of bicycle and pedestrian collisions
- Share of transportation system usage by mode for low income and minority households vs each group's population share in the greater region
- Geographic distribution of transportation investments: examination of transit, roadway and active transportation infrastructure investments in various communities throughout the region

¹⁰Plan Bay Area. Metropolitan Transportation Commission.
http://files.mtc.ca.gov/pdf/Plan_Bay_Area_FINAL/5-Performance.pdf

¹¹ 2016-2040 Regional Transportation Plan/Sustainable Communities Strategy.
<http://scagrtpscs.net/Pages/FINAL2016RTPSCS.aspx>

SANDAG

The San Diego Association of Governments (SANDAG) serves as the forum for regional decision-making for the 18 cities and county government in San Diego. SANDAG's Regional Plan San Diego Forward: The Regional Plan identified a total of nine performance measures related to bicycling and walking.¹²

- Average peak-period travel time to work (drive alone, carpool, transit, bike, and walk)
- Increase in walk, bike, transit, and carpool mode share
- Annual projected number of bike/pedestrian injury/fatal collisions per bike/pedestrian miles traveled per thousand Bicycle Miles Traveled (BMT)
- Percentage of population within 0.25 miles of a bike facility (class I and II, cycletrack, and bike boulevard)
- Percentage of employment within 0.25 mile of a bike facility (class I and II, cycletrack, and Bike Boulevard)
- Average travel distance to work (drive alone, carpool, transit, bike, and walk) (miles)
- Total time engaged in transportation-related physical activity per capita (minutes)
- Average peak-period travel time to work (drive alone, carpool, transit, bike, walk) (minutes)
- Walk, bike, transit, and carpool mode share

Furthermore, SANDAG adopted a regional complete streets policy in 2014 and identified two bicycle and pedestrian focused performance measures.

- An increase in the number of projects that include multimodal connections to destinations by providing bicycle and pedestrian facilities, crossing improvements, traffic calming measures, wayfinding signs or other measures;
- An increase in the miles of new and upgraded bikeways and walkways in the region, and other improvements that improve access for biking, walking, and transit or improve monitoring of those modes.

SACOG

The Sacramento Area Council of Governments is the MPO for the six-county Sacramento region. SACOG's 2016 Metropolitan Transportation Plan/Sustainable Communities Strategy identifies the following bicycle and pedestrian related performance measures.¹³

- Increases in miles of bicycle route mileage by county Bike route miles per 100,000 population
- Weekday person trips by transit, walk and bike modes
- Transit, walk and bike trips per capita
- Transit, bike and walk trips per capita by Community Type
- Weekday commute tours by mode Commute mode share
- Weekday non-commute person trips by mode Non-commute mode share
- Low Income and High Minority Areas (LIHM) and Non- LIHM Area transit mode share
- Bike and Walk mode share in LIHM and Non- LIHM Areas

¹² San Diego Forward: The Regional Plan. San Diego Association of Governments. <http://www.sdfoward.com/>

¹³ Metropolitan Transportation Plan. Sacramento Area Council of Governments. <http://www.sacog.org/general-information/2016-mtpsc>

LA Metro

The Los Angeles County Metropolitan Transportation Authority (LA Metro) is the major operator of bus and rail service as well as the Regional Transportation Planning Agency (RTPA) for Los Angeles County. LA Metro has identified the following bicycle and pedestrian focused performance metrics in their Countywide Sustainability Annual Report¹⁴ and Active Transportation Strategic Plan.¹⁵

- Number of Carpool and Active Transportation Trips
- Safety: Pedestrians and Cyclists Killed or Injured in Car Crashes
- Number and percent bicycle-to-transit
- Number and percent walk-to-transit
- Percent of all trips completed by bicycle in Los Angeles County
- Percent of all trips completed by walking in Los Angeles County
- Means of transportation to work
- Miles of installed bicycle facilities, by class
- Metro capital funding allocated to bicycle/pedestrian improvements
- Percent of bicycle/pedestrian improvement projects funded by Metro capital funding that benefits a disadvantaged community
- Number of station areas receiving Metro capital funding or external funding allocated to bicycle/pedestrian access improvement treatments
- Number of station areas with completed bicycle/pedestrian access improvement treatments funded by Metro capital funding or external funding
- External (non-Metro) discretionary grant funding won within LA County for active transportation projects

Local Bicycle and Pedestrian Plan Measures

Finally, there are a large number of local agencies that have produced performance measures in California. While too many to list, this section provides several examples.

City of Los Angeles Renewing Environments for Nutrition, Exercise, and Wellness¹⁶

The City of Los Angeles received a portion of a CDC Communities Putting Prevention to Work grant through the CDC, which allocated funds for cities in Los Angeles County to develop policies and plans to stimulate active transportation in their communities.

In 2011, the Los Angeles County Department of Public Health (DPH) Renewing Environments for Nutrition, Exercise, and Wellness (RENEW) program established a set of performance metrics related to livability in the City of Los Angeles for three main purposes:

1. To document the current conditions for the City's bicyclists, pedestrians, and transit riders
2. To make explicit the safety, health, environmental, economic, and equity impacts of our transportation system

¹⁴ Metro Countywide Sustainability Annual Report. Los Angeles County Metropolitan Transportation Authority. http://la.streetsblog.org/wp-content/uploads/sites/2/2015/05/Sustainability-Annual-Report-4_30_15.pdf

¹⁵ Metro Active Transportation Strategic Plan. Los Angeles County Metropolitan Transportation Authority. <https://www.metro.net/projects/active-transportation-strategic-plan/>

¹⁶ http://164.67.121.27/files/Lewis_Center/CompleteStreetsInitiative/UCLAPerformanceMetrics.pdf

3. To disseminate this information to key decision-makers and community groups in the City

The performance measures are related to access to active transportation facilities, mode share, VMT, and collision reduction. Data sources include U.S. Census, city, county, and state-wide databases, traffic counts, and GIS layers. Table 6 lists relevant performance metrics.

Table 6 City of Los Angeles Active Transportation Performance Measures

Goal	Objective	Metric
Transportation	Increase the percentage of population living within a ¼ mile of a dedicated, quality bicycle facility	Percentage of population within ¼ mile (1 to 2 min. bike ride) of a dedicated bikeway
	75% of new development should be within ¼ mile of a frequent / reliable transit stop	Percentage of population within ¼ mile (10 to 15 min. walk) of frequent and reliable transit service
	Increase the percentage of short trips made by walking and bicycling	Mode split for trips less than 3 miles in length
	City should strive to grow in size without adding vehicle trips	Change in vehicle miles traveled (VMT) per change in population
	Increase the number of pedestrians and bicyclists and the mode share of pedestrians and bicyclists at each count site	Pedestrian and bicycle counts
Safety	Reduce pedestrian, auto, and bicycle collisions per mile traveled (or per population by mode)	Collisions and fatalities by mode
	Reduce geographic disparities in collision incidents	Pedestrian and cyclist involved collisions by community plan area
Environment	Eliminate childhood obesity	Overweight and obese children by City Council district
	Number of parks and schools within 500 feet of high traffic volume street or freeway	Recognize the effects of air pollution on local populations Prioritize air quality buffers and other air quality mitigations around new and existing sensitive sites

San Francisco Pedestrian Strategy¹⁷

In 2010, the Mayor of San Francisco issued Executive Directive 10-03, which calls on the City to reduce pedestrian fatalities and serious injuries by 25% by 2016 and 50% by 2021 (compared to a 2008 baseline). The Pedestrian Strategy was developed in order to examine current conditions and identify short- and long-term actions to achieve this goal.

Performance measures in the Pedestrian Strategy are related to safety, walking mode share, and pedestrian environment improvements. Targets are structured around increased or decreased rates and quantity of infrastructure improvements, using two to five year increments as benchmarks.

Table 7 San Francisco Pedestrian Strategy Performance Measures

Goal	Objectives	Performance measure
Reduce pedestrian injuries	1. Target enforcement efforts to reduce pedestrian injuries	Reduce severe/fatal injuries

¹⁷ <https://www.sfmta.com/sites/default/files/projects/San%20Francisco%20Pedestrian%20Strategy.pdf>

Goal	Objectives	Performance measure
	<ol style="list-style-type: none"> 2. Reduce vehicle speeds on arterial streets 3. Implement a citywide pedestrian safety marketing campaign 4. Advance complete collision and injury surveillance to inform prevention and monitor progress 	
Reduce Neighborhood Injury Inequities in Pedestrian Injury	Reduce injuries both on highest injury corridors and areas	Reduce fatal and severe injuries per mile on high-injury corridors
Increase Walking Trips and Reduce Driving for Short Trips	Expand public outreach promoting walking	<p>Increase Walk Trips as % of Work Trips</p> <hr/> <p>Increase Walk Trips as % of All Trips</p> <hr/> <p>Increase Walk Trips as % of School Trips</p> <hr/> <p>Reduce Car Trips of Less Than One Mile</p>
Provide High-Quality Walking Environments	<ol style="list-style-type: none"> 1. Provide comprehensive safety, streetscape and walkability improvements and focused, proven safety and accessibility improvements 2. Target safety and walkability improvements near schools and areas with higher rates of senior pedestrian injuries 3. Improve safety and comfort of walking to transit 4. Implement pilot tests for promising, innovative treatments for safety and walkability 5. Expand data analysis to inform targeted safety and walkability improvements 6. Improve resident perceptions of safety and walkability 	<p>Provide Complete Streets Improvements on High Priority Segments</p> <hr/> <p>Provide Focused Safety Improvements on High Injury-Density Corridors</p>

San Francisco Bicycle Strategy¹⁸

The Bicycle Strategy, adopted in 2013, is one of several strategy documents that are part of the SFMTA's 2013-2018 Strategic Plan. The Bicycle Strategy goals and actions are aligned to meet the Strategic Plan overall mode share goal of 50% of all trips made using sustainable modes (walking, bicycle, public transit, and vehicle sharing).

Performance metrics in the Bicycle Strategy are related to quantity and quality of the bicycle network and facilities, safety, and education and encouragement efforts. Targets are measured by quantitative analysis such as Level of Traffic Stress, completion of projects and installation of facilities, and delivery of services and programs. Some performance metrics are tied to fiscal years, while others apply to the overall time frame of the Bicycle Strategy. A sample of goals, objectives, performance measures, and targets is listed in Table 8.

Table 8 San Francisco Bicycle Strategy Performance Measures

Goal	Objective	Performance measure
Improve safety and connectivity for people traveling by bicycle	Improve the comfort and connectivity of the bicycle network for all users, especially vulnerable user groups, e.g. youths, the disabled, and seniors.	Percent of the bicycle network that is moderately comfortable for an average person on a bicycle.
	Improve the safety of the bicycle network for all users.	Number of crash hotspots improved.
	Ease navigation through the bicycle network.	Miles of networked bicycle routes with wayfinding signs indicating destinations and distance
	Collect data to evaluate bicycle network activity and safety.	Bicycle counts and evaluation.
Increase convenience for trips made by bicycle	Increase the supply of short-term bicycle parking.	Short-term bicycle parking spaces and coverage
Normalize riding bicycles through media, marketing, education, and outreach.	Normalize riding bicycles among city residents, employees, and students.	Local bicycle awareness
Plan and deliver complete streets projects	Integrate projects to accommodate bicycle-transit trips.	Bicycle-transit projects

City of Davis – Beyond Platinum Bicycle Action Plan¹⁹

The Davis Bicycle Action Plan, adopted in 2014, is an active transportation plan that focuses on bicycling as the primary mode and also integrates walking and transit. The primary goal is to increase the bicycle mode share to 30% by 2020. At the time of plan development, the mode share was 20-25%.

¹⁸ https://www.sfmta.com/sites/default/files/BicycleStrategyFinal_0.pdf

¹⁹ <http://cityofdavis.org/home/showdocument?id=1073>

Performance measures are related to safety, user comfort and satisfaction, quality of the bicycle network, and mode share. Collision and U.S. Census data, surveys, counts, and observations are used to evaluate progress toward and achievement of the goals.

Table 9 City of Davis Bicycle and Pedestrian Performance Measures

Goal	Performance objective
Davis will develop and maintain a community of safe, confident, and comfortable cyclists.	Decrease the number of reported bicycle crashes by 30% by 2017 and 50% by 2020
	Increase expressed riding comfort, confidence and improved appropriate cycling behavior by 25% by 2017 and 40% by 2020
Davis will offer a complete, seamless, and integrated bikeway network on and off street that is accessible to and comfortable for people of all ages and abilities.	Implement 80% of identified improvements as noted in Part 4: Designing Bikeways for All Ages and Abilities by 2020
Davis will integrate cycling with transit options both locally and regionally	Increase the number of regional commuters utilizing a combination of bicycling and transit options by 30% by 2020
Davis will obtain Diamond Level Bicycle Friendly Community designation from the League of American Bicyclists.	Increase bicycle trips to school, work, and for errands to 30% of all trips taken by 2020
	Attain a 50% public satisfaction rate by 2017 and an 80% public satisfaction rate by 2020 with respect to bicycle safety, facilities, parking, and community leadership

San Jose Bike Plan 2020²⁰

Adopted in 2009, Bike Plan 2020 defines the City of San Jose's vision to make bicycling an integral part of daily life in San Jose. The Vision statement is to "Become a city where bicycling is safe, convenient, and commonplace".

Performance metrics in the plan are related to the bicycle network and facilities, mode share, and safety. The targets align with goals from existing City initiatives and League of American Bicyclists' Bicycle Friendly Community requirements.

²⁰ http://www3.sanjoseca.gov/clerk/Agenda/20091117/20091117_0602att.pdf

Table 10 San Jose Bicycle Plan Performance Measures

Goal	Performance measure
Bikeway network - Complete 500 miles of the Bikeway Network by 2020.	Miles of Bikeway Network completed
Mode share - Achieve 5% of all trips taken by Bike by 2020.	Mode share
Safety - Reduce bike collision rate by 50% by 2020.	Collision rate
Parking - Add 5000 bike parking spaces by 2020.	Bicycle parking
Validation - Achieve Gold-level Bicycle Friendly Community status by 2020.	League of American Bicyclists designation

3. Recommended Measures

Using the research identified in Section 2, potential performance measures were developed for each of Toward an Active California's objectives. This section describes the plan's overall performance framework and the recommended system performance measures.²¹

CSBPP Performance Management Framework

As described in Section 1, performance measures are most appropriately identified at the level of plan objectives. Objectives provide tangible outcomes that can be measured to track progress over time. The basic elements of the framework include a vision, goals, objectives, strategies, and measures.

Vision

By 2040, Californians of all ages, abilities, and incomes can safely, conveniently, and comfortably walk and bicycle for their transportation needs.

Goals

As a modal plan within the multimodal California Transportation Plan (CTP 2040), Toward an Active California adopts the goals set by that plan. The CTP set six goals for the long-term maintenance and improvement of California's transportation system, based on input from local, regional, State, and federal transportation plans and programs, as well as comprehensive stakeholder input:

- 1. Improve Multimodal Mobility and Accessibility for All People.** Improve multimodal mobility and accessibility by providing well integrated-multimodal options and well-managing the existing transportation systems to optimize performance. A key policy component as identified in the CTP 2040, includes providing viable and equitable multimodal choices, including active transportation.
- 2. Preserve the Multimodal Transportation System.** Prioritize the preservation investments that support California's current transportation system, maximize limited resources through asset management, and prepare the system for climate change threats.
- 3. Support a Vibrant Economy.** Improve the transportation system to limit inefficiencies, such as service disruptions, inequitable access and congestion, factors that impact the State's environment and economy
- 4. Foster Livable and Health Communities and Promote Social Equity.** Support and foster healthy and sustainable communities that promote equity among all people, cultivate economic development, protect the environment, and improves public health and safety.
- 5. Improve Public Safety and Security.** Prioritize and implement a comprehensive approach to invest in safety and security improvements for the state's transportation system. A key component of goal 5 is achieve a reduction in fatalities and serious injuries on all public roads through the State's Strategic Highway Safety Plan (SHSP).
- 6. Practice Environmental Stewardship.** Cultivate strategies that preserve the state's natural, cultural and agricultural resources as well as developing transportation infrastructure and avoiding delays in delays in projects and planning.

²¹ Note that system performance does not refer to the performance of individual infrastructure elements but to how the entire system performs as a whole.

Objectives

Toward an Active California includes four plan objectives to implement the CTP goals. These objectives guide the strategies of the plan.

- **Safety:** Reduce the number, rate, and severity of bicycle and pedestrian involved collisions
- **Mobility:** Increase walking and bicycling in California
- **Preservation:** Maintain a high quality active transportation system.
- **Equity:** Invest resources in communities that are most dependent on active transportation and transit

Recommended Performance Measures

Performance Measures in the Context of the Plan

A number of potential performance measures were identified for each of the four objectives. For each objective, sub-categories of measures were identified (e.g., safety outcomes and perception of safety). For each performance measure considered, a definition is provided, along with a brief description of its purpose, and any challenges involved in the data collection of the performance measure.

Short-term and long-term recommended performance measures are listed below, followed by a complete list of the measures evaluated in a series of tables detailing the data requirements and measure calculation methodologies. Short term measures can be calculated today. Longer term measures require additional data collection, analysis, or evaluation to implement.

Short-term Recommended Performance Measures

Safety

Number of bicycle and pedestrian fatalities and serious injuries over 5 years: This measure is defined as the average annual number of pedestrians and bicyclists killed in crashes with motor vehicles over a five-year period. (Note that this is not a rate, just a raw number). This measure relies on bicycle and pedestrian collision data from the Statewide Integrated Traffic Records System (SWITRS) and the Federal Fatality Analysis Reporting System (FARS). This measure is the same as the required national performance measure under MAP-21/FAST Act regulations.

Mobility

Percentage of trips accomplished by walking: This measure is defined as the percentage of trips accomplished by walking for all trip purposes. This measure relies on the California Household Travel Survey (CHTS), which has gathered data on pedestrian trips for all trip purposes. The public data is available at the zip code level and aggregated for California as a whole.

Percentage of trips accomplished by bicycling: This measure is defined as the percentage of trips accomplished by bicycling for all trip purposes. This measure also relies on the CHTS.

For both of these measures, there are potential improvements and considerations. The CHTS is infrequent (conducted approximately every 7 to 10 years) and there is no guaranteed funding for future data collection. Caltrans may also want to track the bicycling and walking commute mode share from the American Community Survey (ACS) 5-year estimates (Table B08301). This provides a partial look at trip making, though it only captures commute trips.

In addition, data from regional household travel surveys conducted by MPOs may be appropriate to use to provide more accurate estimates, especially in urban areas, for bicycle and pedestrian mode share, trip distance, and by trip purpose.

Recommended Long-term Performance Measures

Safety

Bicycle and pedestrian crashes relative to miles traveled over 5 years (crash rates): This measure is defined as the number of crashes or rate of crashes over a designated period of time. This measure relies on the collection of SWITRS collision and fatality data as well as the availability of Bicycle Miles Traveled (BMT) and Pedestrian Miles Traveled (PMT) estimates, both of which are currently unavailable at the statewide level.

Mobility

Total number of bicyclist trips or bicycle miles traveled: This measure can be calculated from the short-term measure, the percent of trips accomplished by bicycling, and the average length of bicycling trips. Current population estimates from the ACS, combined with data from the CHTS can be used to estimate the total number of daily trips that Californians make. This methodology can be used with the current data. However, this estimation methodology can be improved with better real-time data collection through local and regional efforts. In the future, third party data sources (from GPS traces, mobile phone apps, fitness devices, and similar opportunities) may be able to help estimate total bicycle trips or miles traveled at a state, regional, or local level.

Total number of pedestrian trips or pedestrian miles traveled: This measure is a parallel measure to the bicycle measure and can be calculated in a similar way. Given that walking is an element to most trips, this measure can be somewhat more challenging to calculate, and it may be important to focus on walking as the primary mode or as a connecting mode to transit. Regional household surveys may be useful to estimate this measure in urban areas. Like the bicycle measure, third party applications and data gathered through wearable devices and mobile phones may be used to further refine the estimate of total walk trips and trip lengths.

Percent of bicycle-permitting State Highway System mileage by Level of Traffic Stress (LTS) grade: Bicycle level of traffic stress (LTS) is a measurement that can be used to quantify the perceived comfort of bicycling on a given street. This measure quantifies the Level of Traffic Stress (LTS) using standard LTS criteria, including street width, bike lane width, speed limit, and bike lane blockage to assign a numeric stress level to every section of road and bicycle path in the SHS, excluding highway segments where bicycles are not allowed. This measure cannot be tracked currently because there is missing data on some of the inputs to LTS for the State Highway System roadways, such as bicycle facility presence and type. LTS may be a more useful measure for local jurisdictions and local roads that have lower speeds and volumes (i.e., LTS 1 or 2). In the future, California can track the LTS grades of local roadways as local jurisdictions conduct assessments.

Preservation

Percent of bicycle and pedestrian facilities with a good condition rating: This measure quantifies the percent of bicycle and pedestrian facilities that have an overall smoothness of roadway, i.e. easily passable walkways for walkers, cyclists, wheelchairs, and intact surfaces. The condition of state owned and local pedestrian facilities relies on two data sources that are currently unavailable: the existence of sidewalk data and the condition rating.

There are sidewalk design standards for compliance with the Americans with Disabilities Act (ADA) and FHWA published a Sidewalk Assessment Guide for ADA compliance. However, there is no single national standard for assessing the relative conditions of sidewalks (beyond ADA compliance). Local jurisdictions have prepared their own assessments and have developed techniques to automate the data collection and assessment process. Researchers in Georgia reviewed current practices nationwide and developed a technique and mobile application, SideWalk Sentry, to assess compliance with ADA requirements and

quantitatively measure the sidewalk quality. However, given the significant variation between regions nationwide, the research team concluded that local jurisdictions should develop their own locally appropriate rating system. California should develop a data collection process and adopt a standard sidewalk condition rating (Excellent, Good, Fair, Poor) based on the following sidewalk characteristics: grade, cross slope, obstructions, design width, spalling, cracking, and dip/heaves.

Percentage of bicycle and pedestrian facilities on state highways meeting established maintenance standards: This measure entails tracking the maintenance of state owned pedestrian and bicycle facilities. Maintaining bicycle and pedestrian facilities includes identifying methods for removing debris, keeping facilities in good repair, replacing faulty lighting, maintaining safe operating conditions during construction or other temporary events, and repairing potholes in a timely fashion. FHWA documents guidance on facility maintenance for jurisdictions and state DOTs, including two guidebooks: *A Guide for Maintaining Pedestrian Facilities for Enhanced Safety and Designing Sidewalks and Trails for Access*. Additionally, the Rails-to-Trails Conservancy publishes an agency best practices survey for *Maintenance Practices and Costs of Rail-Trails*.

Performance Measures for Future Consideration

Safety

Percentage of the public that feels safe walking and bicycling in their community: This measure is defined as the percent of the public that feels they have the necessary facilities to bike safely in their community. This measure relies on user surveys that evaluate how safe the public feels on a roadway or a bicycle facility due to concerns of personal safety and security. Currently, there are no statewide surveys that measure the perception of safety. However, this question could be added to a future California Household Travel Survey (CHTS) depending on funding availability.

Mobility

Percent of bicycling trips accomplished by women: This measure calculates the percent of bicycling trips that women make out of all bicycling trips. This measure relies on the CHTS, which gathers data on bicycle trips for all trip purposes and tabulated data by gender. Because of lower rates of cycling by women, this measure could provide an indicator of the effectiveness of investments and programs to support bicycling for everyday transportation purposes.

Average length of bike/walk trips: This measure relies on the distance calculations provided in the CHTS. Where available, data from regional household travel surveys conducted by CA MPOs should be used to provide more accurate estimates, especially in urban areas, for bicycle and pedestrian mode share, trip distance, and by trip purpose. This measure may not change over time but is important for calculating the bicycle and walk miles traveled measures.

The total distance, expressed in miles or miles per capita or per road mile, of all pedestrian and bicycle facilities in a specified geographic area: This measure relies on accurate local bicycle and pedestrian facility data. There is no single database for bicycle facility data; however, it can be collected from MPOs and local agencies. Accurate pedestrian facility data is not currently available. This measure also ignores connectivity concerns (whether the bike lanes connect to other facilities) and accessibility concerns (whether the bike or pedestrian facilities provide access to locations that users want to visit)

Percent of State Highway System roadway miles with complete sidewalks or bicycle facilities on both sides: This measure is defined as the percentage of SHS roadway miles that include complete sidewalks or bicycle facilities on both sides of the road. This measure relies on accurate sidewalk and bicycle facility data on the SHS. Key data sources include Caltrans SHS sidewalk and bicycle facility data.

Percent of planned State Highway System pedestrian or bicycle network that is constructed: This measure identifies the percentage of planned pedestrian and bicycle network on the SHS that has been implemented. This measure relies on accurate existing and planned sidewalk and bicycle network data for the SHS.

Percent of pedestrian-permitting State Highway System mileage by pedestrian level of service grade: This measure is defined as the percentage of SHS roads that are suitable for pedestrian use based on a PLOS rating. This measure relies on accurate pedestrian facility data and a consistent Pedestrian Level of Service (PLOS) rating system. CA does not have a PLOS standard. A number of methods exist to evaluate the Pedestrian Level of Service (PLOS). Though a method exists in the Highway Capacity Manual, it is data-intensive and not well suited to network-wide analysis. Many states and communities use simpler methods of network assessment which is based primarily on facility presence and may include some information on facility characteristics (e.g., width) if the information is available. A slightly more complicated PLOS might provide scores in terms of pedestrian safety and consider posted roadway speeds, separation from vehicular traffic and roadway crossing conditions. The most data intensive PLOS methods are used to assess ADA compliance and the quality of the pedestrian experience. These assessments may include detailed facility condition information, presence of pedestrian scale environment and presence of amenities, etc.

Percent of workers' commute origin-destination pairs connected by a low stress route shorter than 2 miles: This measure evaluates the origin-destination for bicyclists that includes a low stress route less than two miles in length. This measure relies on accurate network data for bicycle facilities and the location of jobs from the U.S. Census Bureau's LEHD/LODES. The LEHD publishes their OnTheMap tool where employment and travel data, including origin-destination flows for commute trips, can be downloaded.

Bicycle facility density within 1 mile of a regionally significant transit or rail station: This measure is defined as the presence of several bicycle facilities within one mile of a regionally significant transit or rail station. This measure relies on the location of significant transit stations, recently collected for the CA State Rail Plan, and bicycle facility data from local jurisdictions and transit operators.

Percent of regionally significant transit or rail stations that have covered, secure bicycle parking facilities within or adjacent to the stations: This measure relies on accurate data for bike parking at transit stations. This data would need to be collected from the various operators of inter-city rail, urban rail, and BRT systems.

Preservation

Dollars per capita spent on bicycle and pedestrian infrastructure: This measure is defined as the federal dollars spent per person on bicycle and pedestrian infrastructure. Data sources for this measures include the Federal Highway Administration (FHWA) Fiscal Management Information System (FMIS) data and ACS. This measure relies on the Federal Highway Administration (FHWA) Fiscal Management Information System (FMIS) funding data and as well as population data from the ACS. This dataset can be easily compared to other states.²²

²² California should track additional state non-motorized transportation funding allocations such as Active Transportation Program (ATP) Transportation Development Act (TDA), AB 2766 Subvention Program, Roberti-Z'berg Harris (RZH) Grant Program – Proposition 40, Wildlife Conservation Board Public Access Program, Sustainable Transportation Planning Grant Program and the Coastal Conservancy Program. Local funding sources to track include: Resurfacing and Repaving, Bridge and Highway Tolls, Impact Fees and Developer Mitigation, Benefit Assessment Districts, Property Taxes and Bonds, Business Improvement Districts, User Fees, Parking Meter Revenues, Adopt-a-Path Program, and General Funds.

Mileage of bike lanes implemented through paving/routine maintenance projects: This measure relies on Caltrans to track the new mileage of bike lanes implemented on an annual basis through non-capital improvement projects. Caltrans may have this data for projects on the State Highway System, however, for all roadways local agencies will need to track new bike lane mileage as well as the context or funding source for the implemented projects.

Equity

Percentage of transportation-disadvantaged population within 1/2-mile bicycling distance to on-street bicycle facilities: This measure is defined as the percentage of disadvantaged-population living within ½ bicycling distance to bicycle facilities, including a protected bike lane, marked bike lane, and bike route. It relies on the availability of current bike facility network data, current population data from the ACS, and the classification of which census tracts are considered transportation disadvantaged. California's Active Transportation Program defines a disadvantaged population as meeting one of the following criteria: 1) The median household income that is less than 80% of the statewide median based on the most current census tract level data from the ACS; 2) an area identified as among the most disadvantaged 25% in the state according to the CalEPA and based on the latest version of the CalEnviroScreen scores; or 3) an area where 75% of public school students are eligible to receive free or reduced-priced meals under the National School Lunch Program. Other standardized tools include the Public Health Alliance of Southern California's Health Disadvantaged Index and the EPA's EJSCREEN.

Percentage of transportation-disadvantaged population within 1/2-mile distance of a transit stop: This measure is defined as the percentage of disadvantaged population living within ½ mile to a transit stop. This measure can be tracked for all transit stops, including local bus services, or can be limited to fixed guideway services or a defined set of high quality transit lines. The measure relies on the availability of current transit station data from the California Rail Plan and local operators, current population data from the ACS, and the classification of which census tracts are considered transportation disadvantaged (defined above).

Percentage of roadway network in disadvantaged population area with sidewalks on both sides: This measure is defined as the percentage of roadways in a disadvantaged area that has sidewalks on both sides. It relies on current population data from the ACS and the classification of which census tracts are considered transportation disadvantaged (defined above). It also relies on complete sidewalk data, which is currently unavailable.

Percentage of disadvantaged population for whom highways serve as barriers to accessing opportunities: This measure would require the creation of an inventory of pedestrian crossing opportunities on the state highway system. Both freeways and surface highways can create major pedestrian barriers, requiring substantial route deviation.

Percentage of Caltrans active transportation funding invested in disadvantaged communities: This measure tracks the percentage of Caltrans active transportation funds used within disadvantaged communities. The Active Transportation Program provides this data for each grant cycle.

Number of Full Time Employees within Caltrans working on equity and accessibility: This measure would track the number of Caltrans employees (or FTE equivalents), by district and at headquarters, who work on equity or accessibility programs. Caltrans Human Resources data may have number of employees whose sole responsibility is equity programs; however, additional surveying is necessary to identify employees that dedicate some time towards equity and accessibility programs.

Other– Public Recognition

Number of Bicycle Friendly Communities by grade (platinum, gold, silver, and bronze): This measure is defined as the number of local jurisdictions with a Bicycle Friendly Community Designation at any level and relies on data from the League of American Bicyclists (LAB). LAB ranks applicant cities by how friendly they are for bicycling. There are four grades: Platinum, Gold, Silver, and Bronze.

Number of Walk Friendly Communities (platinum, gold, silver, and bronze): This measure is defined as the number of local jurisdictions with a Walk Friendly Community Designation at any level and relies on data from the Pedestrian and Bicycle Information Center (PBIC). PBIC's Walk Friendly Community project ranks cities by how friendly they are for pedestrians. There are four grades: Platinum, Gold, Silver, and Bronze.

Bicycle Friendly State ranking: This measure is defined as California's annual rank in the League of American Bicyclists Bicycle Friend State Ranking Program and relies on data from LAB's rankings. The League of American Bicyclists (LAB) ranks each state based on the relative bike friendliness.

Data Requirements and Calculation Methodologies

Tables 11-15, below, provide additional details on suggested data sources and their availability for all of the measures under consideration, as well as recommendations on calculation methodologies for each measure. A separate table is shown for measures in support of each of the CSBPP objectives, and the short-term and long-term measures are identified as such.

Table 11 Potential Safety Measures

Performance Measure	Data Availability	Methodology
Safety Outcomes		
Short-term Recommended Measure Number of bicycle and pedestrian fatalities and serious injuries over 5 years	Yes; Statewide Integrated Traffic Records System (SWITRS)	Fatal and serious injuries of bicyclists and pedestrians should be aggregated over the previous five-year period. The SWITRS dataset can be downloaded for each county in California. ²³
Long-term Recommended Measure Bicyclist and pedestrian crashes per unit of exposure (e.g. miles traveled) over 5 years	Partial	To calculate this measure, use the average annual fatal and injury collision rates based on the five-year totals calculated in the previous measure. If there are reliable estimates for annual BMT or PMT, use the total collisions involving bicyclists and pedestrians and divide by either BMT or PMT. This can be calculated at the state or county level.
Perception of Safety		
% of public that feels safe walking and bicycling in their community	No	There are academic studies from other regions and federal resources that measure the perception of safety, including NHTSA's 2012 National Survey of Bicyclist and Pedestrian Attitudes and Behaviors national study. These sources can be used in California to create a benchmark for this measure.

²³ This measure and the proposed data sources are required under Federal law.

Table 12 Potential Mobility Performance Measures

Performance Measure	Data Availability	Methodology
Mode Share		
Short-term Recommended Measure % of trips accomplished by walking	Yes; CHTS, MPO household travel surveys, and ACS	For this measure, CA should use the raw data from the CHTS along with the CHTS' trip correction factors. The trip correction factors should also be refined to better represent pedestrian trip shares.
Short-term Recommended Measure % of trips accomplished by bicycling	Yes; CHTS, MPO household travel surveys, and ACS	For this measure, CA should use the raw data from the CHTS along with the CHTS' trip correction factors. The trip correction factors should also be refined to better represent bicycle trip shares.
Short-term Recommended Measure % of bicycling trips accomplished by women	Yes; CHTS	This measure would calculate the percent of bicycling trips that women make as a percent of all bicycling trips. Trips reported in the CHTS would need to be weighted by their trip correction factors.
Trips/Travel		
Long-term Recommended Measure Total number of bicyclist trips or bicycle miles traveled (long-term)	Yes; ACS, CHTS, and MPO household travel surveys	From the total trips, the total number of bicycle trips can be estimated using the purpose-specific bike mode share estimates, and then bicycle miles traveled (BMT) can be calculated by multiplying the total bike trips by the average trip length by trip purpose (recreational vs utilitarian/commute).
Long-term Recommended Measure Total number of pedestrian trips or pedestrian miles traveled (long-term)	Yes; ACS, CHTS, and MPO household travel surveys	From the total trips, the total number of pedestrian trips statewide (or smaller geographic area) can be estimated using the purpose-specific walk mode share estimates; pedestrian miles traveled (PMT) is calculated by multiplying the total walk trips by the average trip length for trip purpose (recreational vs utilitarian/commute).
Average length of bike/walk trips	Yes; CHTS	CA should use the CHTS raw data and trip correction factors to calculate the average distance per walk and bike trip by trip purpose (recreational vs utilitarian/commute).
Available Network		
The total distance, expressed in miles or miles per capita or per road mile, of all pedestrian and bicycle facilities in a specified geographic area.	No	Use a simple GIS calculation of the total mileage based on the specified geography (state, county, MPO, etc.). Bicycle facility mileage should be tracked by facility class (1, 2, 3, 4), if possible.

Performance Measure	Data Availability	Methodology
Network Quality and Completeness		
Long-term Recommended Measure % of SHS that permits bicycles by Level of Traffic Stress (LTS) grade	No	To quantify LTS, apply LTS criteria to GIS-based bicycle infrastructure data. Each characteristic is allocated a contribution to bicycle LTS. LTS values for each roadway characteristic should be assessed and then combined into an overall traffic stress classification. ²⁴
% of SHS roadway miles with complete sidewalks or bicycle facilities on both sides	Partial; Caltrans SHS sidewalk and bicycle facility data	The measure is a simple calculation that divides the roadway miles with facilities by the total SHS mileage. Bicycle and pedestrian facilities should be tracked separately.
% of planned SHS pedestrian or bicycle network that is constructed	No	Divide the length of the existing network facilities by the sum of the existing and planned facilities.
% of pedestrian permitting SHS by pedestrian level of service grade	No	This calculation should exclude the SHS that does not permit pedestrians. The remaining mileage should be given a PLOS grade and the percent of mileage in each classification should be tracked.
Access to Jobs/Economic Development		
Percentage of workers' commute origin-destination pairs connected by a low stress route shorter than 2 miles	Partial; U.S. Census Longitudinal Employer-Household Dynamics (LEHD/LODES), state bikeway network	A statewide bikeway network rated for Level of Traffic Stress is needed to calculate this measure. Each origin-destination pair with reported work flows would be analyzed for low stress connectivity. A more detailed methodology that can be used for this task can be found in Lowry et al. 2016. ²⁵
Transit and Rail Connectivity		
% of regionally significant transit or rail stations with covered, secure bicycle parking facilities within or adjacent to the stations	No	To calculate this measure, divide the number of stations with secure bike parking by the total number of stations.
Bicycle facility density within 1 mile of a regionally significant transit or rail station	Yes; Caltrans Rail Data List (GIS Data)	To calculate this measure, a GIS spatial analysis can select all the bikeway segments within a 1 mile buffer of regionally significant transit stations (rail, ferry, BRT or bus transfer stations). Next, the total bikeway mileage within the buffer would be divided by land area within the buffer.

Table 13 Potential Preservation and Operational Performance Measures

Performance Measure	Data Availability	Methodology
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²⁴ <http://www.trbtoolsofthetrade.org/files/theme/B6-2-paper.pdf>

²⁵ Lowry, M., Furth, P., and Hadden-Loh, T. (2016). "Prioritizing new bicycle facilities to improve low-stress network connectivity" Transportation Research Part A: Policy and Practice, Vol. 86, pp. 124-140.

Preservation

<p>Long-term Recommended Measure % of bicycle and pedestrian facilities with a good condition rating</p>	<p>Partial; Caltrans Automated Pavement Condition Survey (APCS) results</p>	<p>To determine the percentage of bicycle facilities with a good/fair/poor condition, use the SHS PCS ratings in GIS and overlay data with bicycle facilities within the SHS.</p>
<p>Long-term Recommended Measure % of bicycle and pedestrian facilities on state highways meeting established maintenance standards</p>	<p>No</p>	<p>This measure requires the establishment of maintenance standard practices, the review of the SHS facilities on an annual basis, and the identification of what percentage of facilities meet the established standards.</p>

Operational

<p>Dollars per Capita spent on bicycle and pedestrian infrastructure</p>	<p>Yes; Federal Highway Administration (FHWA) Fiscal Management Information System (FMIS) data and ACS</p>	<p>To calculate the measure, take the federal transportation funds (4-year average) amount obligated to bicycle and pedestrian projects in California and divide by California's population.</p>
<p>Mileage of bike lanes implemented through paving/routine maintenance projects</p>	<p>No</p>	<p>Annual mileage of bike lanes implemented should be collected from local agencies. New bike lane mileage should be coded by funding source or by project type in order to aggregate annual statewide bike lane mileage implemented through non-capital projects.</p>

Table 14 Potential Equity Performance Measures

Performance Measure	Data Availability	Methodology
Disadvantaged Population Served		
% of transportation-disadvantaged* population within 1/2-mile bicycling distance to on-street bicycle facilities	Partial; ACS and CalEPA CalEnviroScreen scoring	This measure relies on a GIS calculation to sum the number of people or households living in census tracts within ½ mile of bike lanes or bike paths.
% of transportation-disadvantaged* population within 1/2-mile distance to transit stop	Yes; California Rail Plan transit station data, ACS and CalEPA CalEnviroScreen scoring	This measure relies on a GIS calculation to sum the number of people or households living in census tracts within ½ mile of a fixed guideway transit stop/station.
% of roadway network in disadvantaged population area with sidewalks on both sides	Partial; ACS, CalEPA CalEnviroScreen scoring	This measure relies on a GIS calculation to calculate the mileage of roadways with complete sidewalks divided by total roadway mileage within the designated disadvantaged communities.
Funding		
% of Caltrans active transportation funding invested in disadvantaged communities	Yes; Active Transportation Program (ATP) (but other programs also fund active transportation)	To calculate this measure, track the amount of funding allocated to projects in disadvantaged communities based on communities that meet the defined ATP criteria via California’s ATP program. A comprehensive measure would consider all funding programs, not just ATP.
Full Time Employees within Caltrans working on equity and accessibility	Partial; Caltrans internal HR data	To calculate this measure, track the number of Caltrans employees (or FTE equivalents), by district and at headquarters, who work on equity or accessibility programs.

Table 15 Potential Other Performance Measures

Performance Measure	Data Availability	Methodology
Public Recognition		
Number of Bicycle Friendly Communities by grade (gold, platinum, and silver)	Yes; League of American Bicyclists (LAB)	California can use the LAB ranking to track the number of CA cities earning each grade in a given calendar year.
Number of Walk Friendly Communities	Yes; Pedestrian and Bicycle Information Center (PBIC)	California can use the PBIC ranking to track the number of CA cities earning each grade in a given calendar year.
Bicycle Friendly State ranking	Yes; League of American Bicyclists (LAB)	California can use the LAB ranking to track California’s state ranking (1 to 50) compared to other states.

Resources

The following list of resources provides additional detail on data sources and performance measures discussed in this document.

- Environmental Protection Agency (EPA) EJSCREEN: <https://www.epa.gov/ejscreen>
- Federal Highway Administration (FHWA) Fiscal Management Information System: <https://fhwaapps.fhwa.dot.gov/fmiswnp/WhatsNewHome.do>; www.fhwa.dot.gov/environment/bicycle_pedestrian/funding/bipedfund.cfm
- Federal Highway Administration (FHWA) *Sidewalk Assessment*: https://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/sidewalk2/pdf/12chapter11.pdf
- Fatality Analysis Reporting System (FARS): [http://www.nhtsa.gov/Data/Fatality-Analysis-Reporting-System-\(FARS\)](http://www.nhtsa.gov/Data/Fatality-Analysis-Reporting-System-(FARS))
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