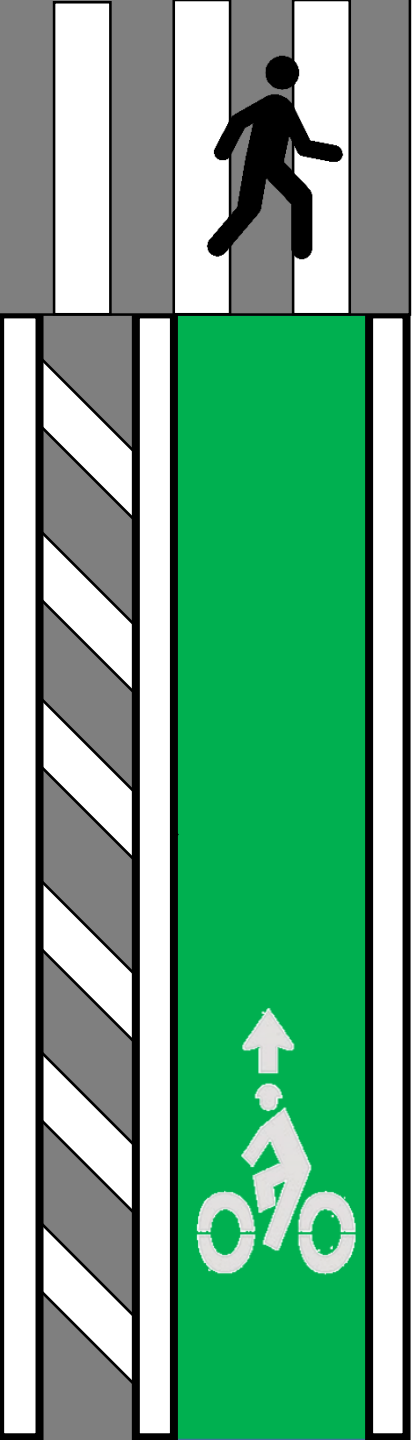

Complete Streets Elements Toolbox

Version 2.0

Prepared by:

Smart Mobility and Active Transportation Branch
Office of Smart Mobility and Climate Change
Division of Transportation Planning

Caltrans

Updated: July 23, 2018

Complete Streets Elements Toolbox
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SHOPP Activity Details Table of Contents

Bicycle Elements

Pedestrian Elements

Caltrans

Complete Streets Elements Toolbox

SHOPP Activity Details Table of Contents

Bicycle and Pedestrian Elements

SHOPP TOOL ID	Activity Description	Activity Unit	Page Number
Various	Standard Shoulder	Various	94
Various	Roundabouts	Various	95
N/A	Accommodating Pedestrians and Bicycles at Interchanges	N/A	96
H42	Bicycle, Pedestrian and Transit Signage	EA	100
H03	Bridge Access for Pedestrians and Bicyclists	EA	103
H09	Bicycle and Pedestrian Facility Gap Closure	Linear Miles	106
H18	Overpass/Underpass for Pedestrians & Bicyclists	EA	114
H52	Automatic Active Transportation Counters	EA	117

Road Space Reallocation Elements

SHOPP TOOL ID	Activity Description	Activity Unit	Page Number
H15	Lane Narrowing	Linear Miles	121
H16	Lane Reduction (Road Diet)	Linear Miles	126
H44	Curb Radius Reduction (eliminate free right turn)	EA	130
H45	Parking Reduction	EA	131

Complete Streets Elements Toolbox

SHOPP Activity Details Table of Contents

Transit Related Elements			
SHOPP TOOL ID	Activity Description	Activity Unit	Page Number
H04	Bus Pull Out or Bulb	EA	134
H19	Park and Ride Lots	EA	137
H27	Transit Stop Improvements	EA	139
H46	Boarding Island	EA	140
H26	New Transit Stop	EA	141
H48	Transit Signal Priority	EA	144
H49	Transit-only Lanes (BRT, LRT)	Linear Miles	145
H47	Transit Traveler Information	EA	147

Landscaping Elements			
SHOPP TOOL ID	Activity Description	Activity Unit	Page Number
H22	Vegetative Street Swales	Square Feet	150
H53	Landscaped Areas	Square Feet	153

Complete Streets Elements Toolbox

Introduction to the Toolbox

Welcome to the *Complete Streets* Elements *Toolbox,* a 'living document' that will be continually updated to reflect adopted Caltrans' guidance and new elements appropriate for use of the State Highway system.

The Toolbox was developed in coordination with a diverse group of stakeholders within Caltrans. The Toolbox translates complex statewide policies into concepts and practices for project delivery purposes aimed at more effective Complete Streets implementation. Our team reviewed the universe of possible roadway Complete Streets elements and developed this guide as a representative sample of those that could be used effectively on the State Highway System. As a result, the focus of the Toolbox is on the concrete roadway *elements* used to prioritize multi-modal travel. With proper planning and engineering judgement, the Toolbox provides guidance to assist project staff– planners, project managers, engineers, designers, etc. at minimum– in the selection of Complete Streets elements to meet relevant goals and objectives in Caltrans' Strategic Management Plan, Complete Streets policy (DD-64-R2), greenhouse gas reduction goals, and SB 1.

This guide defines, provides guidance, project examples and quantification in the SHOPP Tool for all of the Complete Streets Elements listed.

The following section describes 'How to Use the Toolbox' in greater detail.

Complete Streets Elements Toolbox

Introduction to the Toolbox

Why the Toolbox?

The Toolbox is intended to guide the project development process. Given state and Departmental policies, Complete Streets must be considered in Caltrans' internal projects. The Toolbox therefore aligns with the State Highway Operations Protection Program (SHOPP) processes to provide guidance for the consideration of Complete Streets elements in project planning.

The associated SHOPP Tool provides a list of activity details for all Caltrans' performance-related assets, including Complete Streets [listed as the 'Streets' category]. The SHOPP Tool will be used to database all SHOPP project documents and asset quantifications. The *Toolbox* assists in the consideration of Complete Streets elements [or SHOPP Tool activity details] and the quantification of elements in the SHOPP Tool.

Viva Calle San Jose
City of San Jose

Intended Users of the Toolbox:

At this time, the Toolbox is intended for internal project development processes. However, it can also be used as an educational tool for public education on Complete Streets concepts and elements. Potential users and the associated sections they should study include:

- **Individuals Interested in Complete Streets [Internal to Caltrans]:** the entirety of the document is intended to educate all individuals interested in learning about Complete Streets. The Complete Streets Policy Guide is recommended for these individuals.

- **Caltrans SHOPP Project Participants:** Engineers and Planners engaged in Caltrans SHOPP projects should review the *Complete Streets Project Planning Quick Guide* and the recommended Complete Streets elements for consideration based upon project context prior to review of the *Toolbox*. This is intended to streamline the relevant information to review within the *Toolbox*.

Toward an Active California

Complete Streets Elements Toolbox

Introduction to the Toolbox

On the Complete Streets Approach:

The recommendations provided in this document are not meant as a substitute for individual planning or engineering judgement. Project planners and engineers are encouraged to use this document to inform and support their decision-making. Recognizing that project contexts vary, consideration of a specific element must be made on a case-by-case basis and project constraints may preclude the selection of specific Complete Streets elements.

The Complete Streets approach provides recommendations to encourage walking, bicycling, and transit use. This can include reduced travel lane widths and speeds, and increased width for pedestrians, bicyclists, transit facilities and landscaping. This does not constitute a guidance standard, but rather provides links to adopted standards and procedures where appropriate. This approach is intended to align with Caltrans' Design Flexibility, which necessitates proper justification of decisions.

On MUTCD Interim Approvals:

Interim Approvals (IA) are issued by FHWA and the California Traffic Control Devices Committee (CTCDC) reviews them and provides recommendations to Caltrans on whether IA should be adopted or not. Caltrans applies for statewide blanket approval for California, including State highways and all local jurisdictions' roadways. Once FHWA has approved Caltrans' request, Caltrans and Local agencies can install the Traffic Control Devices covered by the IA. No additional approvals are required. All agencies implementing Traffic Control Devices covered by the IA must inform the CTCDC secretary regarding the locations where they have been installed.

CTCDC Executive Secretary contact, meeting information and resources can be found at Caltrans' California Traffic Control Devices Committee page.

Complete Streets Elements Toolbox

How to Use the Toolbox

Table of Contents:

- The table of contents features hyperlinks to each slide allowing users to easily access specific elements within the Toolbox. When a blue hyperlinked title of a Complete Streets element is clicked on, users will be taken directly to that slide.
- ***Because of this, it is recommended that readers access this document electronically.***
- The Complete Streets features are listed with their corresponding IDs in the SHOPP Tool, unit of measurement (activity unit), and are categorized by mode type. The last slide of each element contains a hyperlink in the lower left corner that will redirect back to the Table of Contents.

Complete Streets Elements Toolbox
Table of Contents

Bicycle Elements		
ID	Activity Description	Activity Unit
H01	Bike Box	EA
H02	Bike Parking	EA
H05	Class I Bike Paths	Linear Miles
H06	Class II Bike Lanes	Lanes Miles
H07	Class III Bike Routes	Lanes Miles
H08	Class IV Separated Bikeway	Lanes Miles
H10	Conflict Zone Green Paint	EA

Pedestrian Elements		
ID	Activity Description	Activity Unit
H13	Crosswalks	EA
H12	Enhanced Crosswalk Visibility	EA
H11	Crossing Islands	EA
H14	Curb Extensions/Bulb-Out	EA
H20	Install Shade for Pedestrian Access	EA
H17	LED Lighting	EA

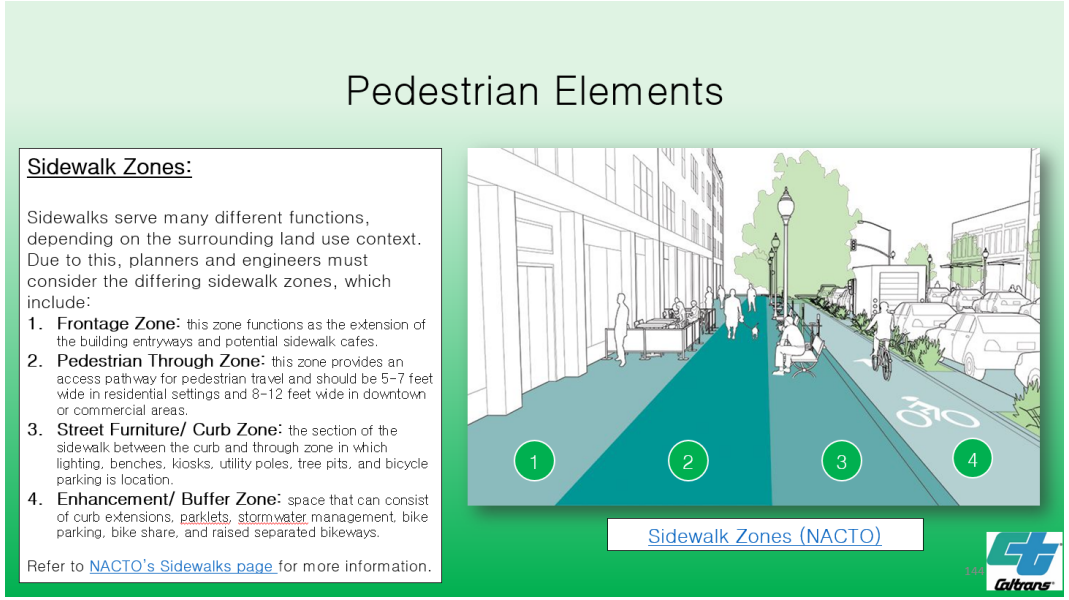
Complete Streets Elements Toolbox

How to Use the Toolbox

Complete Streets Sections:

- Each section of Complete Streets Elements Toolbox includes a green-background title slide to denote that the reader is entering a new section. The section titles include additional slides focused on important concepts to consider.

- Some of the concepts provided for the Complete Streets sections are proposed for future addition into the SHOPP Tool. Future updates will provide further definitions and quantifications for these Elements, once added.



Complete Streets Elements Toolbox

How to Use the Toolbox

Complete Streets elements Slides:

- Each Complete Streets element features a title slide where it is defined and guidance is provided.
    - Definitions are provided for each element as they apply to Complete Streets.
    - Design guidance is included and is hyperlinked in blue so that users can easily access additional information about each Complete Streets element.

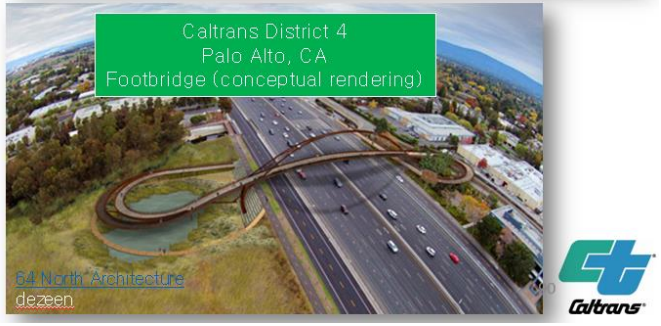
H18: Overpass/Underpass – Pedestrian and Bike

Definition:

- A facility for pedestrians and/or bicycles that provides a connection either over or under a state highway facility that is separate from motor vehicle traffic.
- Pedestrian overcrossings (POC) or undercrossings (PUC) connect pedestrian walkways; bicycle overcrossings (BOC) or undercrossings (BUC) connect bikeways or bike routes and can be built to Class I or Class IV standards.

Guidance:

- Must be ADA accessible.
- 8 ft. minimum walkway; 10 ft. minimum width between railings.
- See HDM 208.6, HDM Topic 309.2, HDM Topic 1003.1, DIB 82, and DIB 89 for more information.



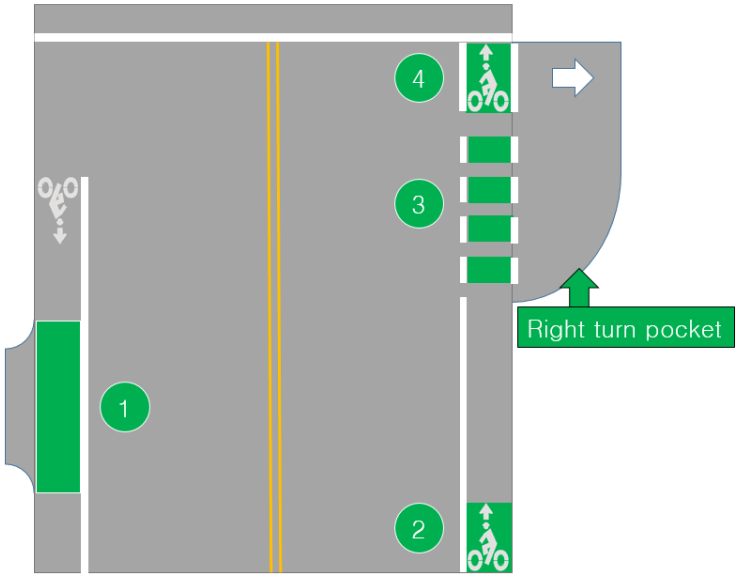
Complete Streets Elements Toolbox

How to Use the Toolbox

Quantification Diagrams and Featured Projects:

- The elements listed in the Toolbox are all shown as diagrams or featured project photos to give examples of how each element is quantified in the SHOPP Tool.
- Elements featured within the project or diagram are numbered to further demonstrate quantification methods. Some elements show before and after diagrams or photos for additional guidance.

Quantifying conflict zone green paint in the SHOPP Tool



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Complete Streets Elements Toolbox

How to Use the Toolbox

Quantification in the SHOPP Tool Examples:

- The final slide for Complete Streets element shows how the quantification would look in the SHOPP Tool entry. Some fields are highlighted or feature green arrows to address which activity detail, quantity placement, and comments are necessary to properly address each element. It is important to remember to only add quantities to the 'Assets in Poor Condition' or 'New Asset Added' columns.

- Each Quantification slide features a hyperlink in the lower left corner that will return to the table of contents.

Quantifying Bike Boxes in the SHOPP Tool

ID	Activity Category	Activity Detail	Unit of Measurement	Quantity	Assets in Good Condition	Assets in Fair Condition	Assets in Poor Condition	New Asset Added	Comments
H01	Streets	Bike Box (201.999)	EA	2				2	

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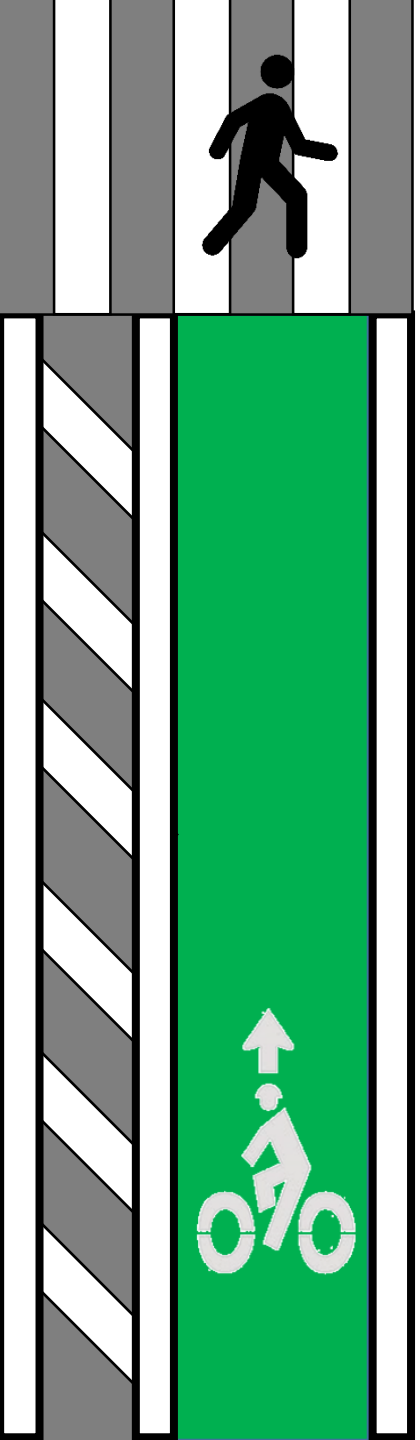
Complete Streets Elements Toolbox

Thank you for using the Complete Streets Elements Toolbox!

Refer to associated Complete Streets products on Caltrans' Complete Streets Program page.

Please follow this Survey Link to provide feedback for future updates to the Complete Streets Elements Toolbox and Selection Guidance.



Complete Streets Elements Toolbox

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Division of Transportation Planning
Office of Smart Mobility and Climate Change
Smart Mobility and Active Transportation Branch

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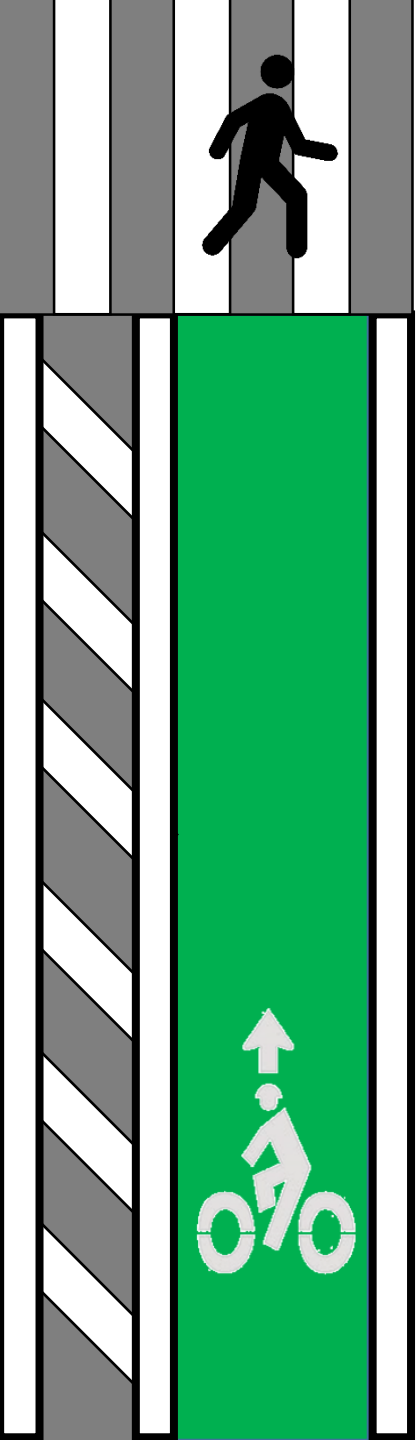

Complete Streets Elements Toolbox

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http://www.dot.ca.gov/design/liaison.html

District Bicycle & Pedestrian Traffic Safety Engineers:

http://www.dot.ca.gov/trafficops/ped/engineer.html

Bicycle and Pedestrian Program Contacts and District Bicycle and Pedestrian Coordinators:

http://www.dot.ca.gov/hq/LocalPrograms/bike/contacts.html

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Complete Streets Elements Toolbox

An Introduction to Complete Streets Planning

What is a Complete Street?

Definition:

- "A transportation facility that is planned, operated and maintained to provide safe mobility for **all users,** including bicyclists, pedestrians, transit riders, and motorists appropriate to the **function and context** of the facility."
  –Deputy Directive 64–R2

- A Complete Street is a **public space** that conveys **people walking and bicycling, public transit**, **automobiles** and **freight**.

Complete Streets Elements Toolbox

An Introduction to Complete Streets Planning

Complete Streets Prioritize:

- Multi-modal transportation planning:
  - Facilities designed with consideration of pedestrians, bicyclists, transit users, automobile users, and freight.
- Safety and Health:
  - Using proven safety countermeasures to reduce collisions and provide access to all road users.
  - Increasing mobility of transportation modes that encourage physical activity, thereby improving health.
- Environment:
  - Planning that reduces greenhouse gas emissions, pollution, preserves open space, and incorporates green infrastructure.
- Economy:
  - Transportation facilities that provide access to commercial uses.

Complete Streets Elements Toolbox

An Introduction to Complete Streets Planning

Complete Street Example:

- Massachusetts DOT provides a compelling example of a Complete Street, with ample space for pedestrians, separated bikeways, landscaped areas with street trees, lighting, and street furniture.

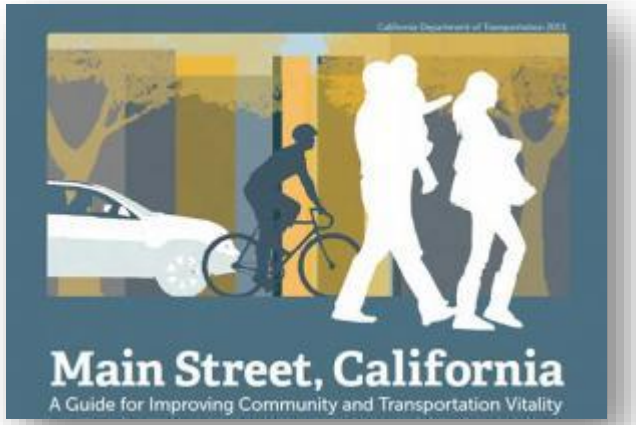
- All of these elements work in tandem to create a *vibrant*, *people-oriented community space*.

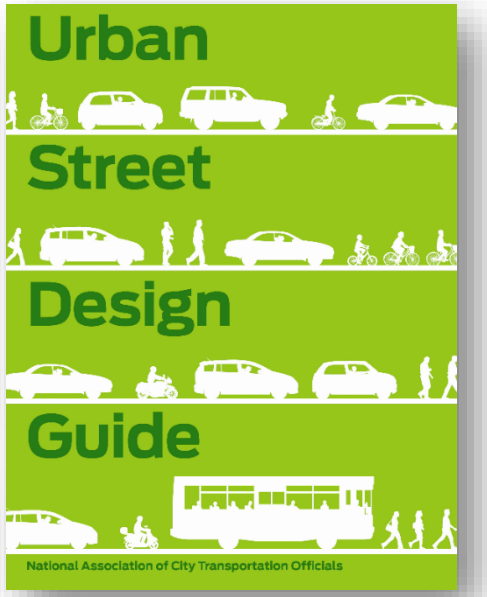
Complete Streets Elements Toolbox

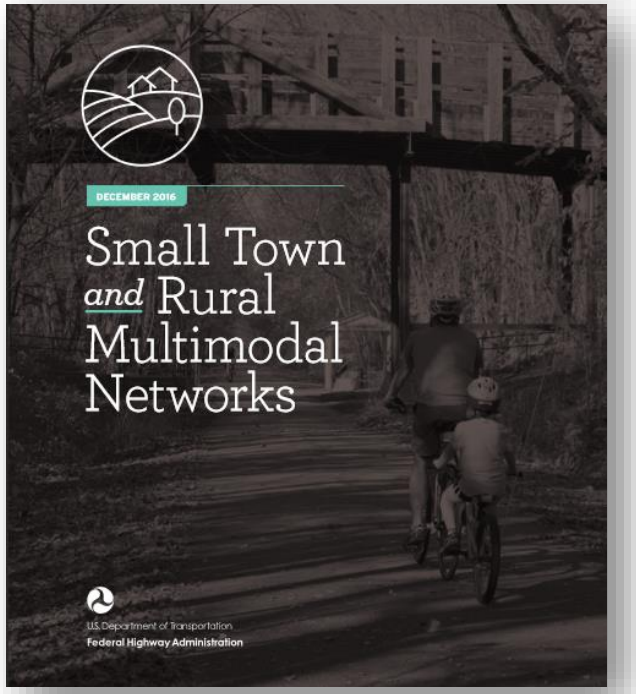
Complete Streets Resources

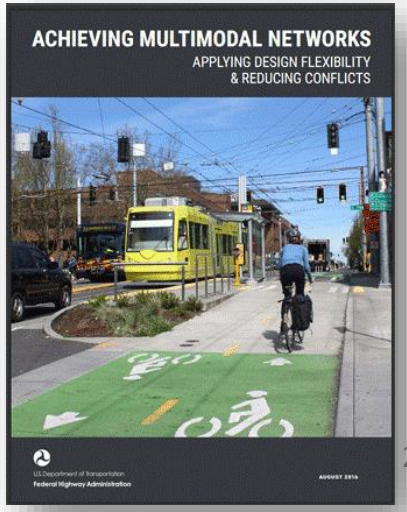
These additional resources will assist planners and engineers in understanding Complete Streets Planning:

- Caltrans' Main Street, California
- FHWA: Achieving Multimodal Networks
- FHWA: Small Town and Rural Multimodal Networks
- NACTO:
  - Urban Street Design Guide
  - Urban Bikeway Design Guide
  - Transit Street Design Guide
  - Urban Street Stormwater Guide









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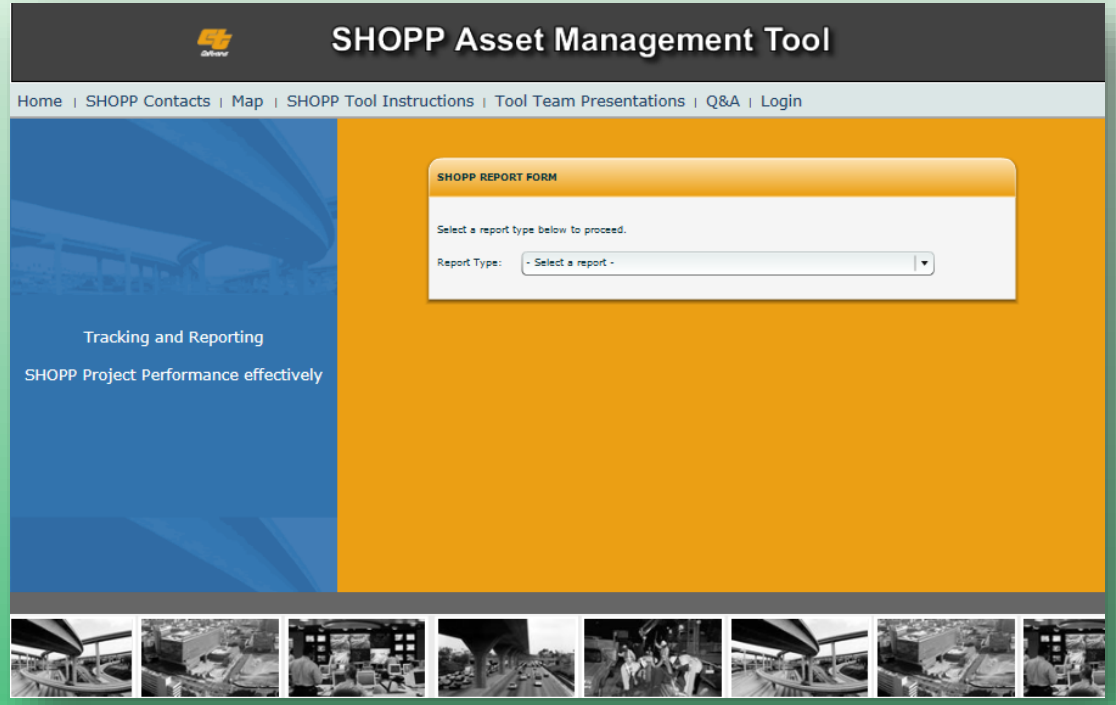
Introduction to SHOPP Tool

The SHOPP Tool allows Caltrans staff to input Project information into a central database for tracking. The SHOPP Tool includes the Complete Streets activity category with the associated activity details that are explained within the *Toolbox*. The Toolbox is meant as a guide to assist project staff as it defines each Element (or Asset), links to adopted standards and guidance, provides project examples, and provides quantification metrics for each of the Complete Streets activity details.

Guidance:

- Use Quantification methods in this document to assist in entering quantities in the SHOPP Tool.
- Inputting data correctly in the SHOPP Tool provides Headquarters the ability to ensure Complete Streets are implemented per applicable Departmental Complete Streets policies and SB 1 mandates.



Link to SHOPP Tool

Introduction to SHOPP Tool

H32: Is any location within the project limits Ped/Bike accessible?

Project staff are required to answer H32 in all projects to meet the needs of all users of the facility. Division of Transportation Planning staff have developed the Statewide Bicycle Map to assist in answering this question for people bicycling on the State Highway System.

- Statewide Bicycle Map shows where *bicyclists are Prohibited/Not Prohibited.*
  - *Assume similar access for pedestrians.*
- Includes searchable District Maps.
  - District Bicycle Maps and webpages are linked (if available).
- *Please note– use for Planning purposes only as further data verification is needed.*

Go to Statewide Bicycle Map

Pedestrian and Bicycle Safety

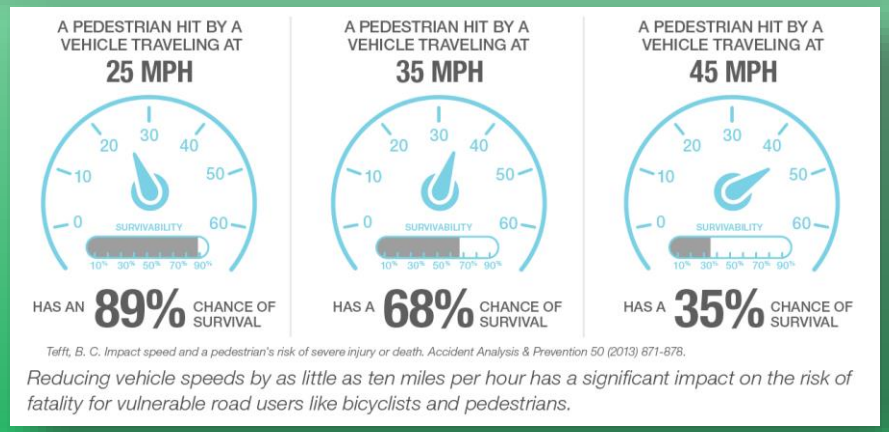
This section is intended to provide resources that provide information on the safety impacts of Complete Streets Elements, based upon FHWA guidance and crash reduction factors research. The intended users of this section include District Bicycle and Pedestrian Traffic Safety Engineers. The guidance and research within this section provide justification for using Complete Streets Elements as a part of pedestrian and bicycle safety projects.

Resources:

- Caltrans Headquarters Traffic Operations' Pedestrian & Bicycle Safety
- FHWA PedBikeSafe
- FHWA Crash Modification Factors Clearinghouse
- Toward an Active California [Safety Section Pages 25-36]

Windsor US 101 Ramp Raised Crosswalk

The Town of Windsor and Caltrans installed a raised crosswalk across the on ramp to US 101 from Old Redwood Highway. The raised crosswalk draws increased attention to pedestrians crossing the ramp.



Toward an Active California

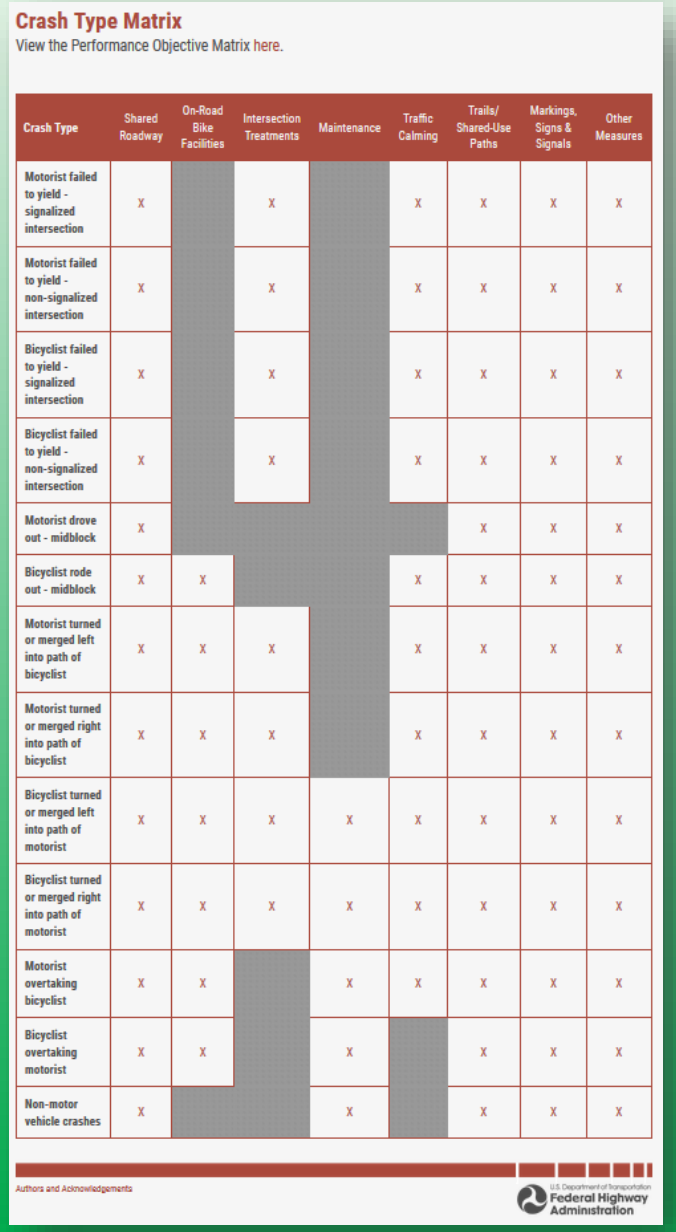
Pedestrian and Bicycle Safety

Bicycle Safety

FHWA's Bicycle Safety Guide and Countermeasure Selection System (BikeSafe) provides guidance and tools on the selection of bicycle countermeasures. These include:

- Countermeasure Selection Tool
- Crash Type Matrix [Pictured Right]
- Performance Objective Matrix

Consider utilizing these resources to assist in the decision-making process.



Crash Type Matrix

View the Performance Objective Matrix here.

Crash Type	Shared Roadway	On-Road Bike Facilities	Intersection Treatments	Maintenance	Traffic Calming	Trails/ Shared-Use Paths	Markings, Signs & Signals	Other Measures
Motorist failed to yield - signalized intersection	x		x		x	x	x	x
Motorist failed to yield - non-signalized intersection	x		x		x	x	x	x
Bicyclist failed to yield - signalized intersection	x		x		x	x	x	x
Bicyclist failed to yield - non-signalized intersection	x		x		x	x	x	x
Motorist drove out - midblock	x					x	x	x
Bicyclist rode out - midblock	x	x			x	x	x	x
Motorist turned or merged left into path of bicyclist	x	x	x		x	x	x	x
Motorist turned or merged right into path of bicyclist	x	x	x		x	x	x	x
Bicyclist turned or merged left into path of motorist	x	x	x	x	x	x	x	x
Bicyclist turned or merged right into path of motorist	x	x	x	x	x	x	x	x
Motorist overtaking bicyclist	x	x		x	x	x	x	x
Bicyclist overtaking motorist	x	x		x		x	x	x
Non-motor vehicle crashes	x			x		x	x	x

Authors and Acknowledgements

U.S. Department of Transportation Federal Highway Administration

Caltrans

Pedestrian and Bicycle Safety

Pedestrian Safety

FHWA's Pedestrian Safety Guide and Countermeasure Selection System (PedSafe) provides guidance and tools on the selection of bicycle countermeasures. These include:

- Countermeasure Selection Tool
- Crash Type Matrix [Pictured Right]
- Performance Objective Matrix

Consider utilizing these resources to assist in the decision-making process.

Crash Type Matrix

View the Performance Objective Matrix here.

Crash Type	Along Roadway	Crossing Locations	Transit	Roadway Design	Intersection Design	Traffic Calming	Traffic Mgmt.	Signals/ Signs	Other
Dart/Dash	X	X	X	X		X	X	X	
Multiple Threat/Trapped		X	X	X	X	X		X	X
Unique Midblock		X		X		X		X	X
Through Vehicle at Unsignalized Location		X	X	X	X	X		X	X
Bus-Related	X	X	X	X				X	X
Turning Vehicle		X	X	X	X	X	X	X	X
Through Vehicle at Signalized Location		X	X	X	X	X	X	X	X
Walking Along Roadway	X	X	X	X				X	X
Working or Playing in Roadway	X	X		X		X	X	X	X
Non-Roadway	X	X		X	X	X		X	X
Backing Vehicle	X	X		X		X			X
Crossing an Expressway		X						X	X

Authors and Acknowledgements

U.S. Department of Transportation Federal Highway Administration

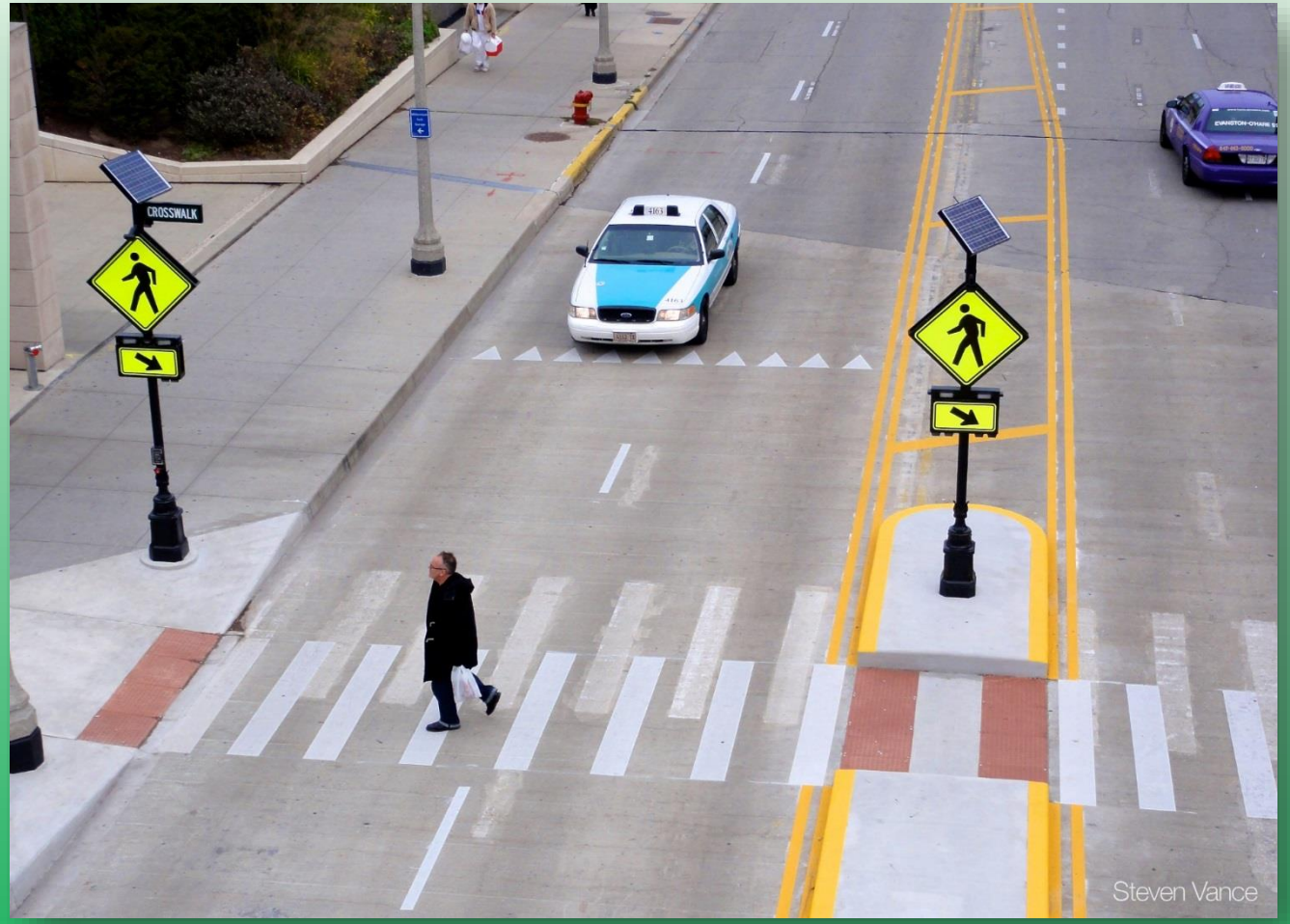
Caltrans

Pedestrian and Bicycle Safety

Pedestrian Safety

Caltrans and FHWA provide guidance for pedestrian crossing countermeasure selection. These include:

- Caltrans' Traffic Operations Policy Directive 12-03: Crosswalk Enhancements Policy [Visualized on *Toolbox* Page 75]
- FHWA Resources:
  - Field Guide for Selecting Countermeasures at Uncontrolled Pedestrian Crossing Locations
  - Process for Selecting Countermeasures at Uncontrolled Pedestrian Crossing Locations Safe Transportation for Every Pedestrian (STEP) Program: Selecting Countermeasures for Uncontrolled Crossing Locations (FHWA Webinar)



Bicycle Elements

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Bicycle Facility Classifications	28
Bicycle Facility Selection Contextual Guidance	29
Bikeshare [not a SHOPP Tool Asset]	30
Bicycle-friendly accommodations	31
Bike Boxes	35
Bike Parking	38
Class I Bike Path	43
Class II Bike Lanes and Class II Buffered Lanes	46
Class III Bike Route	47
Class IV Separated Bikeway	50
Green Colored Pavement for Bikeways	58
Bicycle Signal Priority	62

Caltrans District 2
Los Molinos, CA
Railroad Avenue (SR-99)

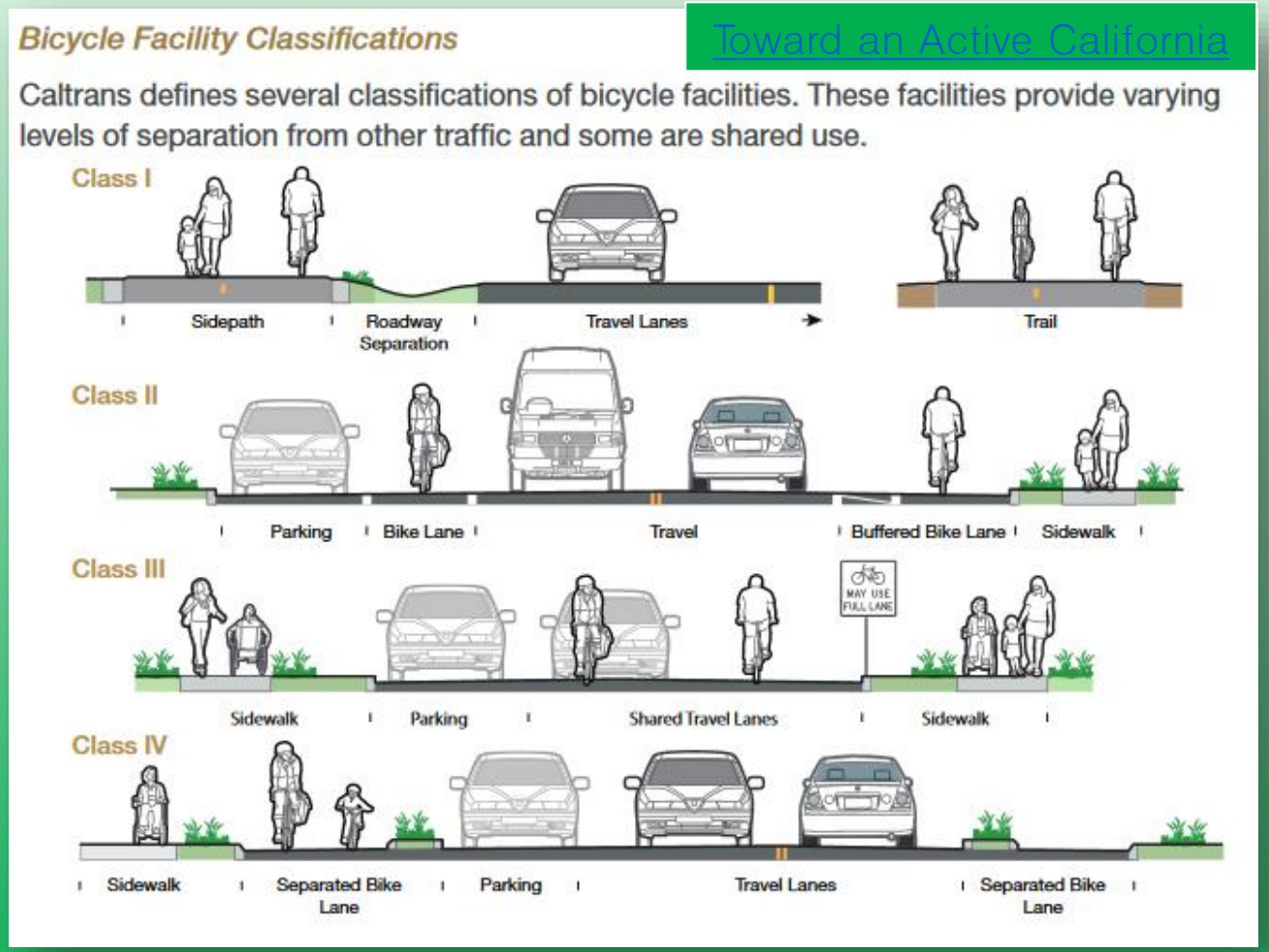
Bicycle Elements

Bicycle Facility Classifications:

Refer to Highway Design Manual Chapter 1000 for guidance on the four bicycle classes. These are:

- Class I Bikeway: Shared-Use Path
- Class II Bikeway: Bike Lane
- Class III Bikeway: Bike Route
- Class IV Bikeway: Separated Bikeway [Refer to DIB 89]

The four classes are pictured to the right. More information on each facility classification is shared in the element slides below.



Bicycle Elements

Bicycle Facility Selection Contextual Guidance:

Many jurisdictions and organizations provide contextual guidance for the selection of bicycle facilities based upon roadway context, which can include street classification, Average Daily Traffic, and Posted Travel Speed. Refer to the charts below and to the right to assess the guidance adopted by other organizations. Such guidance is intended to provide bicycle facilities that encourage people of all ages and abilities to ride bicycles on local roadway networks.

New Jersey DOT Complete Streets Design Guide

A Bicycle Facility Table

ADT	85TH PERCENTILE SPEED[1]						
	≤ 20	25	30	35	40	45	≥50
≤ 2,500	ABCDEF	A[2]BCDEF	CDEF	CDEF	CDEF	DEF	F
2,500–5,000	BCDEF	BCDEF	CDEF	CDEF	DEF	DEF	F
5,000–10,000	B[3]CDEF	B[3]CDEF	CDEF	DEF	DEF	EF	F
10,000–15,000	DEF	DEF	DEF	DEF	EF	EF	F
≥15,000	DEF	DEF	DEF	EF	EF	F	F

A: Shared Street/Bicycle Boulevard **B:** Shared-lane Markings **C:** Bicycle Lane **D:** Buffered Bicycle Lane
E: Separated Bicycle Lane **F:** Shared-use Path

[1] *If data not available, use posted speed*
[2] *Bicycle boulevards are preferred at speeds ≤25 mph*
[3] *Shared-lane markings are not a preferred treatment with truck percentages greater than 10%*

NACTO Designing for All Ages & Abilities Bikeways

Contextual Guidance for Selecting All Ages & Abilities Bikeways

Roadway Context				All Ages & Abilities Bicycle Facility
Target Motor Vehicle Speed*	Target Max. Motor Vehicle Volume (ADT)	Motor Vehicle Lanes	Key Operational Considerations	
Any		*Any*	*Any of the following:* high curbside activity, frequent buses, motor vehicle congestion, or turning conflicts‡	**Protected Bicycle Lane**
< 10 mph	Less relevant	No centerline, or single lane one-way	Pedestrians share the roadway	**Shared Street**
≤ 20 mph	≤ 1,000–2,000		< 50 motor vehicles per hour in the peak direction at peak hour	**Bicycle Boulevard**
	≤ 500–1,500			
≤ 25 mph	≤ 1,500–3,000	Single lane each direction, or single lane one-way	Low curbside activity, or low congestion pressure	**Conventional or Buffered Bicycle Lane, or Protected Bicycle Lane**
	≤ 3,000–6,000			**Buffered or Protected Bicycle Lane**
	Greater than 6,000			**Protected Bicycle Lane**
	Any	Multiple lanes per direction		
Greater than 26 mph†	≤ 6,000	Single lane each direction	Low curbside activity, or low congestion pressure	**Protected Bicycle Lane, or Reduce Speed**
		Multiple lanes per direction		**Protected Bicycle Lane, or Reduce to Single Lane & Reduce Speed**
	Greater than 6,000	*Any*	*Any*	**Protected Bicycle Lane, or Bicycle Path**
High-speed limited access roadways, natural corridors, or geographic edge conditions with limited conflicts		*Any*	High pedestrian volume	**Bike Path with Separate Walkway or Protected Bicycle Lane**
			Low pedestrian volume	**Shared-Use Path or Protected Bicycle Lane**

*While posted or 85th percentile motor vehicle speed are commonly used design speed targets, 95th percentile speed captures high-end speeding, which causes greater stress to bicyclists and more frequent passing events. Setting target speed based on this threshold results in a higher level of bicycling comfort for the full range of riders.

† Setting 25 mph as a motor vehicle speed threshold for providing protected bikeways is consistent with many cities' traffic safety and Vision Zero policies. However, some cities use a 30 mph posted speed as a threshold for protected bikeways, consistent with providing Level of Traffic Stress level 2 (LTS 2) that can effectively reduce stress and accommodate more types of riders.[18]

‡ Operational factors that lead to bikeway conflicts are reasons to provide protected bike lanes regardless of motor vehicle speed and volume.

Bicycle Elements

Bikeshare:

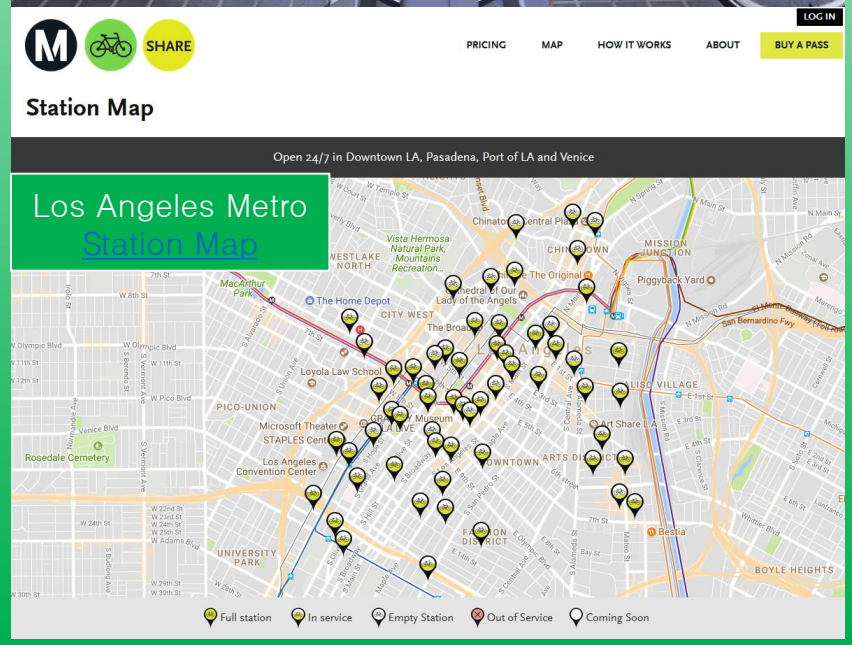
A public bicycle transportation service where short-term bicycle rentals are provided in accessible public locations. These are used to get the customer from an origin to a destination. These systems are often provided by a public agency through either:

- A membership service where reservations are made at a station hub. Or
- A dockless smart-phone enabled service.

Bicycles can be returned at the destination hub, or in some cases, at a bike parking rack for an additional fee. Bikeshare is often developed in tandem with public transit stations to provide a first- and last-mile connection to destinations; it is therefore considered an extension of public transit usage.

- *This overview is provided for informational purposes as Bikeshare is not a SHOPP Tool Asset.*

LADOT Bike Program



Los Angeles Metro Station Map

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Bicycle Elements

Bicycle-friendly Accommodations:

The following elements should be considered on a routine basis in order to provide bicyclists a comfortable and enjoyable ride. For some, the hazards posed by accommodations that are not bicycle-friendly could cause crashes or near-misses. If included in a project, these considerations should be considered applicable Complete Streets elements.

These include:

1. Bicycle detection loops [H35 in the SHOPP Tool]
2. Designing rumble strips with consideration for bicyclists [H36 in the SHOPP Tool]
3. Bicycle-friendly drainage grates [H37 in the SHOPP Tool]
4. Bicycle rails on bridges
5. Debris removal from the shoulder or bicycle facility
6. Bicycle-friendly train track crossings

The following pages provide examples of these accommodations.

Bicycle Elements

Bicycle-friendly Accommodations

Caltrans District 1
ST-10 Bicycle Rail on US 101
http://www.dot.ca.gov/design/lap/livability/docs/Caltrans_Bridge_Rails_and_Barriers.pdf

Bicycle rails on bridges are installed behind the vehicular rail to increase the rail height to 42 inches. These are necessary to retain bicyclists and improve comfort.

Go to:
http://www.dot.ca.gov/design/lap/livability/docs/Caltrans_Bridge_Rails_and_Barriers.pdf for more information.

In the SHOPP Tool, quantify each bicycle detection loop.

H35: Bicycle detection loops and actuation are installed to alert the signal controller of bicycle demand to cross an intersection. Otherwise, bicyclists have to wait for a vehicle to arrive, or dismount and push the pedestrian button. These elements both:

1) detect bicyclists; and
2) provide guidance to bicyclist on how to actuate.

Bicycle Detection and Actuation
San Luis Obispo, CA

See NACTO for more information.

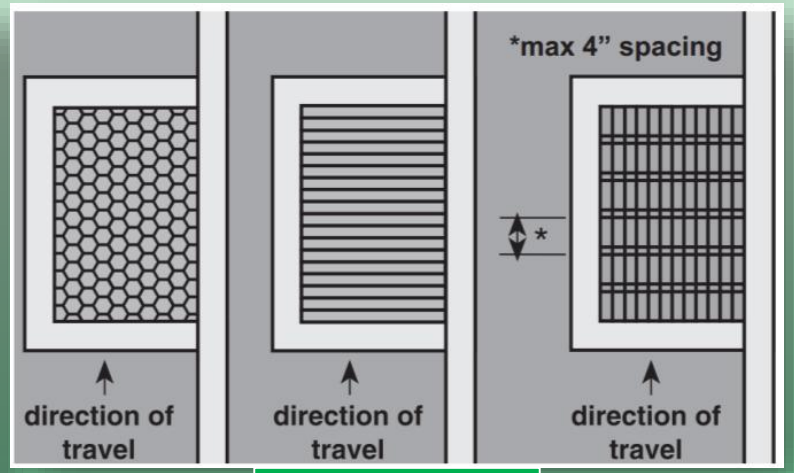
Bicycle Elements

Bicycle-friendly Accommodations

Bike Portland

1

In the SHOPP Tool, quantify each bicycle-tolerable drainage grate.



Pedbikesafe.org

H37: Bicycle-tolerable drainage grates are necessary as they prevent tires from being stuck between the slots, as shown above left. Grates should therefore be designed with the considerations pictured above right.

Go to: http://www.pedbikesafe.org/bikesafe/countermeasures_detail.cfm?CM_NUM=1 for more information.

1

Caltrans District 2
Flying Wedge on SR-44
http://www.dot.ca.gov/paffairs/pr/2017/prs/17pr011.html

In the SHOPP Tool, quantify linear feet of bicycle-tolerable rumble strips.

designing rumble strips with consideration for bicycles [H36: bicycle-tolerable rumble strips]:

Rumble strips can have a negative impact on bicyclist comfort. Providing solutions such as the Flying Wedge (pictured above), gaps in the rumble strips, rumble strips that are less deep, and wider shoulders are recommended.

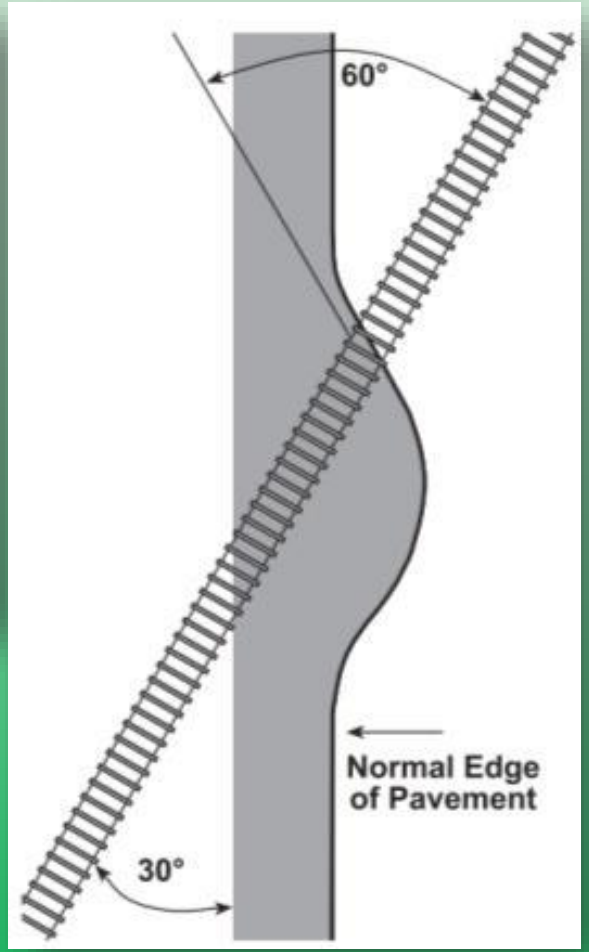
Bicycle Elements

Bicycle-friendly Accommodations

Debris can naturally collect within the bikeway or shoulder, or be swept there from the general purpose travel lanes, as shown above. **Debris removal from the shoulder or bicycle facility** is therefore recommended on state highways that are accessible by bicyclists and on which there is observed usage.

Caltrans District 4
SR 29 Channelization Project, St. Helena, CA
http://www.dot.ca.gov/dist4/projects/NAP29Channelization/

Train tracks can create challenges for bicycle crossings. A **bicycle-friendly train track crossing** is shown above in the SR-29 St. Helena Channelization Project. Guidance suggests that a train track crossing should be designed at a 60-90 degree angle to prevent crashes.



http://www.pedbikesafe.org/bikesafe/countermeasures_detail.cfm?CM_NUM=1

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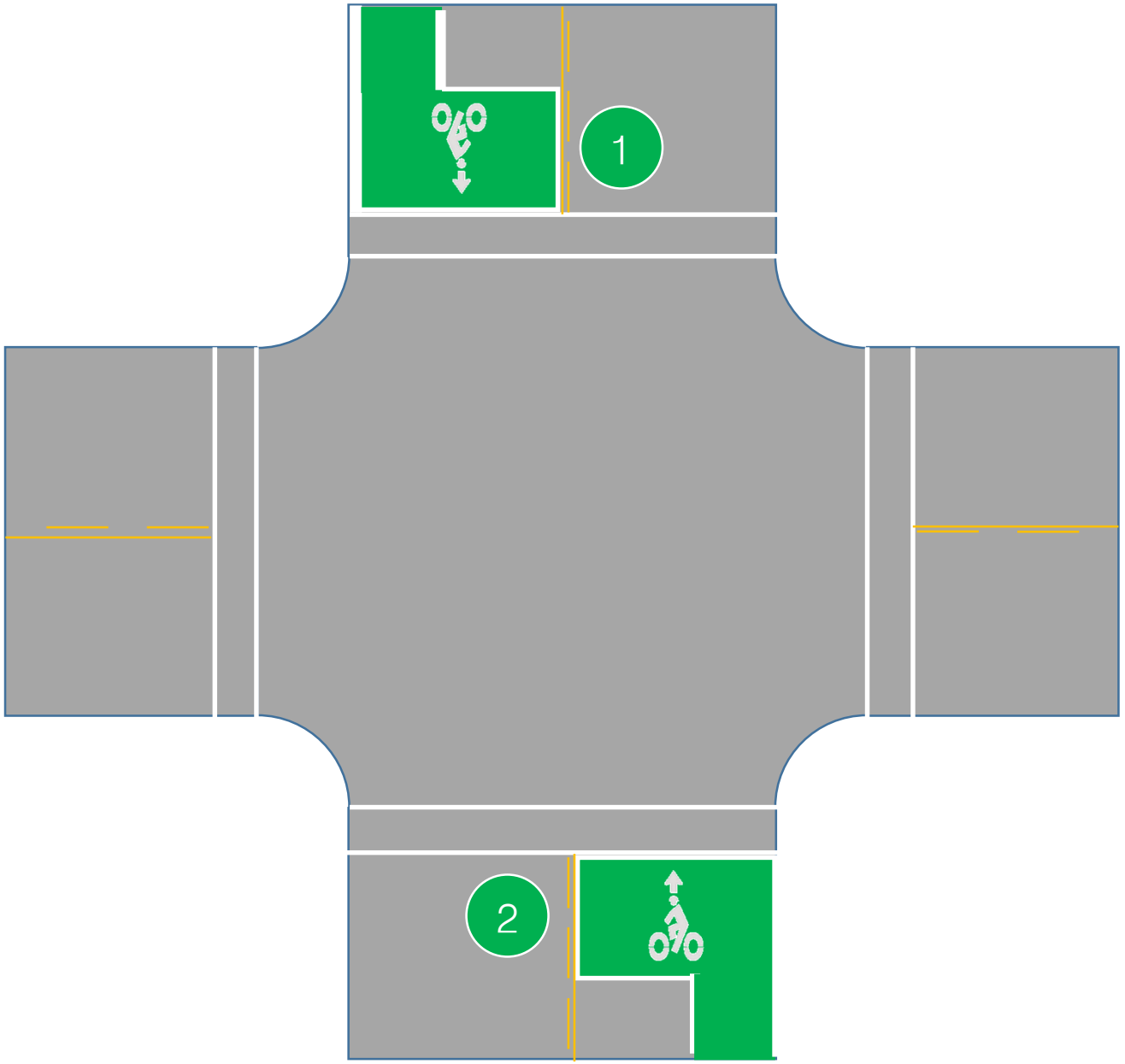
H01: Bike Boxes

- Designates an area for bicyclists ahead of automobile traffic at a signalized intersection.
- Increases the visibility of bicyclists.
- Can facilitate left turn positions during red signal indication.
- Reduces conflicts between bicyclists and turning vehicles, as well as motor vehicles and pedestrians in the crosswalk.

Guidance:

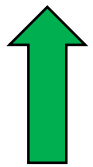
- Interim approval (IA-18) from MUTCD for the use of bike boxes.

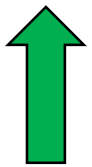
Quantifying Bike Boxes in the SHOPP Tool



Quantifying Bike Boxes in the SHOPP Tool

ID	Activity Category	Activity Detail	Unit of Measurement	Quantity	Assets in Good Condition	Assets in Fair Condition	Assets in Poor Condition	New Asset Added	Comments
H01	Streets	Bike Box (201.999)	EA	2				2	





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H02: Bike Parking

- The availability of a secure, safe and convenient space to store a bicycle that provides access to destinations.
- Should be well lit and in plain view without being in the way of pedestrians and motor vehicles.
- Parking stalls should support the whole bike, not just a wheel, to prevent theft.

Guidance:

- Visit: Pedbikeinfo.org for more information.

H02: Bike Parking

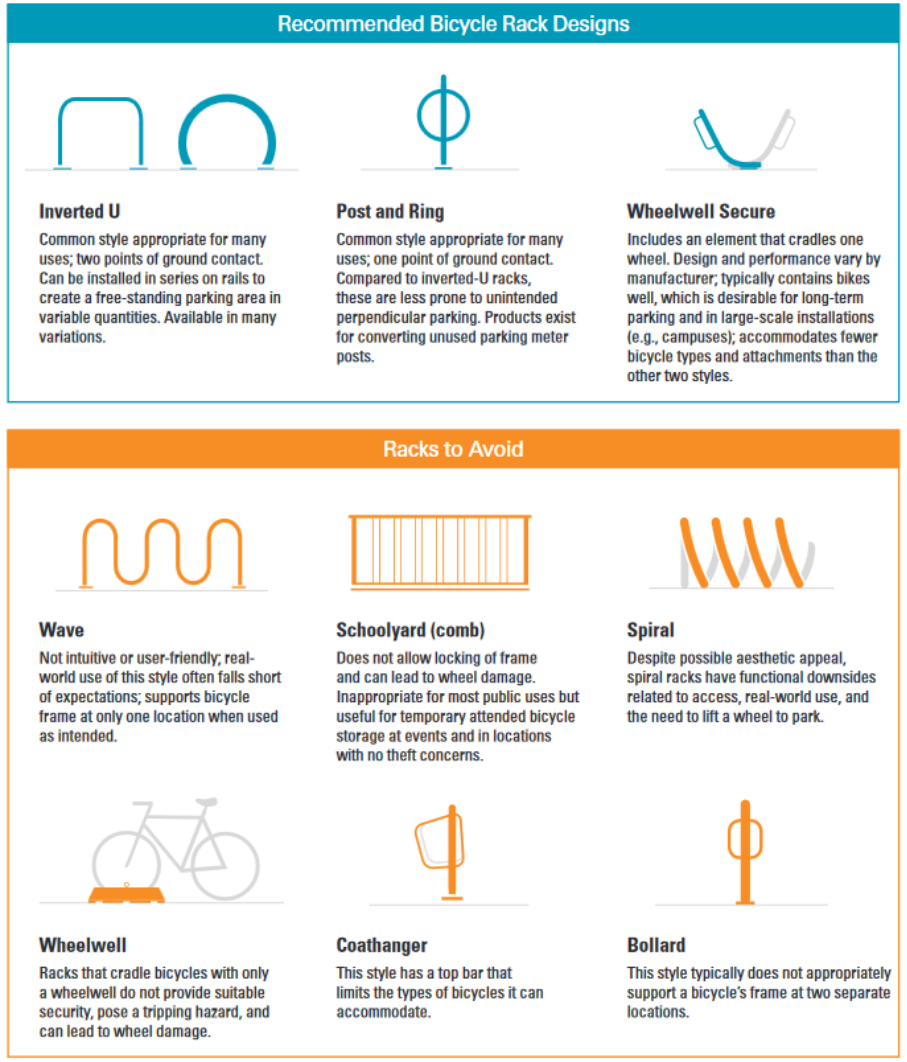
Bike Corral:

- Road space reallocation that replaces underutilized space, or parking, for bicycle parking.
- Should be located in high-activity commercial corridors.

H02: Bike Parking

Bike Parking Guidance (Pictured Right):

"Recommended Bicycle Rack Designs" and "Racks to Avoid" per the Association of Pedestrian and Bicycle Professionals' *Essentials of Bicycle Parking*. Use this resource as a tool to recommend bicycle racks that adequately accommodate the needs of people who bicycle.



Images and descriptions courtesy of APBP *Essentials of Bicycle Parking*

From New Jersey DOT Complete Streets Design Guide

Quantifying Bike Parking in the SHOPP Tool

Count the number of spaces for bicycle parking

Quantifying Bike Parking in the SHOPP Tool

Activity Detail	Unit of Measurement	Quantity	Assets in Good Condition	Assets in Fair Condition	Assets in Poor Condition	New Asset Added	Comments
Bike Parking (201.999)	EA	10				10	Bike Corral

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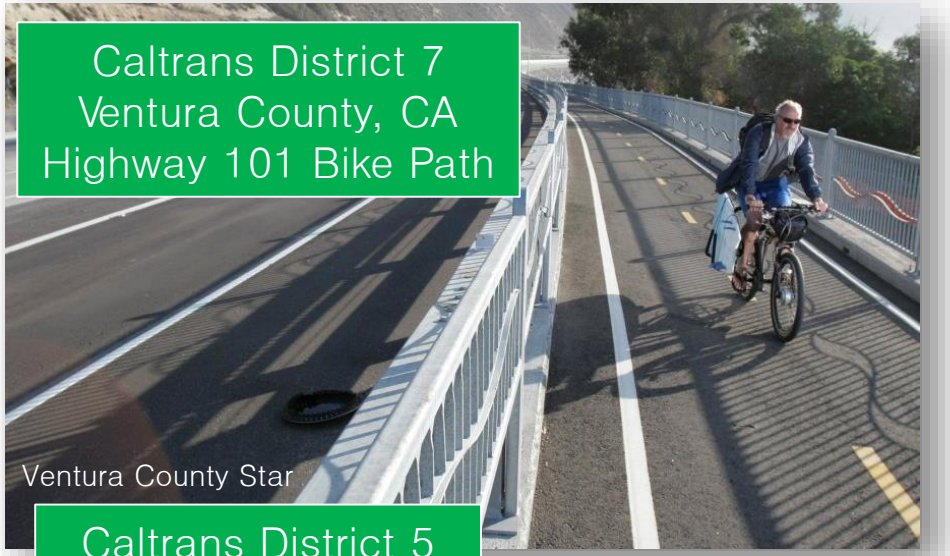
H05: Class I Bikeways– Bike Paths or Shared–Use Paths

- Per CA MUTCD Section 1A.13, 31d, "a completely separated right–of–way designated for the exclusive use of bicycles and pedestrians with crossflows by motorists minimized."

Guidance:

- Refer to HDM Topic 1003.1: Class I Bikeways (Bike Paths)
  - 8 ft. minimum; 10 ft. preferred travel width.
  - 2 ft. shoulders on both sides for pedestrian access.
  - 5 ft. minimum between edge of path and edge of shoulder of roadway.

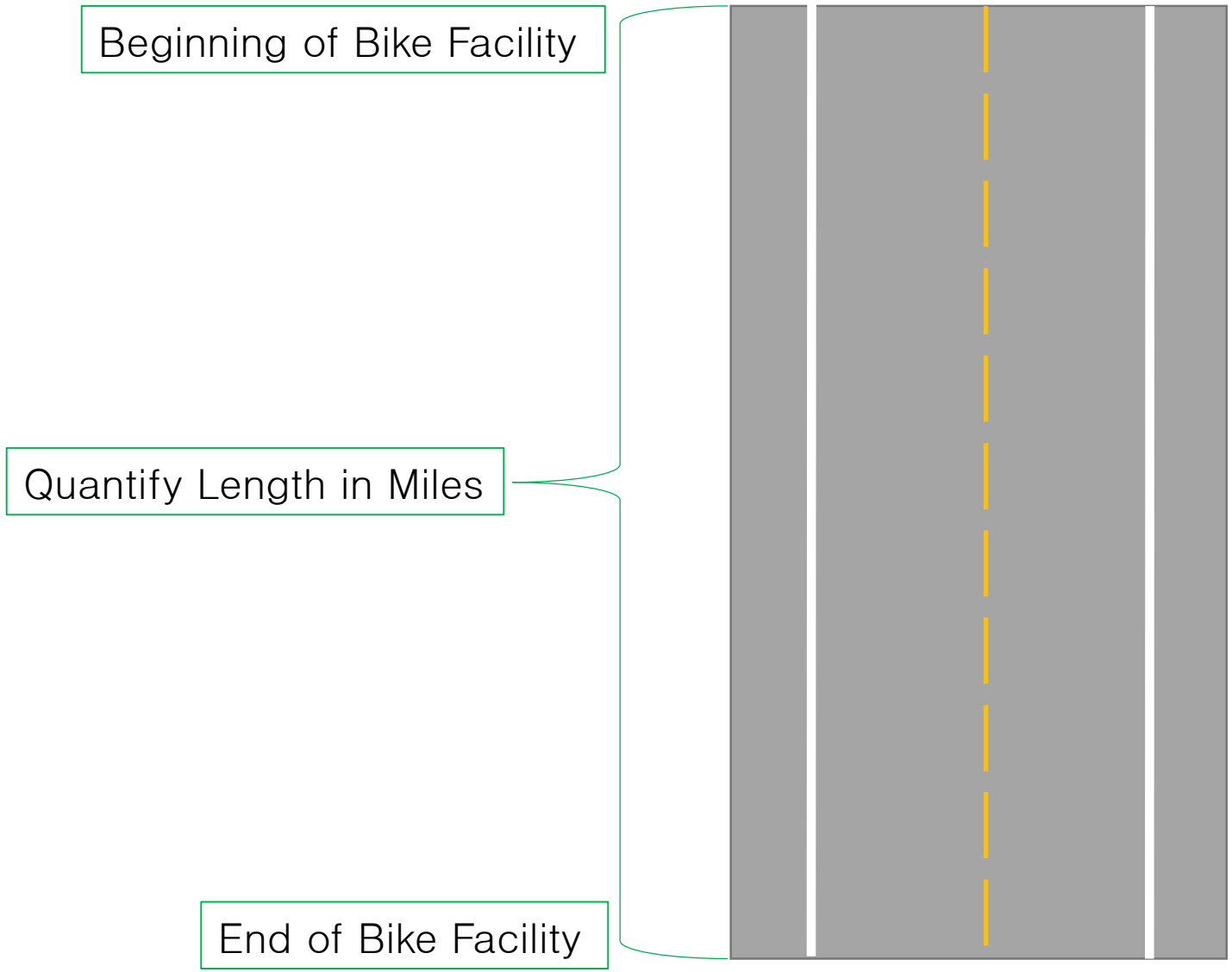


H05: Class I Bikeways– Bike Paths or Shared–Use Paths

Shared–Use Path adjacent to a road:

- Bidirectional shared use path located immediately adjacent and parallel to a roadway.
- Appropriate in rural settings to provide access to users of all ages and abilities; can "maintain rural and small town community character".
- Refer to 'Sidepath' in FHWA Small Town and Rural Multimodal Networks for more information.

Quantifying Class I Bikeways in the SHOPP Tool



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H06: Class II Bike Lanes and H33: Class II Buffered Bike Lanes

- An exclusive lane for bicycle access within the roadway to separate bicyclists from the adjacent motor vehicle travel lane and/or parking lane.
- A Buffered Bike Lane (pictured below right) provides additional space (18 inches minimum) to further separate bicyclists from automobiles.

Guidance:

- Refer to HDM Topic 301.2: Class II Bikeway (Bike Lane) Lane Width
  - **4 ft. minimum.**
  - 5 ft. if next to parked vehicles.
  - 6 ft. if posted speed is greater than 40 MPH.

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H07: Class III Bike Routes

- A road that designates preferred usage for bicyclists using a combination of signing, striping, or volume management.
- H34: Shared-lane markings (pictured right) are used to delineate the preferred path of bicycle travel in a lane shared with automobiles.

Guidance:

- Refer to HDM Topic 1002.1 (4): Class III Bikeway (Bike Route) for more information.
- Per CA MUTCD Section 1A.13 31d, Class III Bikeways are designated by signs or permanent markings [see applicable signage in "H42: Pedestrian, Bicycle and Transit Signage"].

For quantification in the SHOPP Tool- quantify each shared-lane marking

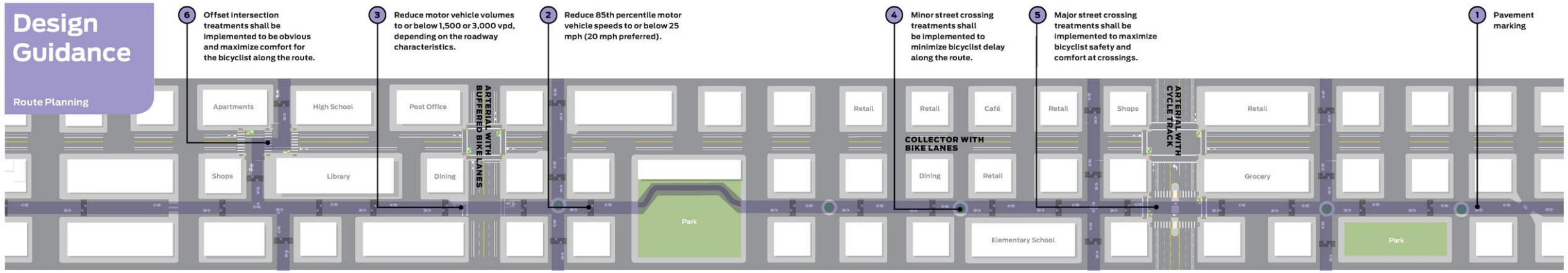
Table of Contents

H07: Class III Bike Routes

Class III Bicycle Boulevards:

Although Bicycle Boulevards are not a Complete Streets element for the State Highway System, these low-stress neighborhood routes provide comfort for users, in addition to connectivity, when paralleling major roadways. Consider discussing the opportunity for Bicycle Boulevards in communities to provide parallel alternate bicycling facilities to the State Highway System.

Refer to Bicycle Boulevard guidance from Pedestrian and Bicycle Information Center and NACTO for more information.



https://nacto.org/publication/urban-bikeway-design-guide/bicycle-boulevards/route-planning/

Caltrans

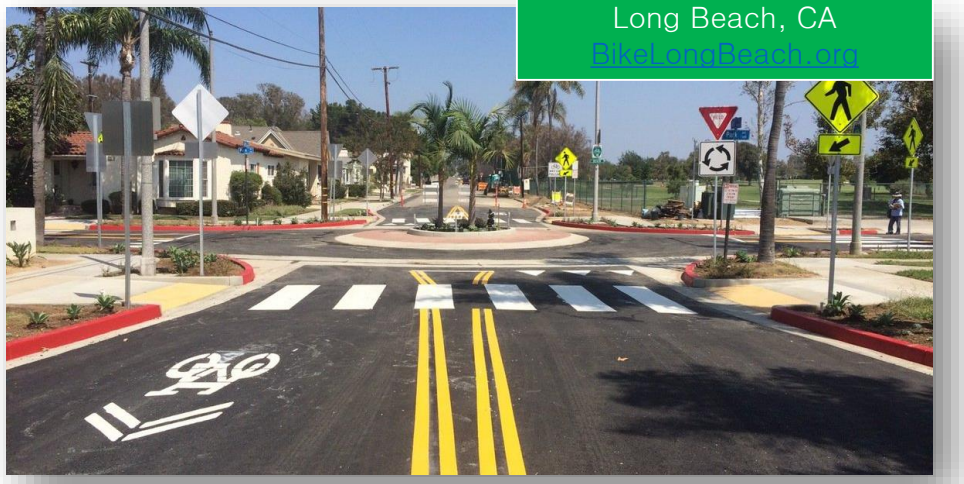
H07: Class III Bike Route

Class III Bicycle Boulevards:

Common treatments include:

- Traffic Diverters (pictured above right)
- Roundabouts, Mini Roundabouts, and Traffic Circles (pictured below right)
- Bike Route Signs
- Shared-lane Markings
- Speed bumps/humps/tables
- Chicanes
- High Visibility Crosswalks, pedestrian-activated traffic control devices, and Yield Lines at mid-block crossings.

Morro Street Bicycle Boulevard
Traffic Diverters
San Luis Obispo, CA
B.I.K.A.S.



6th Street Bicycle Boulevard
Roundabout
Long Beach, CA
BikeLongBeach.org

H08: Class IV Separated Bikeways

- A bikeway that is separated from vehicular traffic using horizontal and vertical elements.
- Separation can be made through:
  - Flexible posts
  - Inflexible physical barriers
  - Planters
  - Parked vehicles
  - Curbs

Guidance:

- Refer to Design Information Bulletin 89 and FHWA's Separated Bike Lane Planning and Design Guidance for more information.

H08: Class IV Separated Bikeways

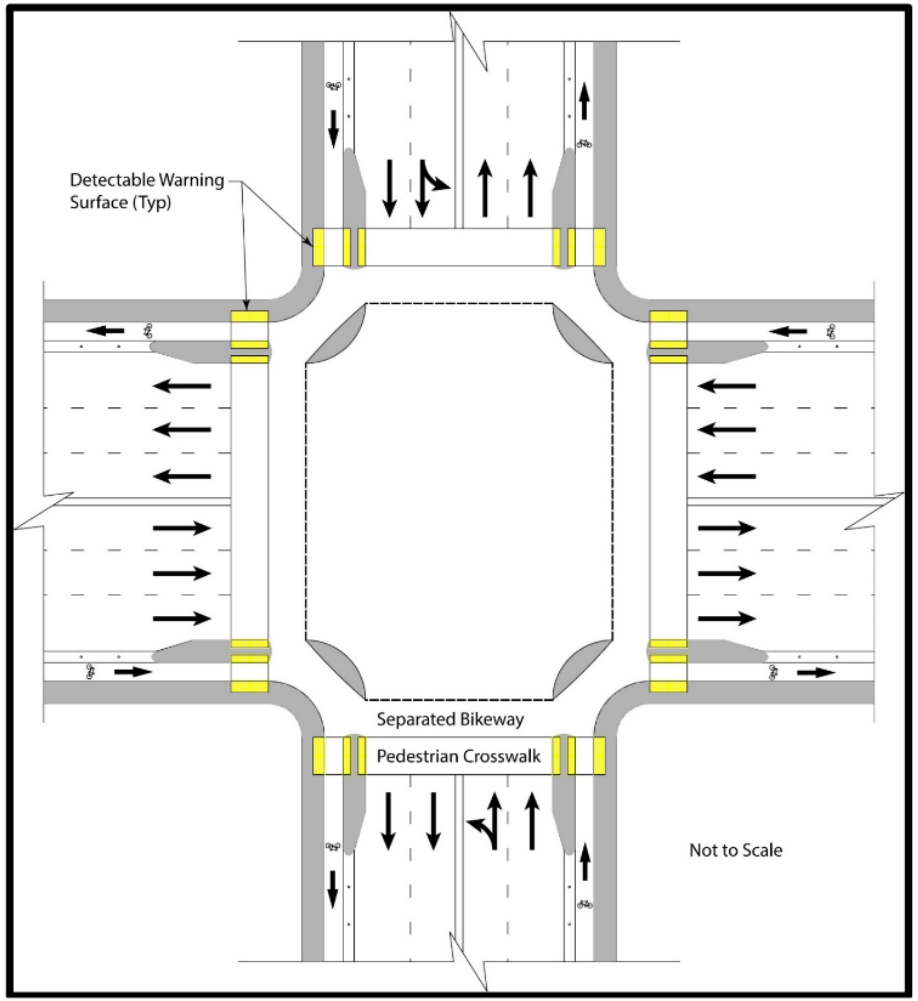
Protected Intersections:

- Intersection improvements for pedestrians and bicyclists that maintains the bikeway at the intersection and provides separation from automobile traffic.
- Consider utilizing in conjunction with a bicycle signal.

Guidance:

- Refer to Design Information Bulletin 89 and FHWA's Separated Bike Lane Planning and Design Guidance for more information.
- Consider viewing the video at: http://www.protectedintersection.com/ for an explanation of the benefits of protected intersections.

Figure 2.2
Example of a Protected Intersection

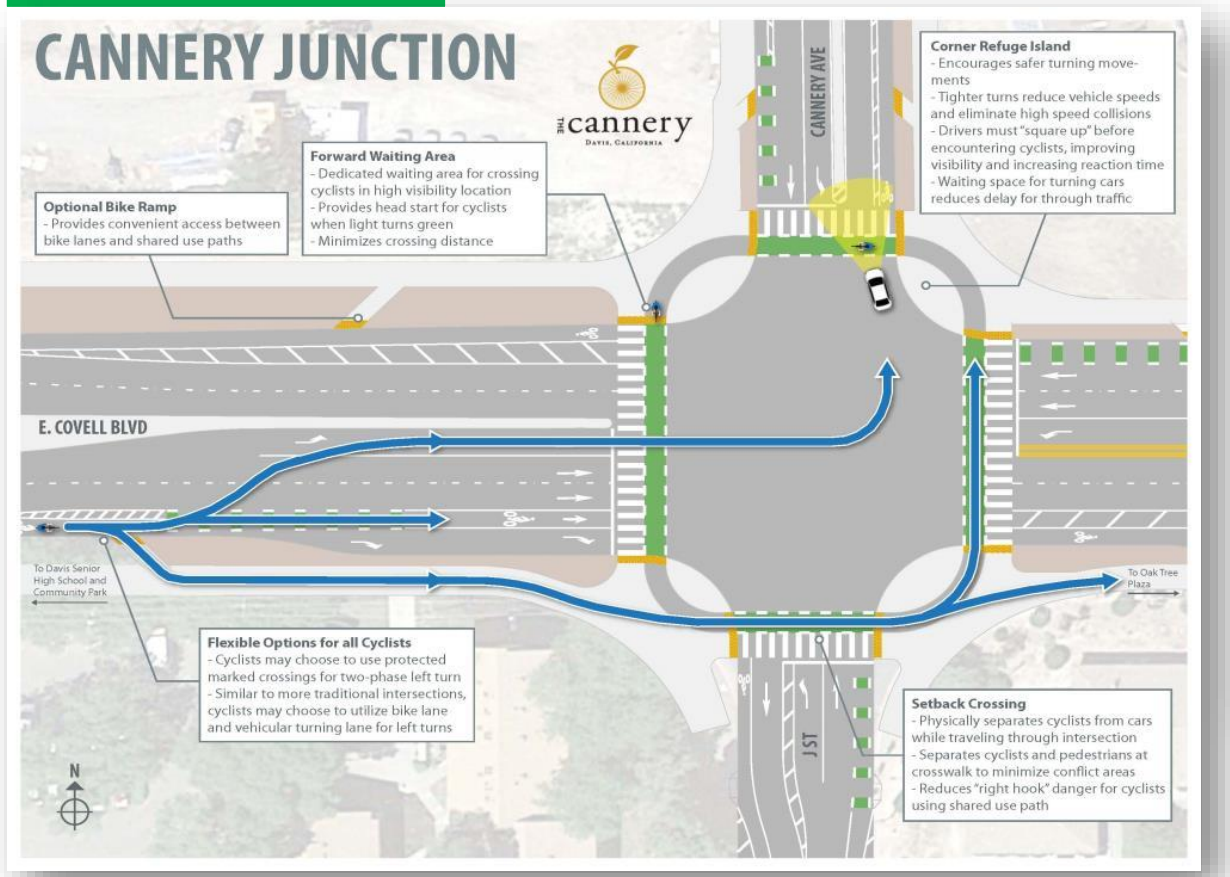


Caltrans' DIB 89 Figure 2.2

H08: Class IV Separated Bikeways

Protected Intersections

Covell and J Street
Protected Intersection
Davis, CA
CityofDavis.org



Caltrans District 4
9th St and Division
(State ROW)
San Francisco, CA

Caltrans

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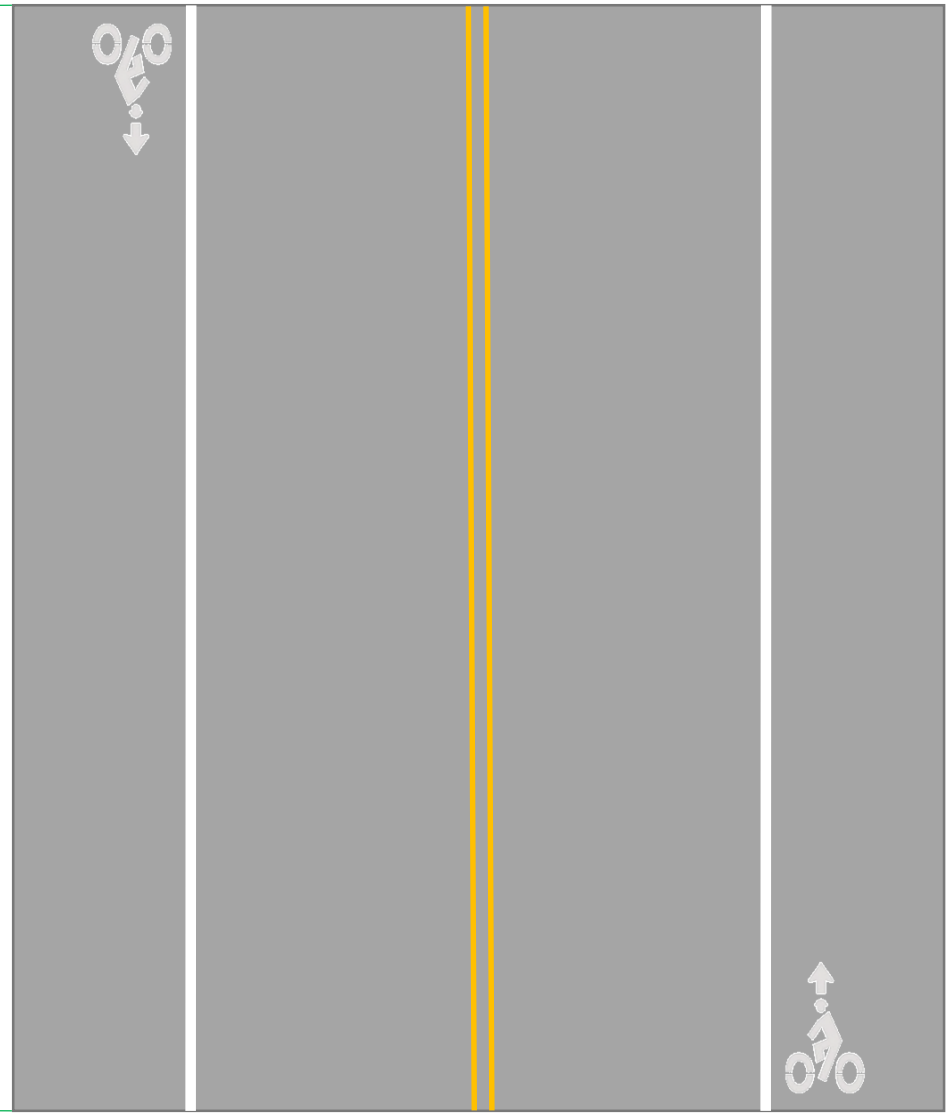
Quantifying Bikeways (Classes II–IV) in the SHOPP Tool

Beginning of Bike Facility

1. Quantify Length in Miles
2. Multiply by 2 if Bike Lane is in both directions



End of Bike Facility

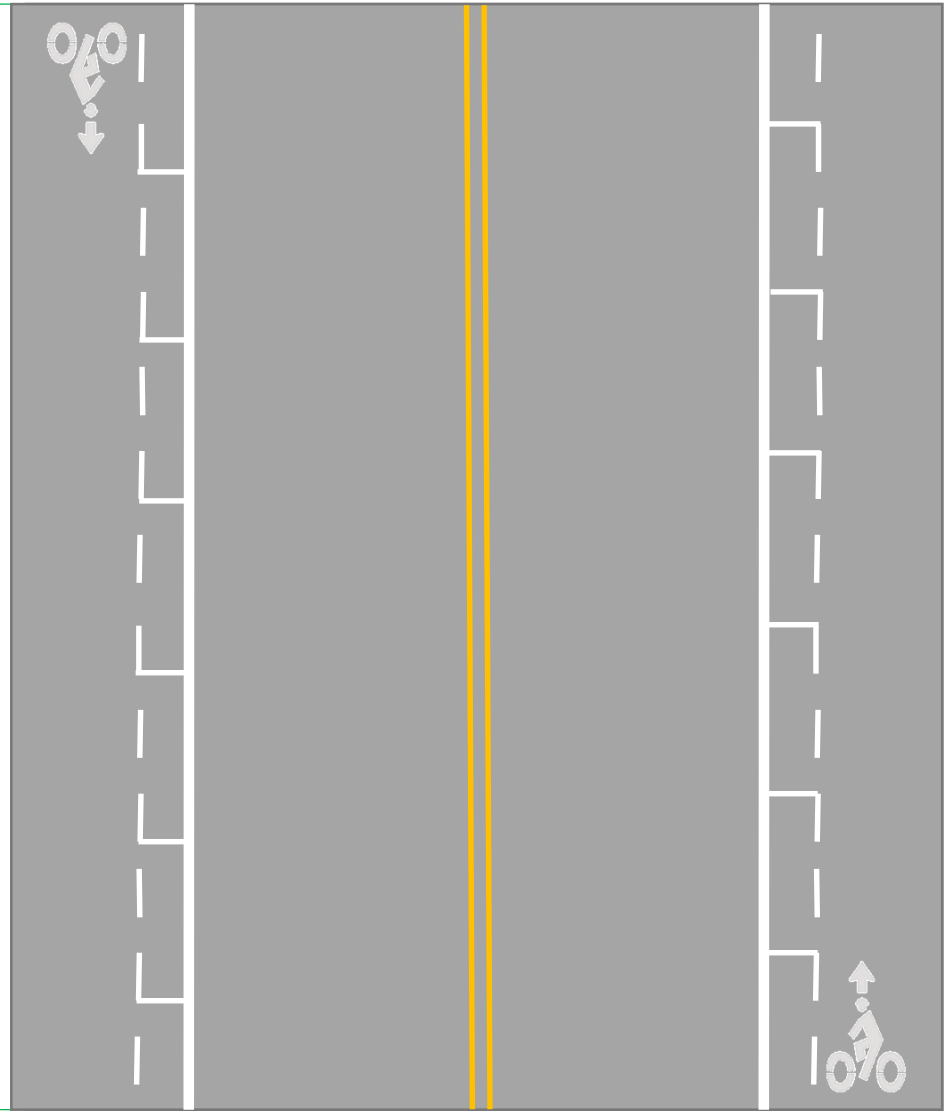
Quantifying Bikeways (Classes II–IV) in the SHOPP Tool

Beginning of Bike Facility

San Francisco
SR–35 Sloat Boulevard

Length: 0.6 Centerline Mile
Class II: 1.2 Lane Miles

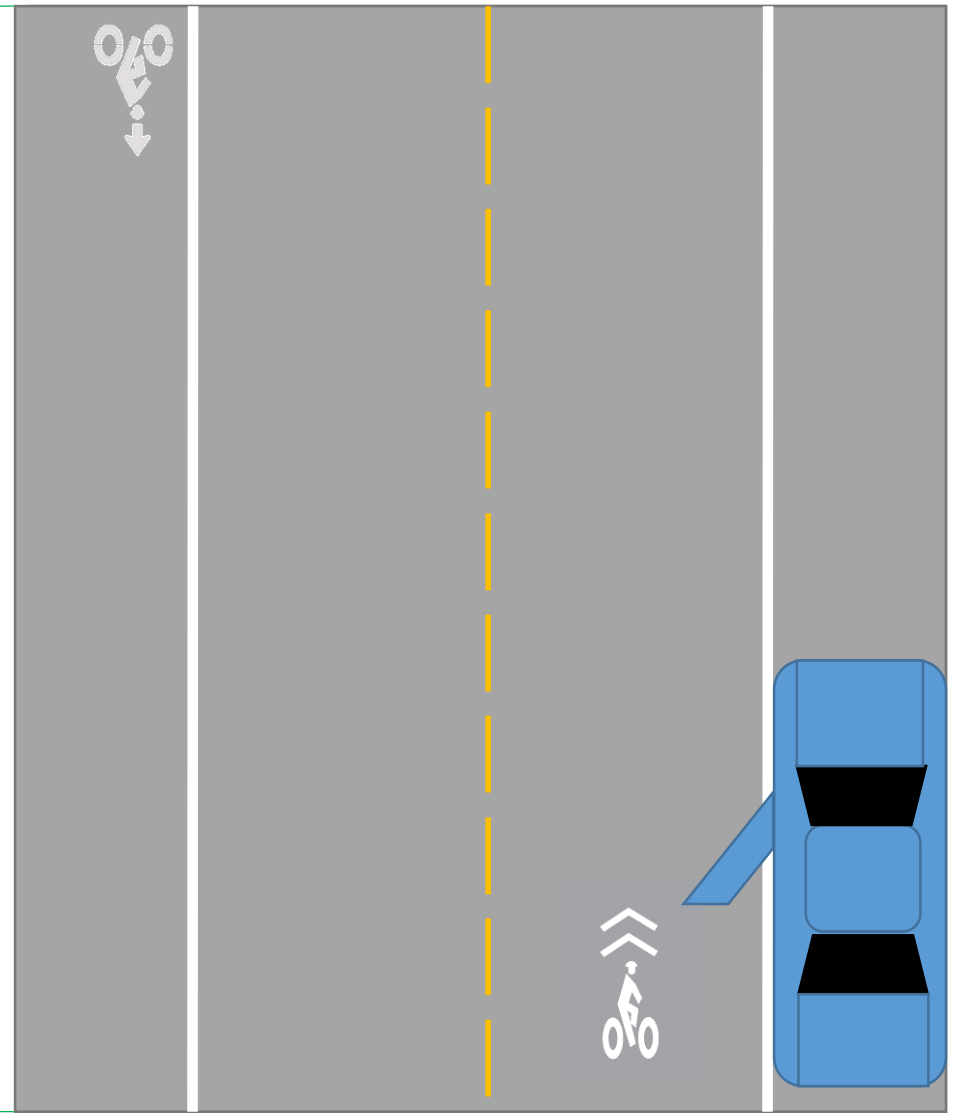
End of Bike Facility



Quantifying Bikeways (Classes II–IV) in the SHOPP Tool

Beginning of Bike Facility

Length: 0.5 Miles
Class II: 0.5 Miles
Class III: 0.5 Miles



End of Bike Facility

Quantifying Bikeways in the SHOPP Tool

ID	Activity Category	Activity Detail	Unit of Measurement	Quantity	Assets in Good Condition	Assets in Fair Condition	Assets in Poor Condition	New Asset Added	Comments
F17	Mobility	Restripe Bikeways (201.310)	Linear Miles						
H05	Streets	Class I Bike Paths (201.999)	Linear Miles						
H06	Streets	Class II Bike Lane (201.999)	Lane Miles						
H07	Streets	Class III Bike Routes (201.999)	Lane Miles						
H08	Streets	Class IV Separated Bikeway (201.999)	Lane Miles						

- Only if Bikeway striping is being maintained.
- Still need to quantify distance, bicycle class and condition.

Quantifying Bikeways in the SHOPP Tool

ID	Activity Category	Activity Detail	Unit of Measurement	Quantity	Assets in Good Condition	Assets in Fair Condition	Assets in Poor Condition	New Asset Added	Comments
F17	Mobility	Restripe Bikeways (201.310)	Linear Miles						
H05	Streets	Class I Bike Paths (201.999)	Linear Miles						
H06	Streets	Class II Bike Lane (201.999)	Lane Miles						
H07	Streets	Class III Bike Routes (201.999)	Lane Miles						
H08	Streets	Class IV Separated Bikeway (201.999)	Lane Miles						incl. Protected Intersection

- If <u>new</u> construction or striping, select Bikeway class in Streets Category.
- Still need to quantify distance and bicycle class.

# of Detection Loops, # of Signals, uni- or bi-directional, Buffered, type of Class IV separation, etc.

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Green Colored Pavement for Bikeways

H10: Conflict Zone Green Paint

- Conflict zone green paint can be used on Class II and Class IV bikeways.
- Increases the visibility of the bicycle facility, thereby increasing bicyclist comfort and motorist yielding behavior.
- Identifies and mitigates potential conflict areas, such as:
  - Right turn pockets
  - Driveways
  - Freeway on-ramps and off-ramps
  - Intersections
  - Beginning of bike lane

Guidance:

- Interim approval (IA-14) from FHWA for the use of green paint.

Green Colored Pavement for Bikeways

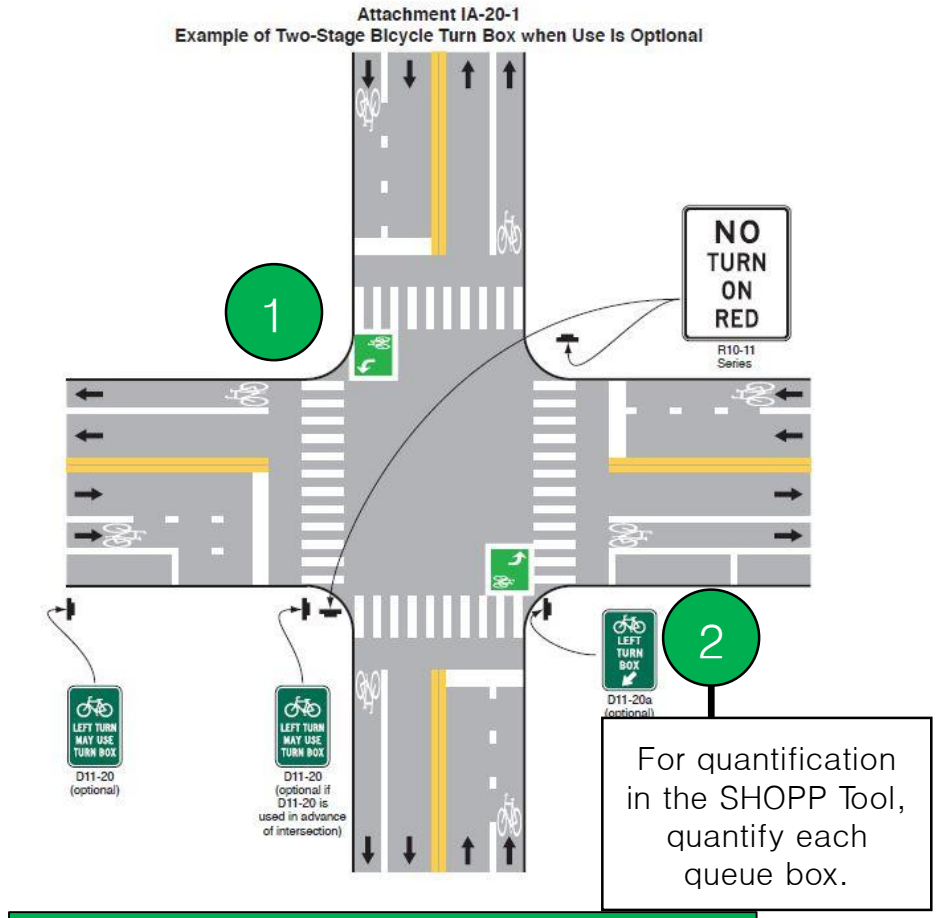
Use of Green Paint in Intersections:

H39: Two-stage Left-Turn Queue Boxes (diagrammed right):

- Green pavement markings at a signalized intersection that provide a refuge area for bicyclists attempting to make a 'two-stage left-turn'. This allows for a bicyclists to stay to the right of traffic, continue through the signalized intersection, then cross when the intersecting roadway has the right-of-way.

Cross-Bike (pictured below):

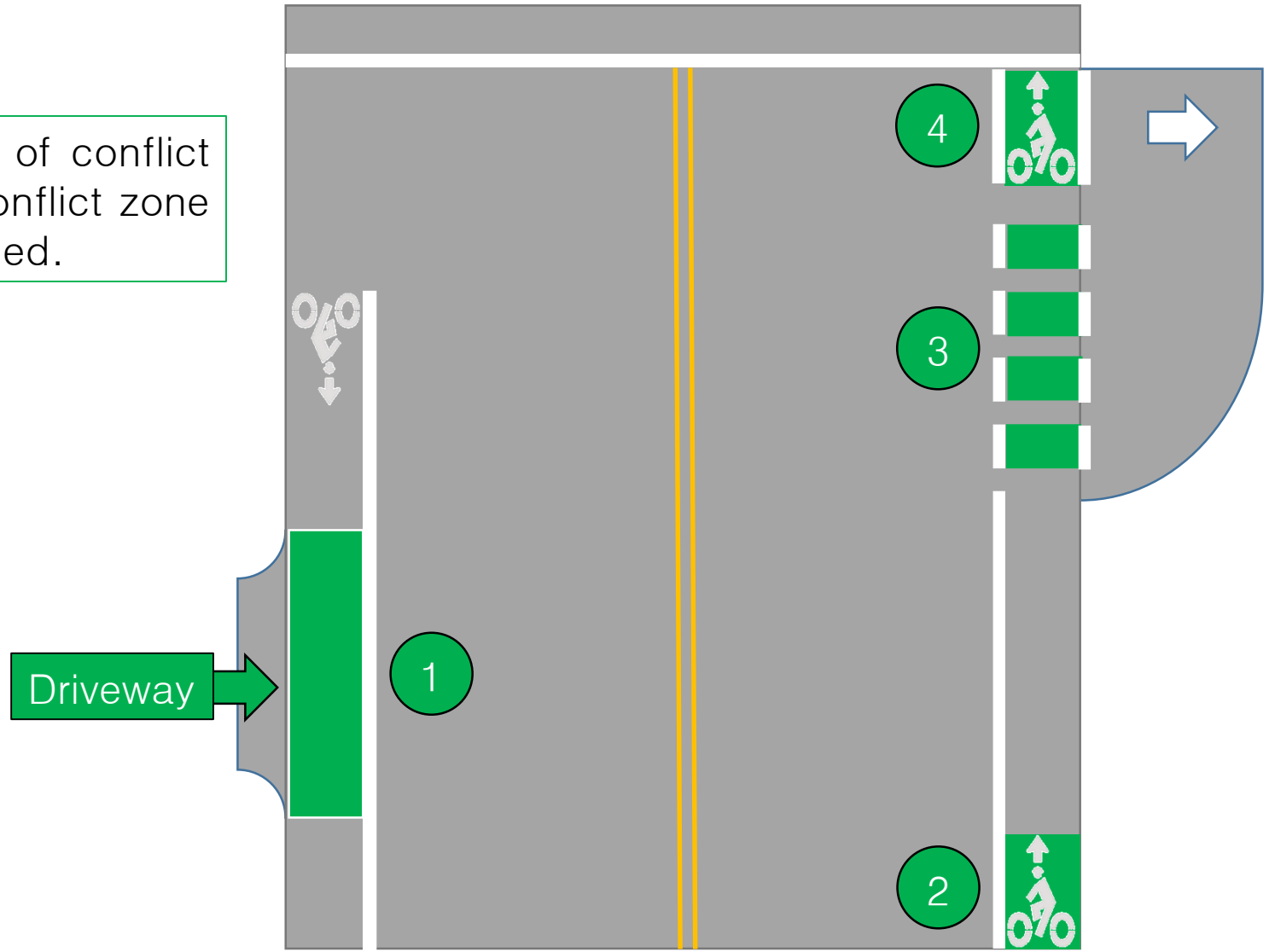
- Green pavement markings that continue through the intersection to alert motorists to the presence of a bicycle facility on the intersection roadway.



- FHWA MUTCD Interim Approval
- Blanket Approval in California

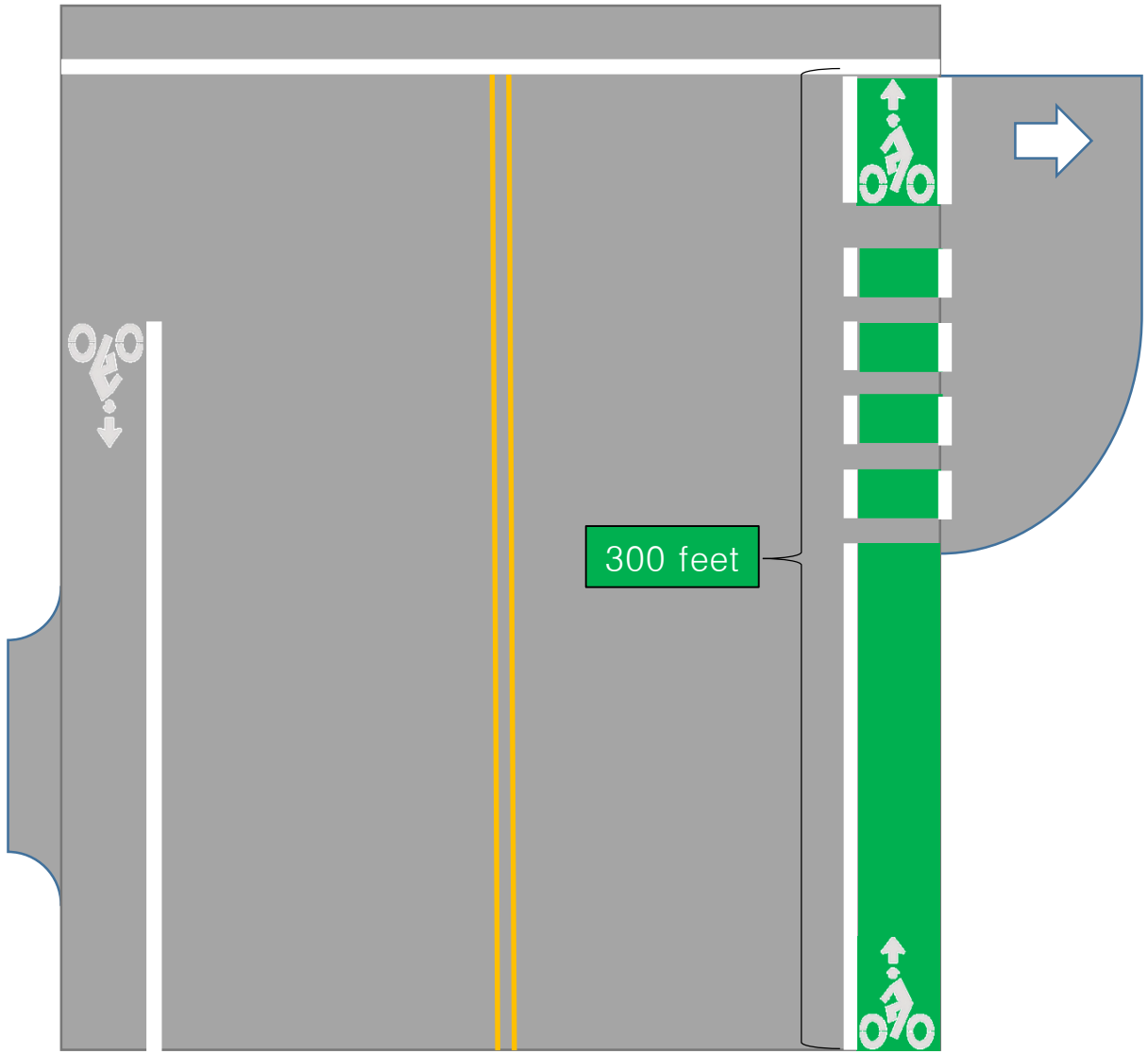
Quantifying conflict zone green paint in the SHOPP Tool

Count the number of conflict zones for which conflict zone green paint is applied.



Quantifying green colored pavement in Bikeways in the SHOPP Tool

Measure the linear feet of the conflict zones.



For SHOPP Tool quantification– green colored pavement striped within Class II or Class IV Bikeways, provide a quantification of linear feet in the comments for the bikeway facility.

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H38: Bicycle Signals and H50: Bicycle Signal Priority

Bicycle Signal Priority is a traffic signal timing strategy to coordinate continuous bicycle travel over several intersections in one direction. This strategy is also called *Greenwave*.

Bicycle Signal Heads are used at intersections to separate bicycle movements from conflicting motor vehicle, street car, light rail, or pedestrian movements. These can also give a *Leading Bicycle Interval* to prioritize bicycle movements through the intersection. Per DIB 89 Guidance, consider utilizing the CA MUTCD Part 4 guidance when planning and designing bicycle signal heads.

Bicycle Signal Heads (NACTO)

In the SHOPP Tool, quantify each bicycle signal/ bicycle signal improvement.

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Pedestrian Elements

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Pedestrian-active Traffic Control Devices and Yield Lines	73
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Curb Extensions/ Bulb-outs	82
LED Lighting	86
Shade for Pedestrian Access	89
Leading Pedestrian Interval	92

Chinatown Scramble Crosswalk
Oakland, CA

Pedestrian Elements

H21: Sidewalks:

Sidewalks serve many different functions, depending on the surrounding land use context. Due to this, planners and engineers must consider the differing sidewalk zones, which include:

1. **Frontage Zone:** this zone functions as the extension of the building entryways and potential sidewalk cafes.
2. **Pedestrian Through Zone:** this zone provides an access pathway for pedestrian travel and should be 5–7 feet wide in residential settings and 8–12 feet wide in downtown or commercial areas.
    1. Per HDM Topic 105, the minimum width should be **8 feet in an urban or rural main street, 6 feet when contiguous to a curb, or 5 feet when separated by a planting strip**.
3. **Street Furniture/ Curb Zone:** the section of the sidewalk between the curb and through zone in which lighting, benches, kiosks, utility poles, tree pits, and bicycle parking is location.
4. **Enhancement/ Buffer Zone:** space that can consist of curb extensions, parklets, stormwater management, bike parking, bike share, and raised separated bikeways.

Refer to DIB 82 for accessibility guidance, and NACTO's Sidewalks page for more information.

Sidewalk Zones (NACTO)

Pedestrian Elements

Americans with Disabilities Act (ADA)–compliant facilities are integral to providing access to those with disabilities. The objective of Caltrans' ADA Infrastructure Program is to make state infrastructure equally accessible to persons with disabilities.

The ADA–compliant activity details listed in the SHOPP Tool are considered applicable Complete Streets Element. These activity details are found within the SHOPP Tool and a selection of them are provided to the right.

Please refer to ADA Infrastructure Program guidance for more information.

ID	Activity Category	Activity Description	Activity Unit
F21	Mobility	ADA – New sidewalk (201.361)	LF
F22	Mobility	ADA – Repair existing sidewalk (201.361)	LF
F23	Mobility	ADA – New curb ramp installed (201.361)	EA
F24	Mobility	ADA – Repair/upgrade curb ramp (201.361)	EA
F25	Mobility	ADA – Install accessible pedestrian signal (201.361)	EA
F26	Mobility	ADA – Lower pedestrian push button (201.361)	EA
F27	Mobility	ADA – Relocate pedestrian push button posts (201.361)	EA
F28	Mobility	ADA – Modify driveway (201.361)	LF
F29	Mobility	ADA – New crosswalk (201.361)	LF
F30	Mobility	ADA – Modify crosswalk (201.361)	LF
F31	Mobility	ADA – Remove obstructions (201.361)	EA
F32	Mobility	ADA – Install new detectable warning surface (201.361)	SQFT
F33	Mobility	ADA – Upgrade detectable warning surface (201.361)	SQFT

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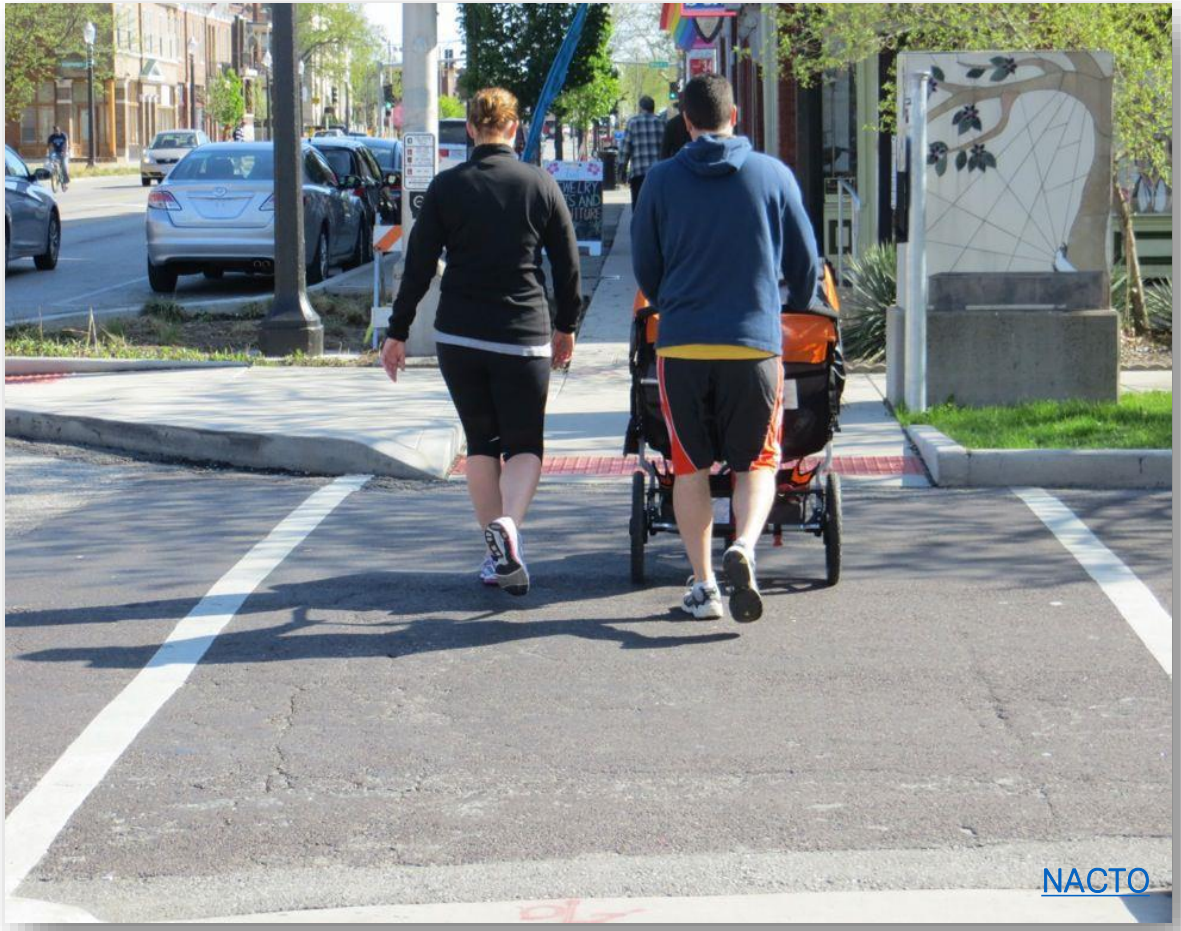
H13: Crosswalks

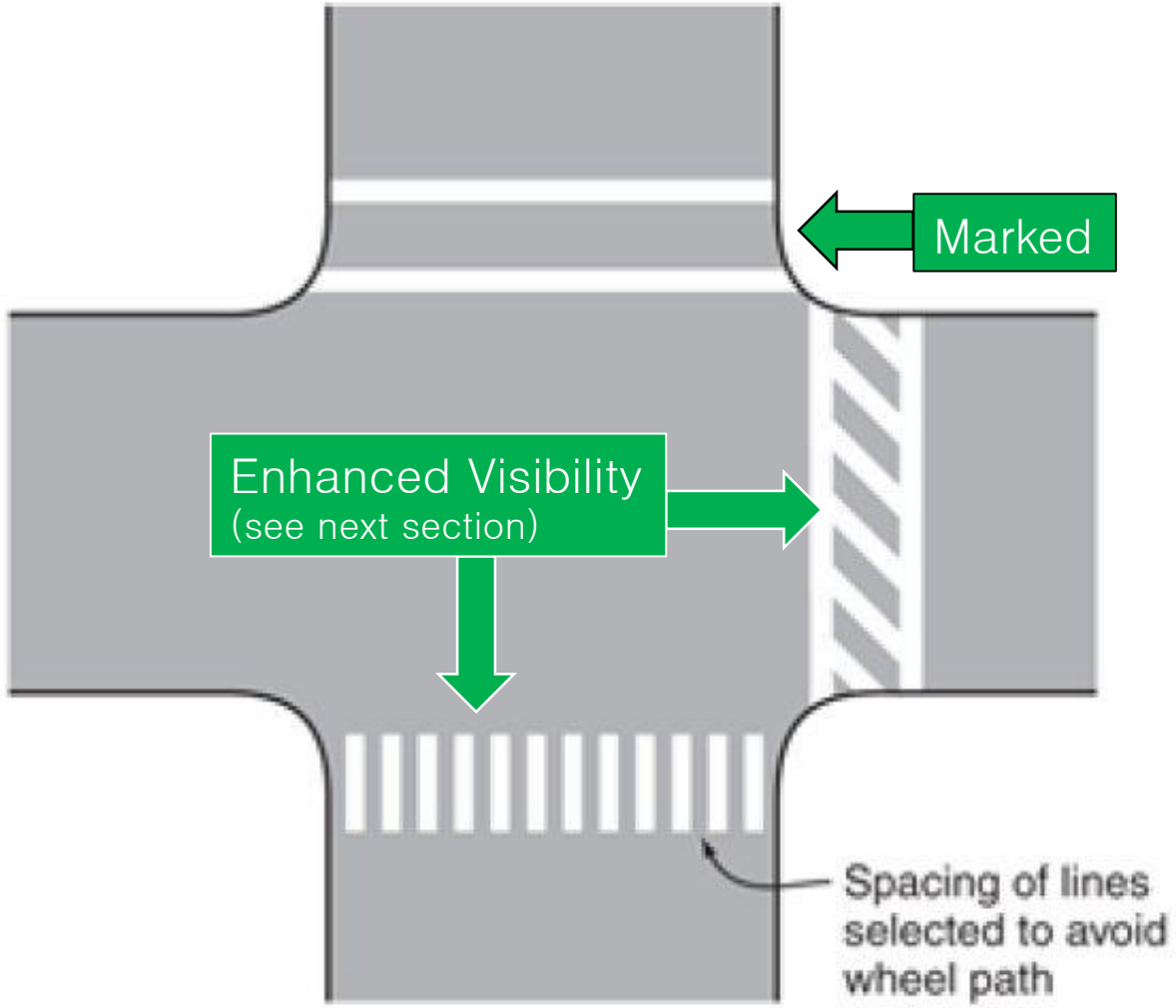
- Marked crosswalks define pedestrian accessibility at preferred crossing locations, give guidance for pedestrians, and indicate motorists to yield to pedestrians.
- Marked crosswalks provide pedestrian crossing access, but additional countermeasures are encouraged whenever possible (see High Visibility Crosswalks).

Guidance:

- Refer to MUTCD 3B-19 and NACTO for more information.

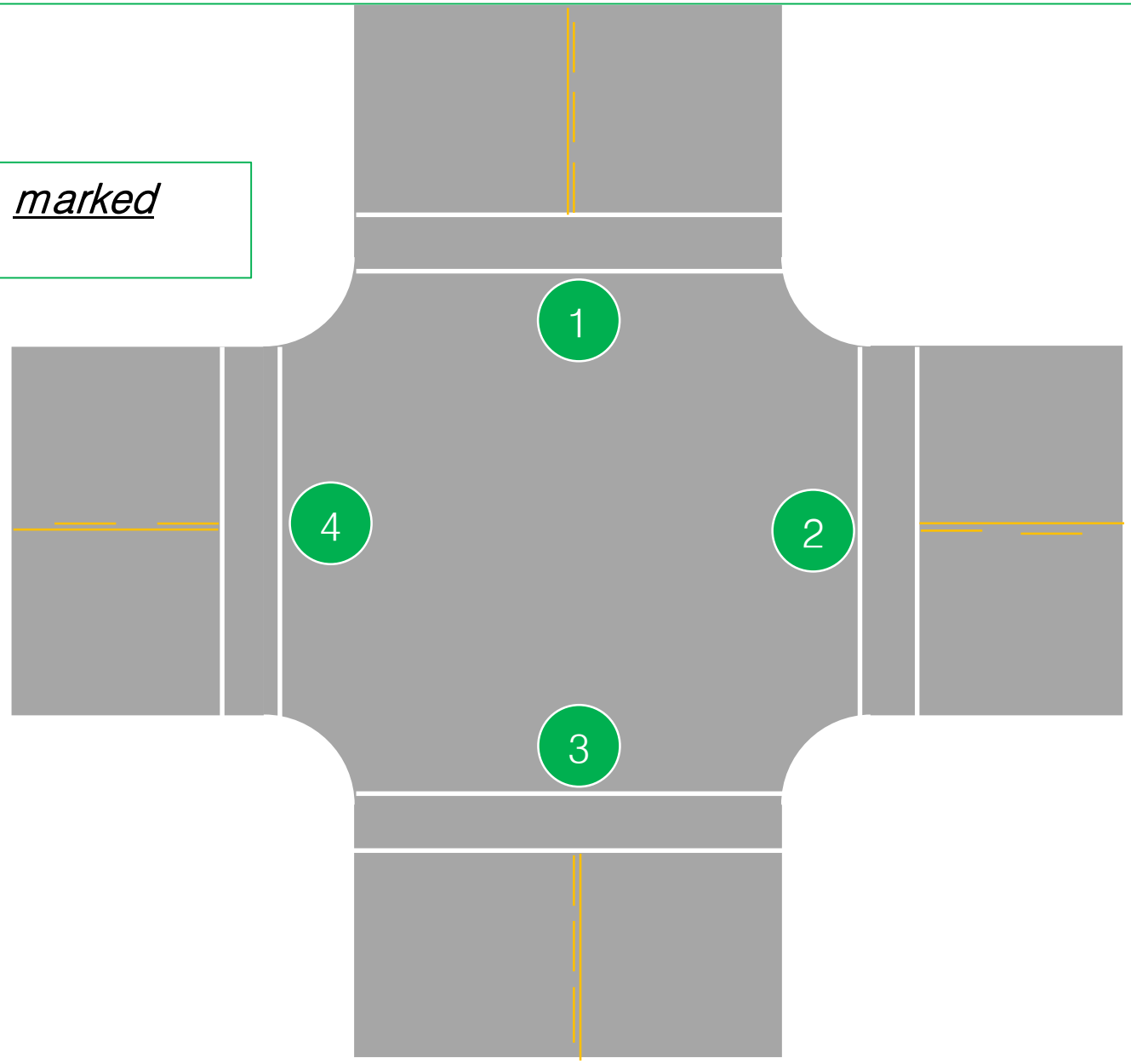


H13: Crosswalks



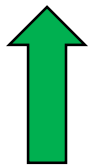
Quantifying Crosswalks in the SHOPP Tool

Quantify each leg of a ***marked*** crosswalk individually



Quantifying Crosswalks in the SHOPP Tool

ID	Activity Category	Activity Detail	Unit of Measurement	Quantity	Assets in Good Condition	Assets in Fair Condition	Assets in Poor Condition	New Asset Added	Comments
H13	Streets	Crosswalk (201.999)	EA	4				4	4 new marked crosswalks



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H12: High Visibility Crosswalks

- Markings that consist of diagonal or longitudinal lines parallel to traffic flow.
- Additional treatments can also be used to increase crosswalk visibility, such as brick pavers (pictured below right).
- Additional elements that increase the visibility of the pedestrian right-of-way can be paired in conjunction with high visibility crosswalk markings. These are detailed in the preceding pages.

Guidance:

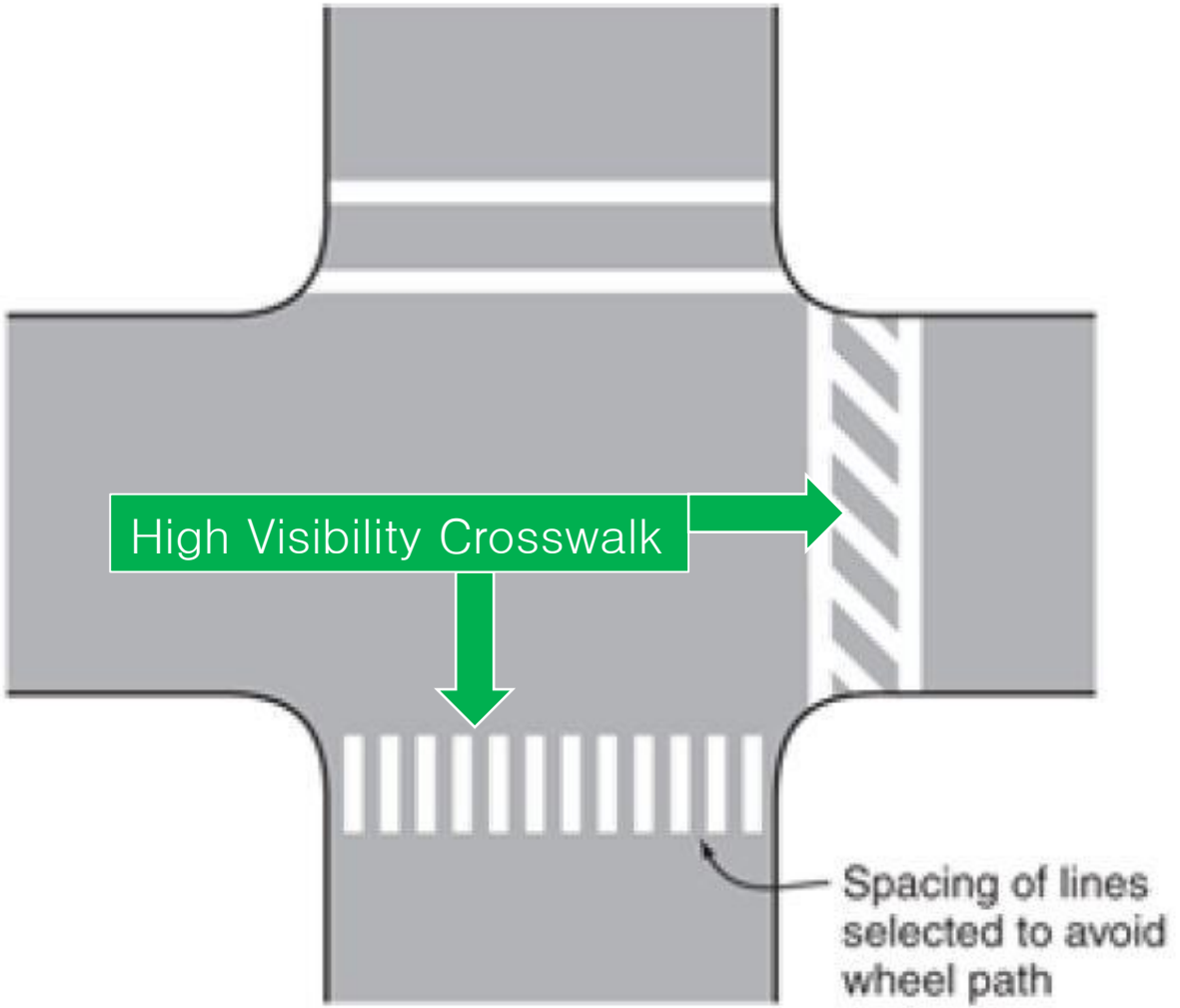
- Refer to Traffic Operations' Crosswalk Enhancements Policy [diagrammed on page 151].

High Visibility Crosswalks

Speed Limit	40 + MPH
Travel Lanes	4 +
ADT	12,000 +

For marked crosswalks at uncontrolled intersections or mid-block locations, with the above characteristics, the following should be installed:

- **Advanced Yield Lines** and R1-5 or R1-5 a signs 20-50 ft. in advanced of crosswalk.
- **High Visibility Crosswalk** Pattern (pictured right)
- W11-2 sign and W16-7p sign at the crosswalk



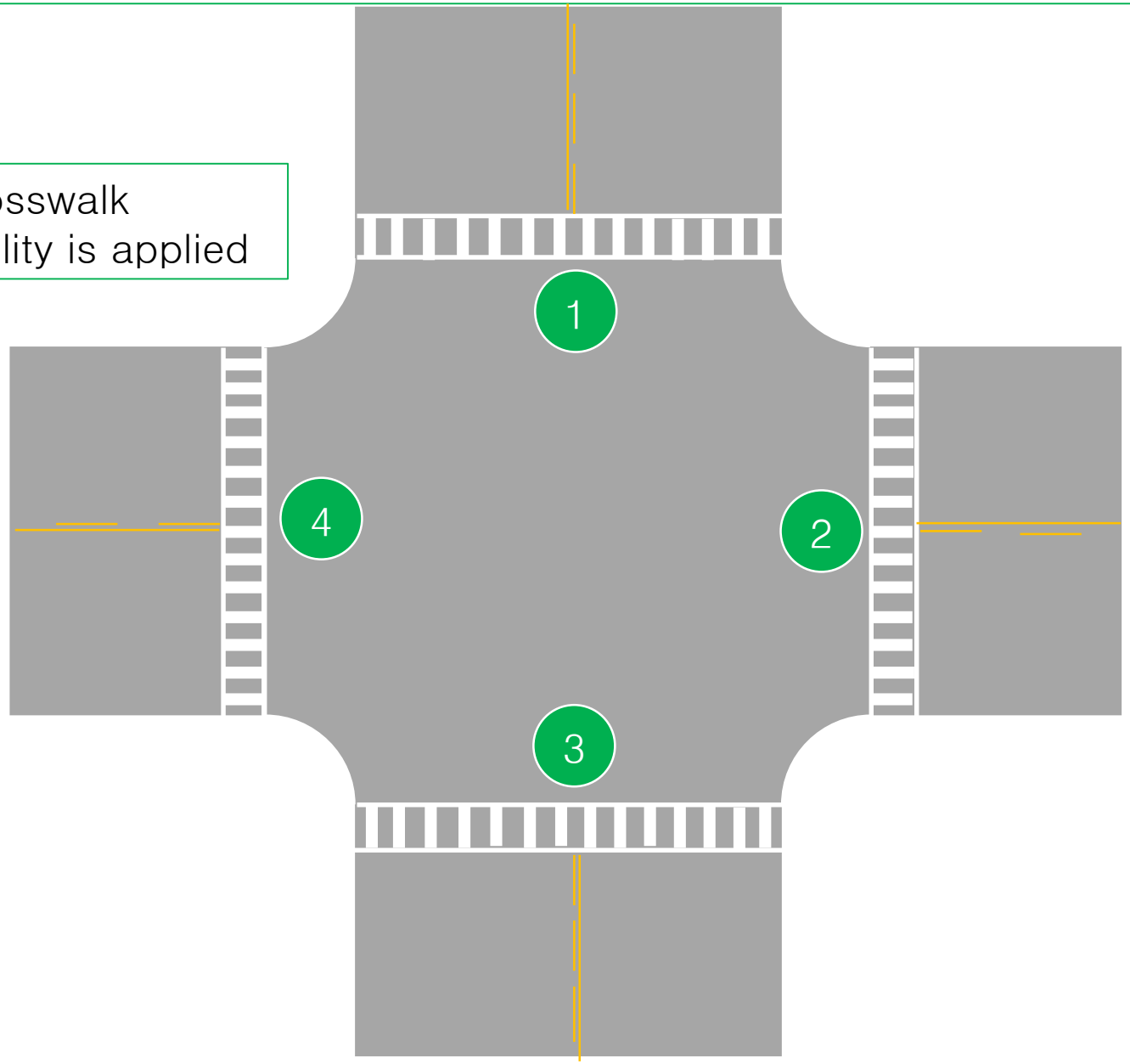
Other enhancements to consider:

- Curb extensions
- Raised medians
- Pedestrian refuge islands
- Lighting
- Signing and marking
- Pedestrian actuated flashing beacons
- Pedestrian hybrid beacons
- Signalized control

Note- some of these enhancements are detailed in later sections and element slides.

Quantifying High Visibility Crosswalks in the SHOPP Tool

Quantify per leg of crosswalk
Where enhanced visibility is applied



H43: Pedestrian-activated Traffic Control Devices and H41: Yield Lines

Pedestrian-activated Traffic Control Devices:

LED rapid-flash system that increases driver awareness of potential pedestrian conflicts at unsignalized intersections and mid-block pedestrian crossings.

- Refer the FHWA Interim Approval 21- Rectangular Rapid-Flashing Beacons at Crosswalks.
- Refer to FHWA for a list of applicable devices.

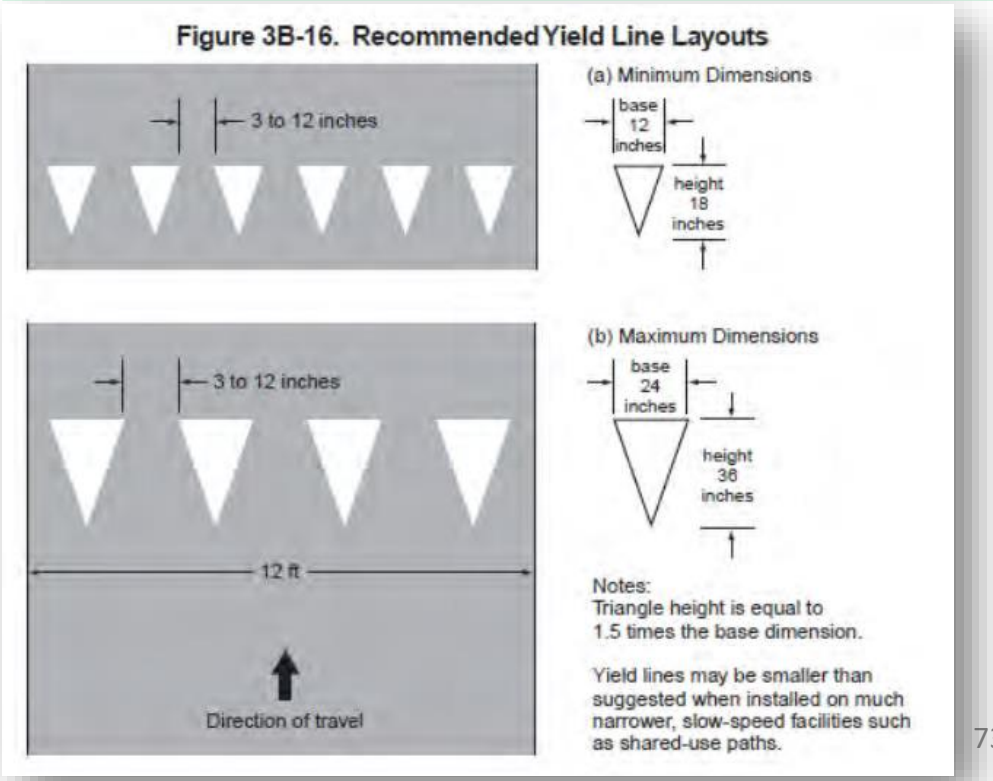
Yield Lines:

A marking used to inform automobile drivers of the need to yield or give priority to other road users, including pedestrians, bicyclists, and other vehicles.

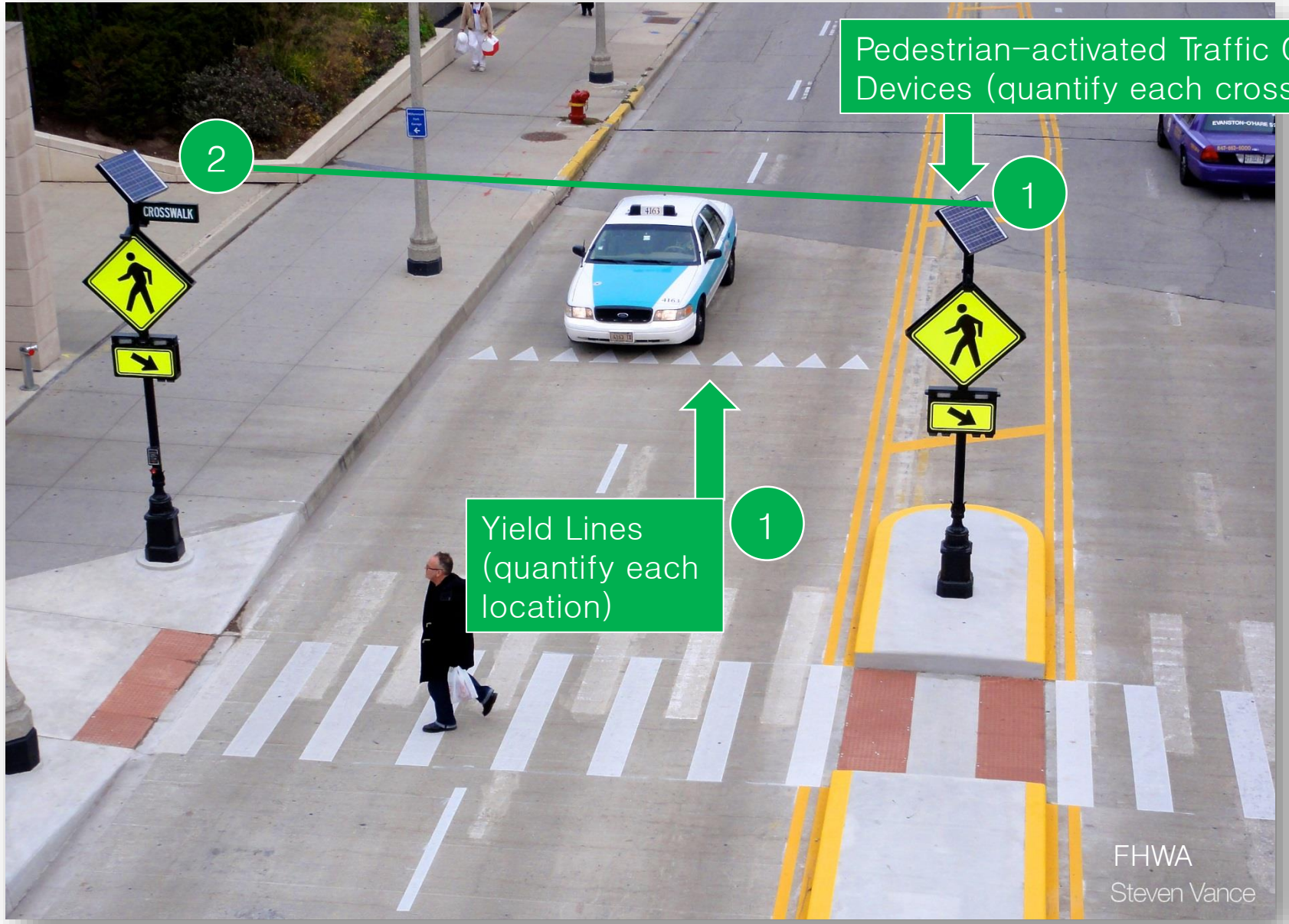
Refer to California MUTCD Figures 3B-16, 3B-17, and 3B-18 for Yield Lines guidance and crosswalk enhancements at unsignalized/uncontrolled crossings/approaches.

Santa Monica Boulevard and Stanford Street
Santa Monica, CA

FHWA Item 4(09)-8(E) Final Report (City of Santa Monica)

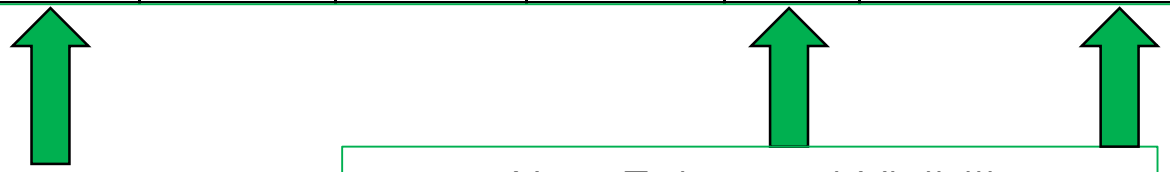


Pedestrian-activated Traffic Control Devices and Yield Line Application and Quantification



Quantifying High Visibility Crosswalks, Pedestrian-activated Traffic Control Devices, and Yield Lines in the SHOPP Tool

ID	Activity Category	Activity Detail	Unit of Measurement	Quantity	Assets in Good Condition	Assets in Fair Condition	Assets in Poor Condition	New Asset Added	Comments
H12	Streets	Enhanced Crosswalk Visibility (201.999)	EA	4				4	Ladder striping
H41	Streets	Yield Lines (201.999)	EA	1				1	
H43	Streets	Pedestrian-activated Traffic Control Devices (201.999)	EA	1				1	



4 New Enhanced Visibility Crosswalks; 1 mid-block crossing

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H11: Crossing Islands

- An area within the median for pedestrian refuge from exposure to traffic while crossing the roadway.
- Allows pedestrian to cross fewer lanes and directions of traffic at a time and judge conflicts separately.

Guidance:

- Provide at least 6 feet in the direction of pedestrian travel.
- See DIB 82 and HDM Topic 405.4 for more detailed information.
- Per Traffic Operations' Crosswalk Enhancements Policy: "for six-lane roadways or roadways with long crossing distances, a two-stage pedestrian crossing, using a raised median or pedestrian refuge island, should be considered where the proposed crossing will be controlled by a warranted pedestrian signal".

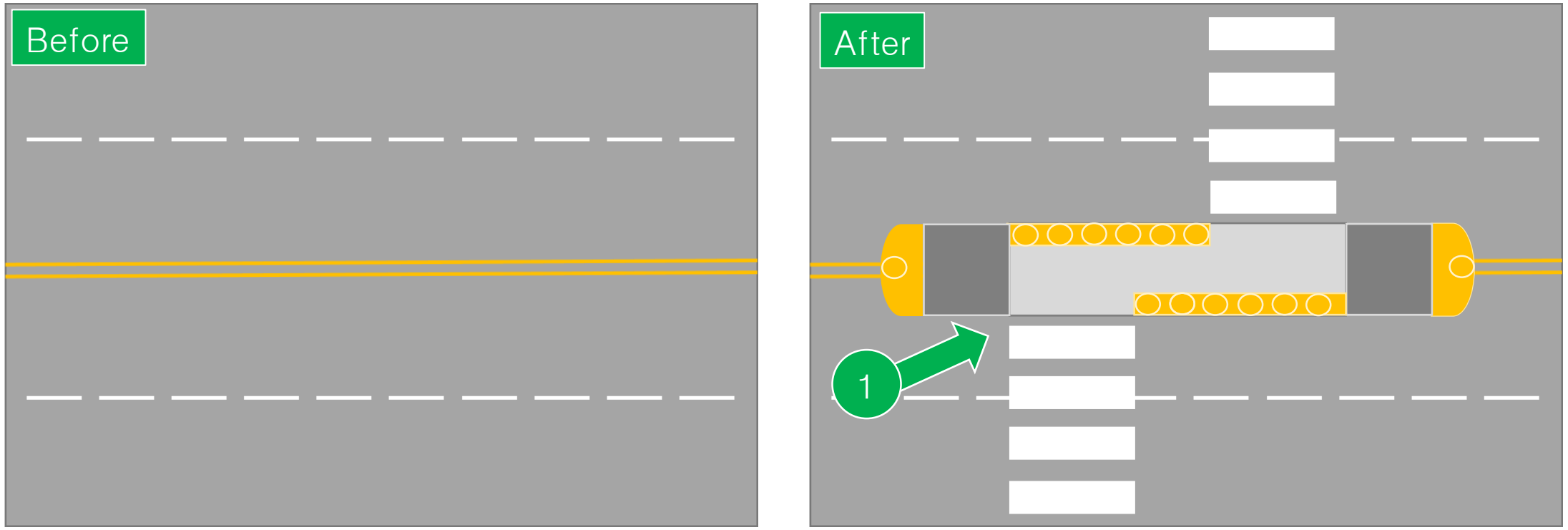
H11: Crossing Islands

Danish Offset Crossing:

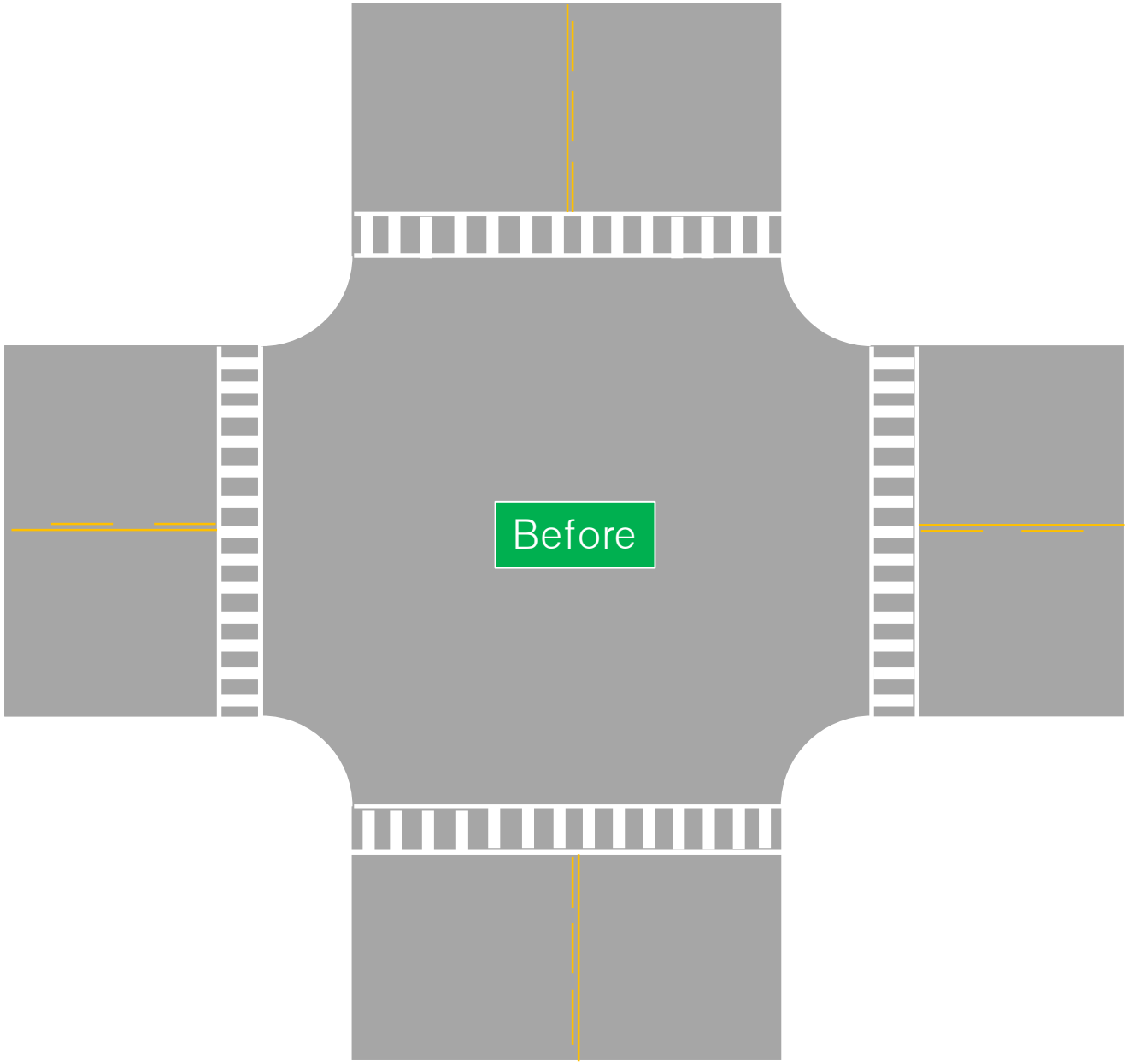
- A crossing island which channelizes pedestrians in the direction of oncoming traffic to ensure they look at oncoming vehicles while traveling within the median.
- Increase motorist yielding rates as well as pedestrian safety.
- More information on pedestrian crossing safety can be accessed on FHWA's website:
  - Evaluating Pedestrian Safety Countermeasures
  - Proven Countermeasures for Pedestrian Safety
  - Pedestrian Crossing Infrastructure

Quantifying Crossing Islands in the SHOPP Tool

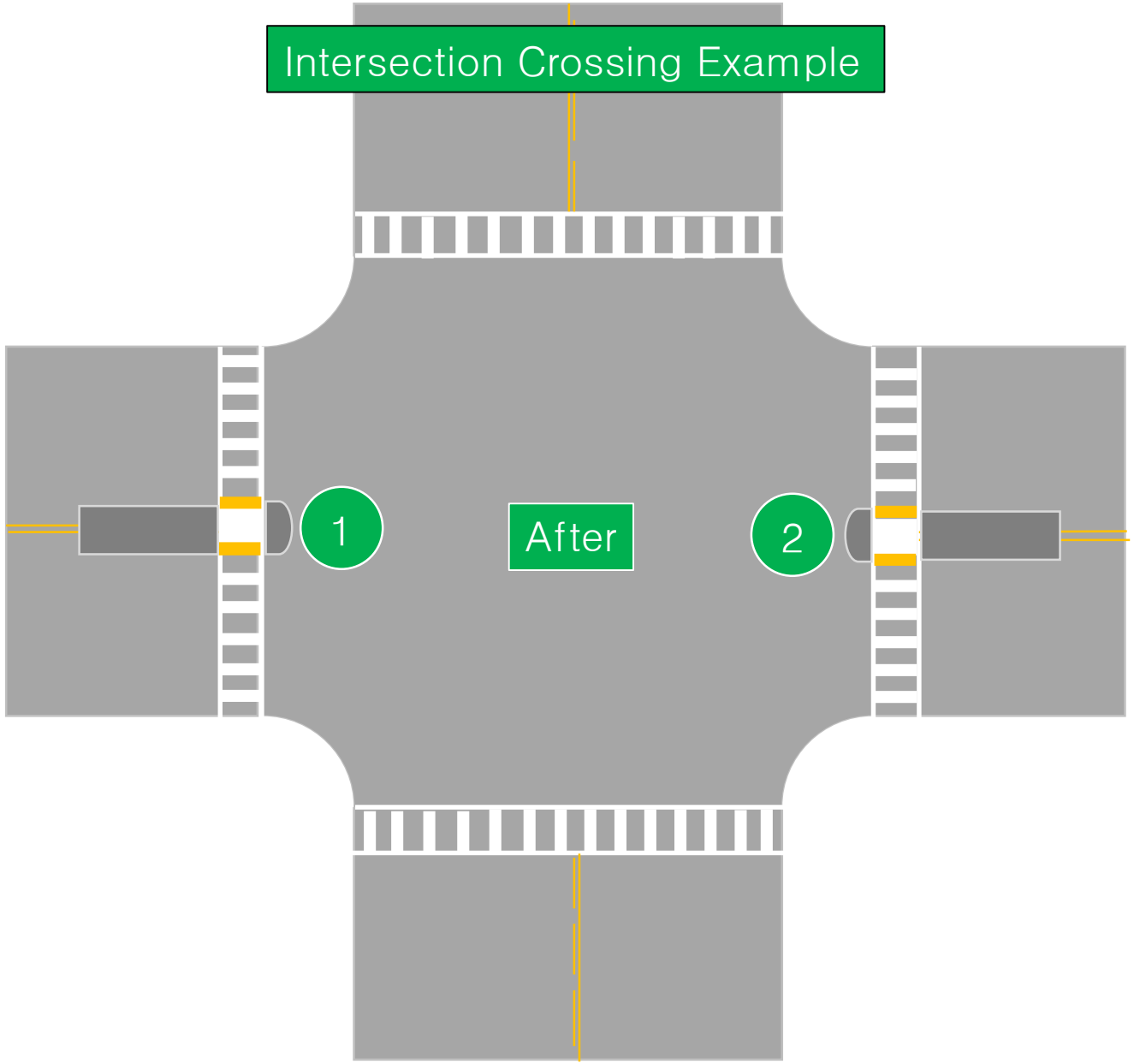
Mid-Block Crossing Example



Quantifying Crossing Islands in the SHOPP Tool

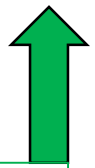


Quantifying Crossing Islands in the SHOPP Tool



Quantifying Crossing Islands in the SHOPP Tool

ID	Activity Category	Activity Detail	Unit of Measurement	Quantity	Assets in Good Condition	Assets in Fair Condition	Assets in Poor Condition	New Asset Added	Comments
H11	Streets	Crossing Islands (201.999)	EA	2				2	Intersection crossing



Location of crossing

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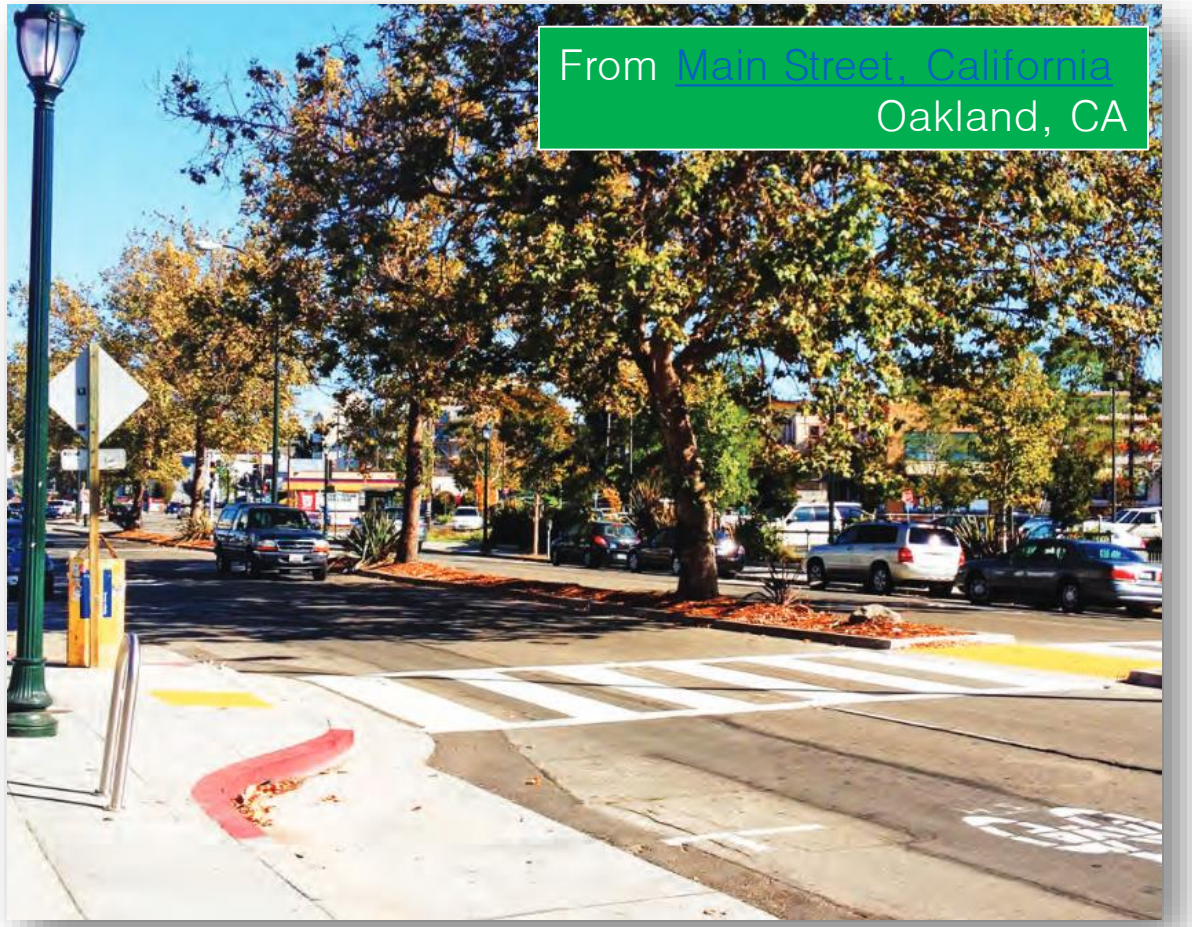
H14: Curb Bulb-Outs

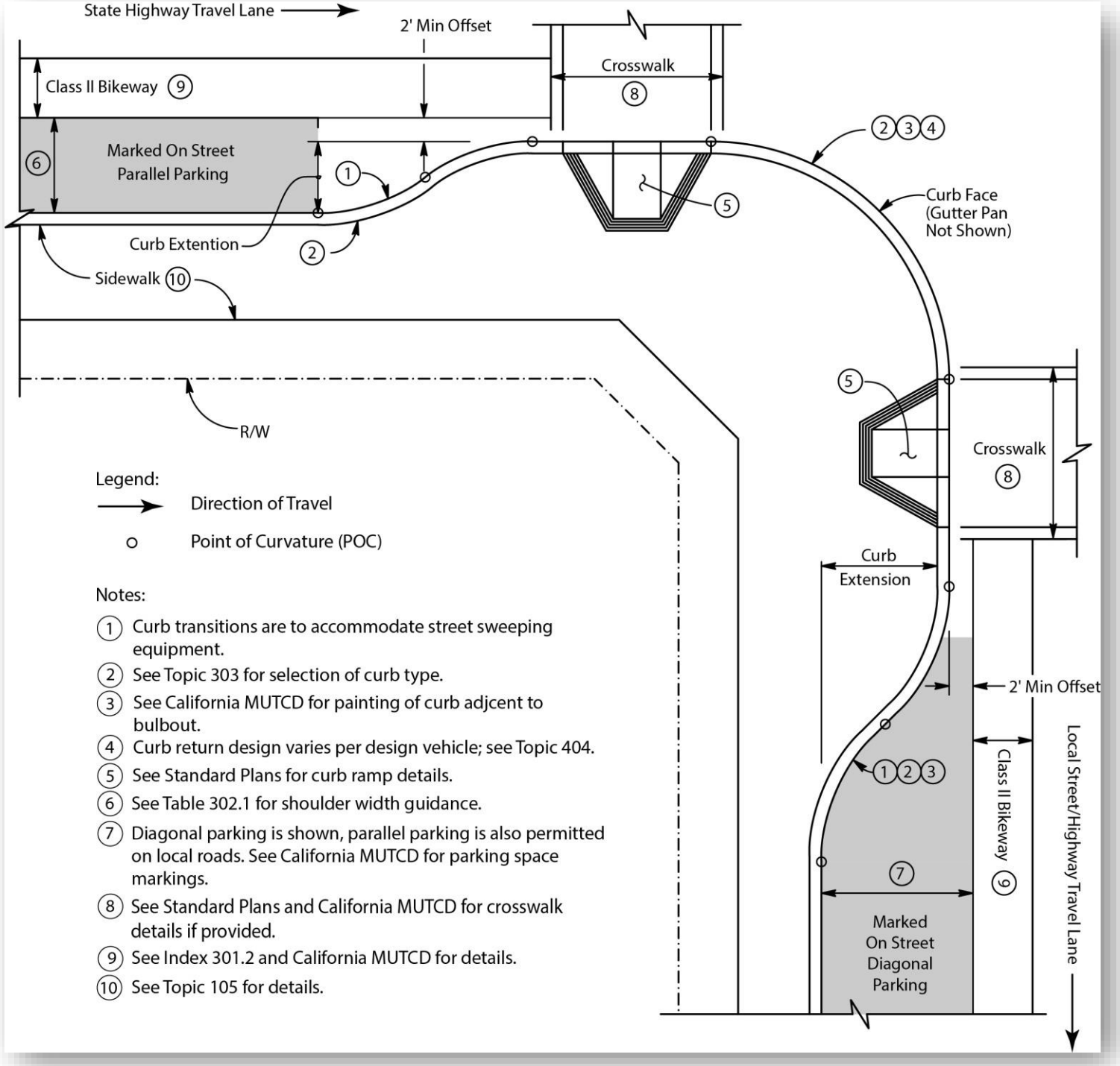
- An extension of the sidewalk into the roadway which provides queuing space, increases visibility, and shortens crossing distances.

Guidance:

- When used, bulb-outs should be placed at all corners of an intersection.
- Use when on-street parking is present.
- Mid-block locations: bulb-outs should be used on both sides of the street.
- See HDM Topic 303.4, DIB 82, and NACTO for further information.



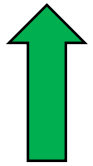
HDM Figure 303.4 A Typical Bulbout with Class II Bikeway (Bike Lane)

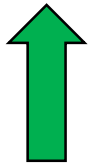


H14: Curb Bulb-Outs

Quantifying Curb Bulb-Outs in the SHOPP Tool

ID	Activity Category	Activity Detail	Unit of Measurement	Quantity	Assets in Good Condition	Assets in Fair Condition	Assets in Poor Condition	New Asset Added	Comments
H14	Streets	Curb Extensions/Bulbouts (201.999)	EA	4				4	4- added to each crossing of intersection





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H17: LED Lighting in Pedestrian and Bicycle Accessible Areas

- The illumination of bicycle and pedestrian facilities using LED lights to increase visibility, security, safety, and awareness of all road users.
- Increases awareness of bicycle facility conflicts and obstacles.

Guidance:

- Pedestrian and Bicycle facilities should be well lit.
- Commercial Districts and wide streets should have lighting on both sides of the street.
- Refer to HDM Topic 1003.1 (17) for more information.

H17: LED Lighting in Pedestrian and Bicycle Accessible Areas

Figure 11. Drawing. Traditional midblock crosswalk lighting layout.

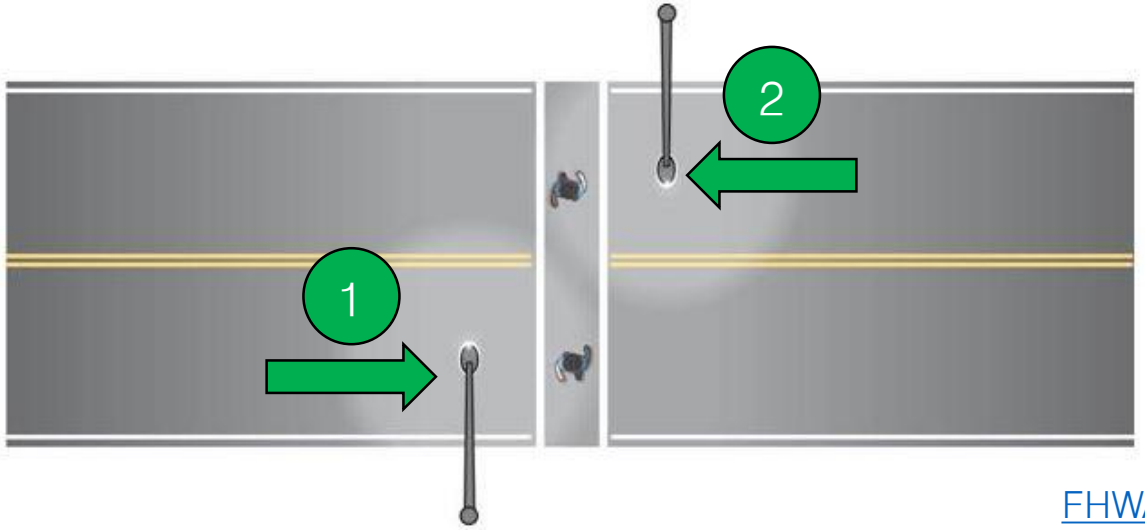


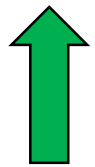
Figure 12. Drawing. New design for midblock crosswalk lighting layout.

Strategic lighting in midblock crossings increases pedestrian visibility to motorists.

FHWA

Quantifying LED Lighting in the SHOPP Tool

ID	Activity Category	Activity Detail	Unit of Measurement	Quantity	Assets in Good Condition	Assets in Fair Condition	Assets in Poor Condition	New Asset Added	Comments
H17	Streets	LED Lighting (201.999)	EA	2				2	2 new lights illuminate peds in crosswalk



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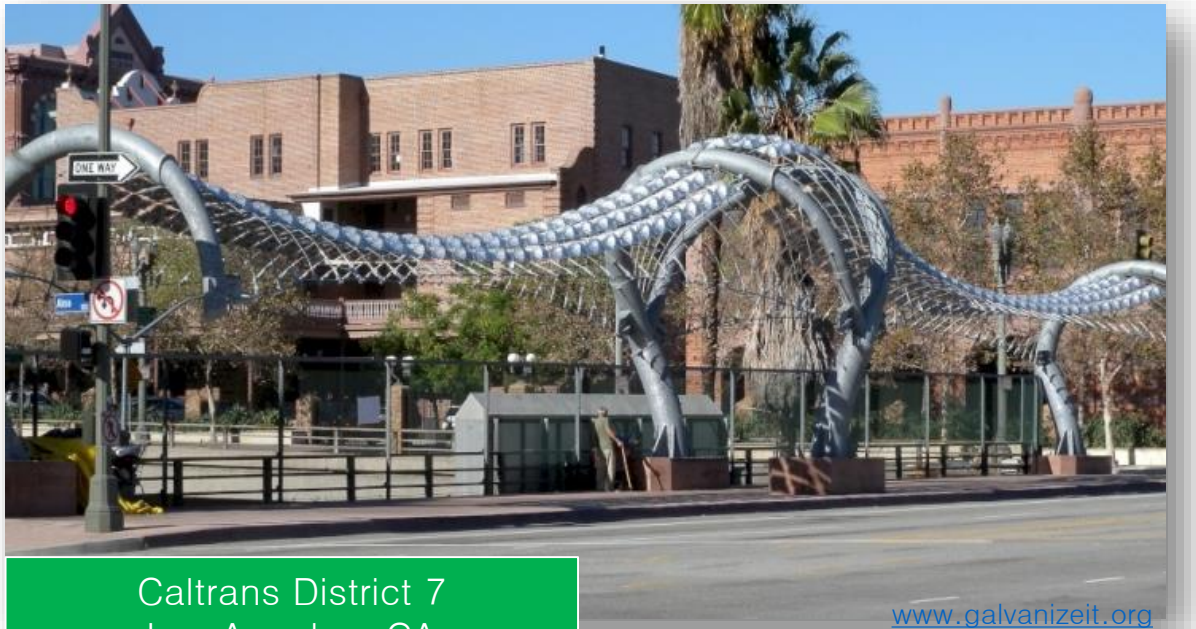
H20: Shade for Pedestrian Access

- A structure located or constructed within a pedestrian facility that provides shade to users.
- Reduces effects of heat and increases pedestrian comfort.

Guidance:

- Refer to HDM Chapter 900 for more information.

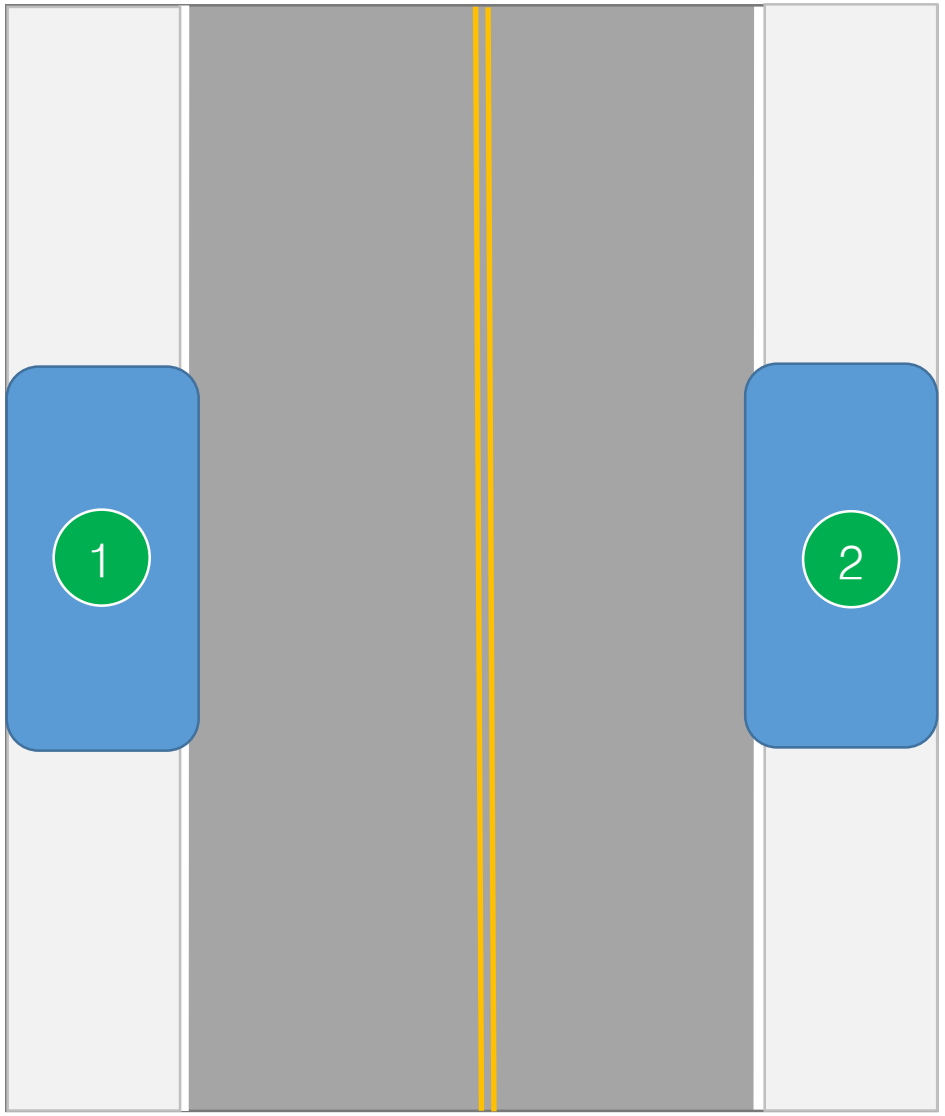


www.galvanizeit.org

Caltrans District 7
Los Angeles, CA
SR-101 Freeway Overcrossing

Quantifying Shade for Pedestrian Access in the SHOPP Tool

- Quantify number of shade structures provided.



Quantifying Shade for Pedestrian Access in the SHOPP Tool

ID	Activity Category	Activity Detail	Unit of Measurement	Quantity	Assets in Good Condition	Assets in Fair Condition	Assets in Poor Condition	New Asset Added	Comments
H20	Streets	Install Shade for Pedestrian access (201.999)	EA	2				2	

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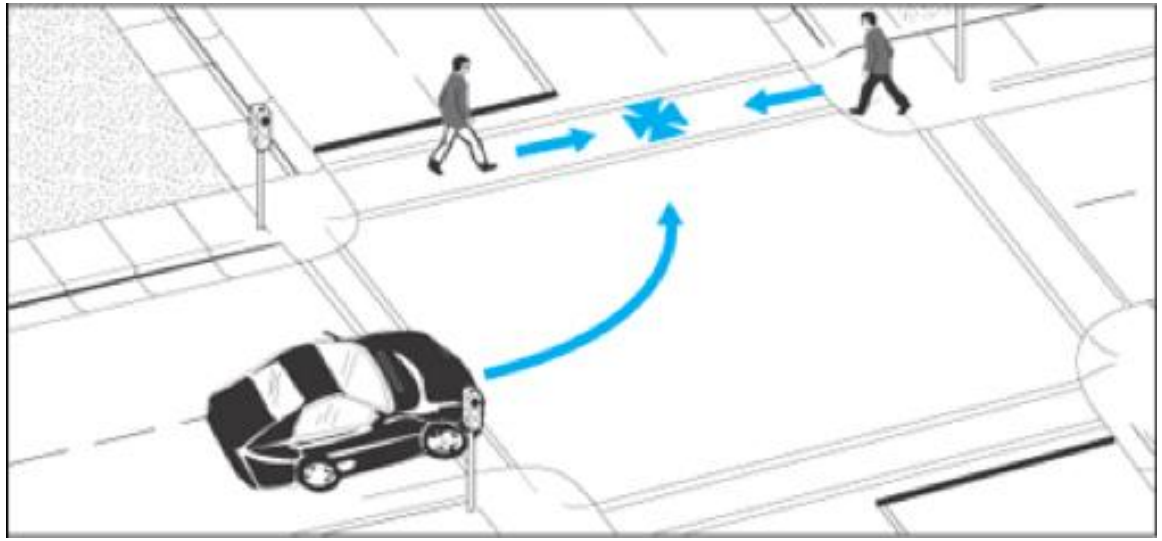
H 40: Leading Pedestrian Interval (LPI)

- Traffic signalization strategy that can be programmed into traffic signals to provide pedestrians a 3–7 second "WALK" signal prior to allowing vehicles to proceed through the intersection. This can reduce vehicle and pedestrian collisions by making pedestrian crossing movements more visible to turning vehicles. For more information, refer to NACTO.org and PedBikeSafe.org.



From PedBikeSafe.org: "A LPI allows pedestrians to be fully in the crosswalk before motorists attempt to turn".

Main Street and 1st Street
Los Angeles, CA

LADOT Bike Program

K Street and 15th Street
Sacramento, CA

For SHOPP Tool Quantification, quantify each crossing with LPI.

Caltrans

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Bicycle and Pedestrian Elements

Element	Page Number
Standard Shoulder	94
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Accommodating Pedestrians and Bicycles at Interchanges	96
Bicycle, Pedestrian and Transit Signage	100
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Bicycle and Pedestrian Facility Gap Closure	106
Overpass/ Underpass for Pedestrians & Bicyclists	114
Pedestrian and Bicycle Counters	117

Bicycle and Pedestrian Elements

Standard Shoulders are components of many pavement, safety and mobility projects on the State Highway System. In many locations, they provide access for pedestrians and bicyclists. Design guidance can be found at: HDM Chapter 300 Topic 302 and Table 301.2. Some shoulders have even been colorized [pictured below right] to provide additional visibility for bicyclists accessing the facility.

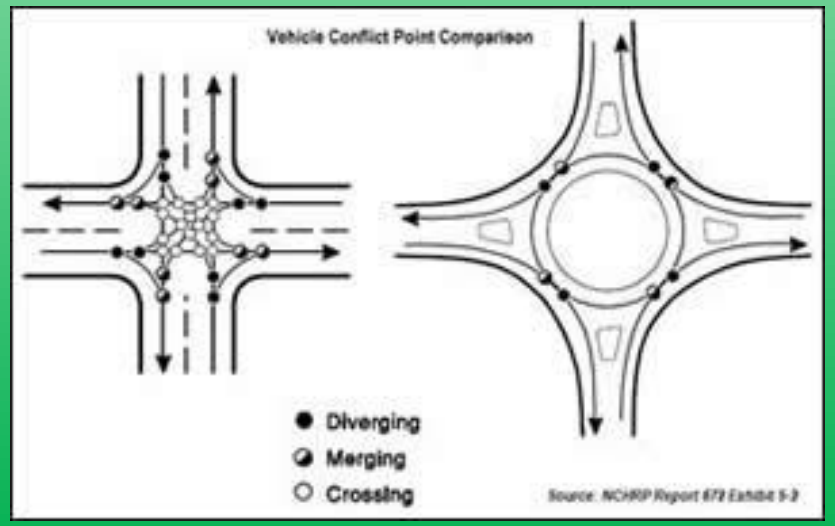
The inclusion of the shoulder-related activity details listed in the SHOPP Tool are considered applicable Complete Streets elements. These activity details include:

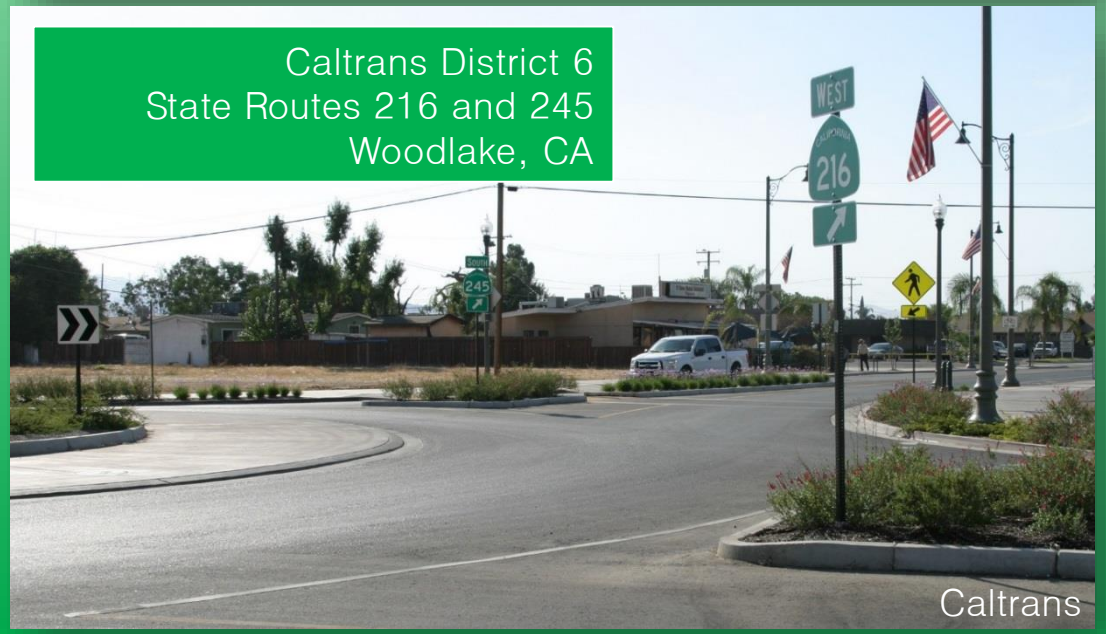
ID	Activity Category	Activity Description	Activity Unit
B10	Pavement	Existing Shoulders (201.121, .122, .120)	Square Feet
E12	Safety	Pave Shoulders (201.010, .015)	Linear Feet
E20	Safety	Widen Shoulders (201.010, .015)	Linear Feet
F19	Mobility	Shoulders – New & Widening (201.310, .010, .015)	Linear Miles

Bicycle and Pedestrian Elements

Roundabouts can be "safer, more efficient, less costly and more aesthetically appealing than conventional intersection designs". They are also proven safety countermeasures by improving safety for all road users by reducing the number and severity of conflict points (pictured below). Refer to FHWA's Roundabouts page for more information.

Roundabout projects that include pedestrian- and bicycle-accessible facilities are considered applicable Complete Streets elements. They are identified in the SHOPP Tool as ID E15 in the Safety Program activity details.





Bicycle and Pedestrian Elements

Accommodating Pedestrians and Bicycles at Intersections and Interchanges:

Per *Toward an Active California: State Bicycle and Pedestrian Plan's Safer Streets and Crossings Strategy*:

- Caltrans is committed to reducing the barriers that state highways can create for communities.
- Intersections and interchanges often present safety challenges for people walking and bicycling because of the many potential conflicts with turns, crossings, and merges.

The following pages provide *conceptual diagrams from Caltrans publications* to inform the design of interchanges that accommodate pedestrians and bicycles. For more information, please refer to:

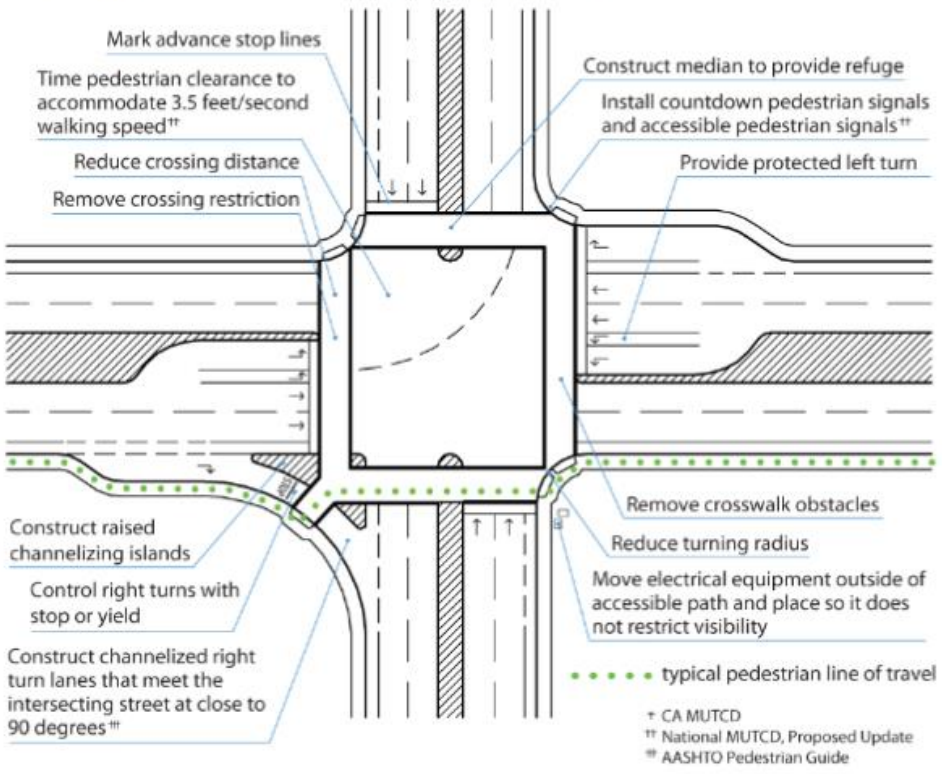
- Caltrans' Complete Intersections Guide
- ITE Recommended Practices to Accommodate Pedestrians and Bicyclists at Interchanges:
  - PBIC Webinar
  - For Purchase from ITE

Caltrans District 4
Alpine Road and I-280 On and Off Ramps
San Mateo County, CA

Bicycle and Pedestrian Elements

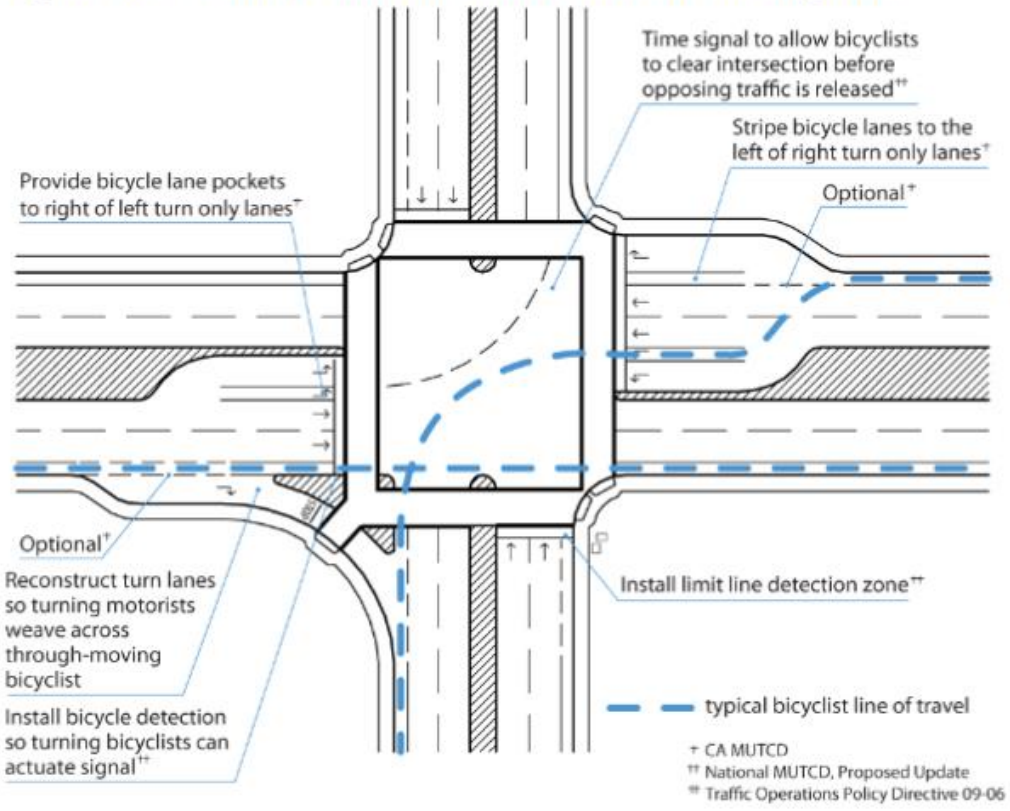
Common Intersection Treatments for Pedestrians and Bicyclists– from Caltrans' Complete Intersections Guide (refer to the Guide for further information).

Figure 3.2 Common Intersection Treatments for Pedestrians



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

Figure 3.3 Common Intersection Treatments for Bicyclists



Bicycle and Pedestrian Elements

Interchange Treatments for Pedestrians and Bicyclists– from Caltrans' Complete Intersections Guide (refer to the Guide for further information).

Figure 9.4 Preferred Treatment for Free-Flow Ramp Intersections

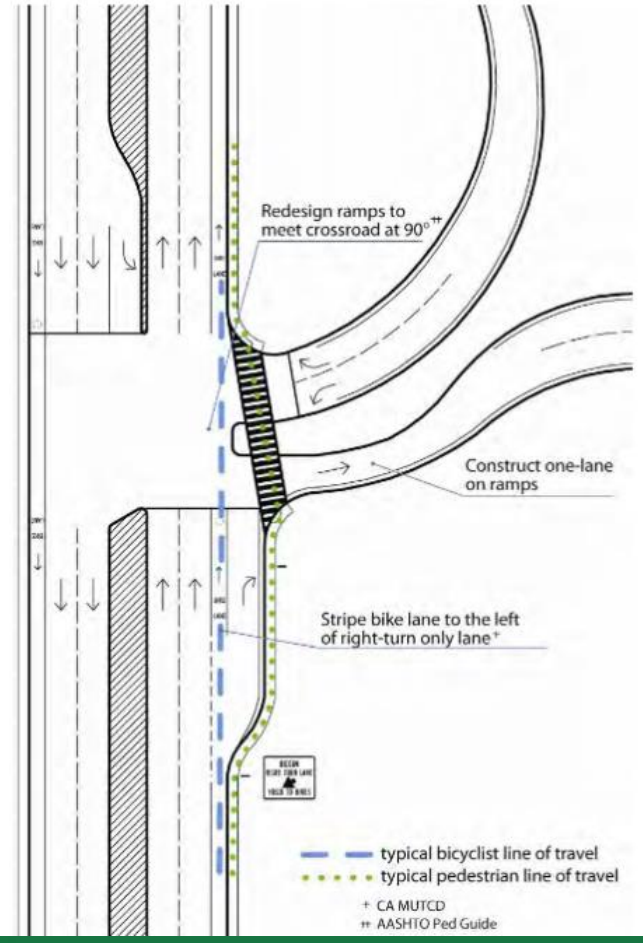


Figure 9.5 Signage and Striping Treatments for Free-Flow Ramp Intersections

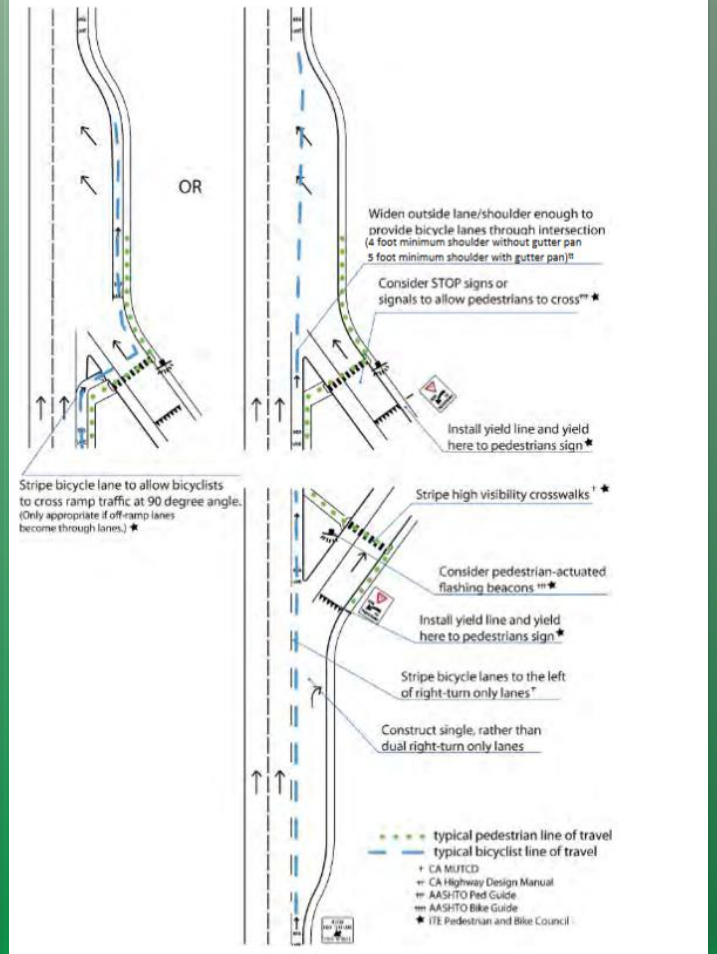
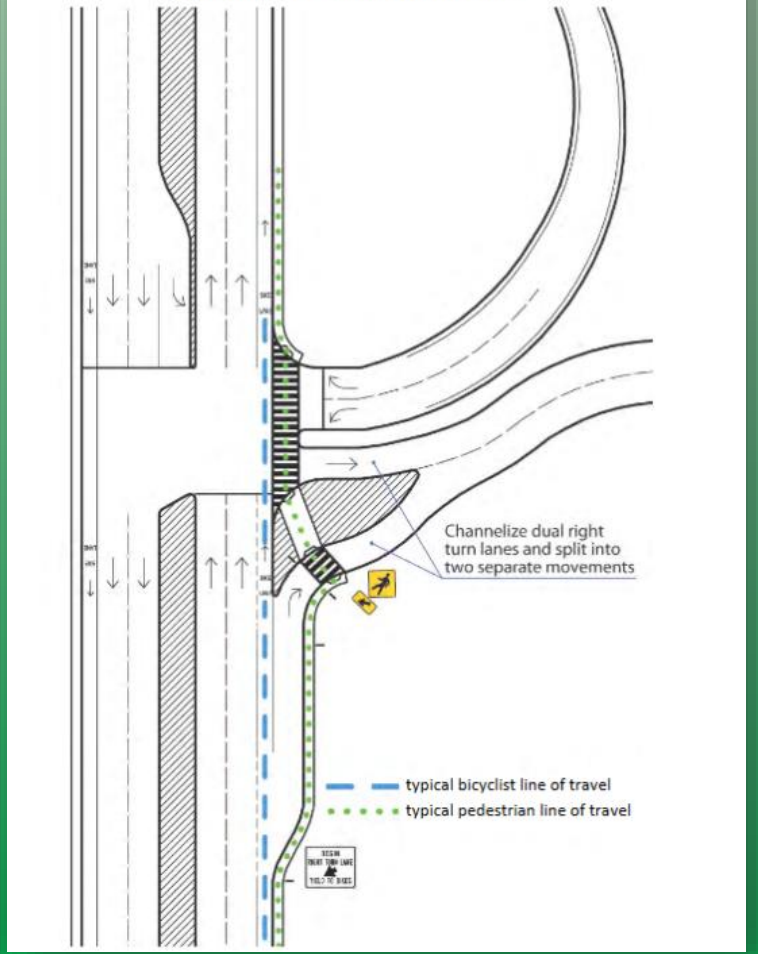


Figure 9.6 Double-Lane Free-Flow On-Ramp Treatment: Channelize Turn Movements

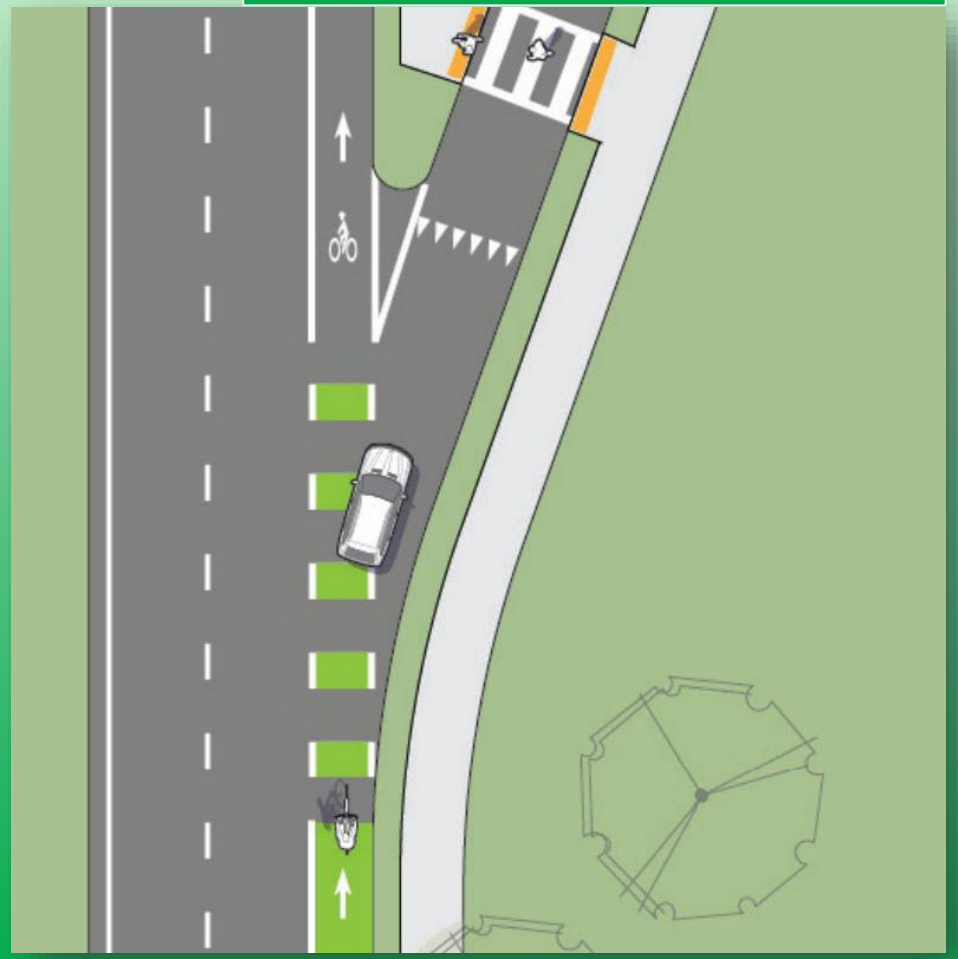


Bicycle and Pedestrian Elements

Green-Colored Pavement through interchange conflict areas (pictured right):

- "When bikeways cross intersections or motorists need to merge across a bikeway, green-colored markings become dashed. This can be useful at ramp intersections to increase visibility and draw attention to the presence of bicyclists."–from District 4 Bicycle Plan Bikeway Classification Chart, pictured right.
    - Source: FHWA IA-14; CAMUTCD Figure 9C-103(CA)

From District 4 Bicycle Plan Bikeway Classification Brochure



H42: Pedestrian, Bicycle and Transit Signage

- Signs are used to communicate regulations, warnings, and guidance to roadway users concerning pedestrians and bicyclists on or crossing the roadway, or on adjacent sidewalks.
- Pedestrian, bicycle, and transit signs in projects are considered applicable Complete Streets elements.
- A selection of applicable pedestrian, bicycle, and transit signs are provided on this and the following pages; these do not comprise the total applicable signs, but rather provide guidance on the types of signs that are applicable.

Guidance:

Refer to California Manual of Uniform Traffic Control Devices Part 2 and Chapter 9B for pedestrian and bicycle signs.

*Note- pedestrian and bicycle prohibition signs are **not** considered applicable Complete Streets elements.*

Applicable Warning Signs

1

For SHOPP Tool Quantification

H42: Pedestrian, Bicycle and Transit Signage

Applicable Regulatory Signs

R1-6

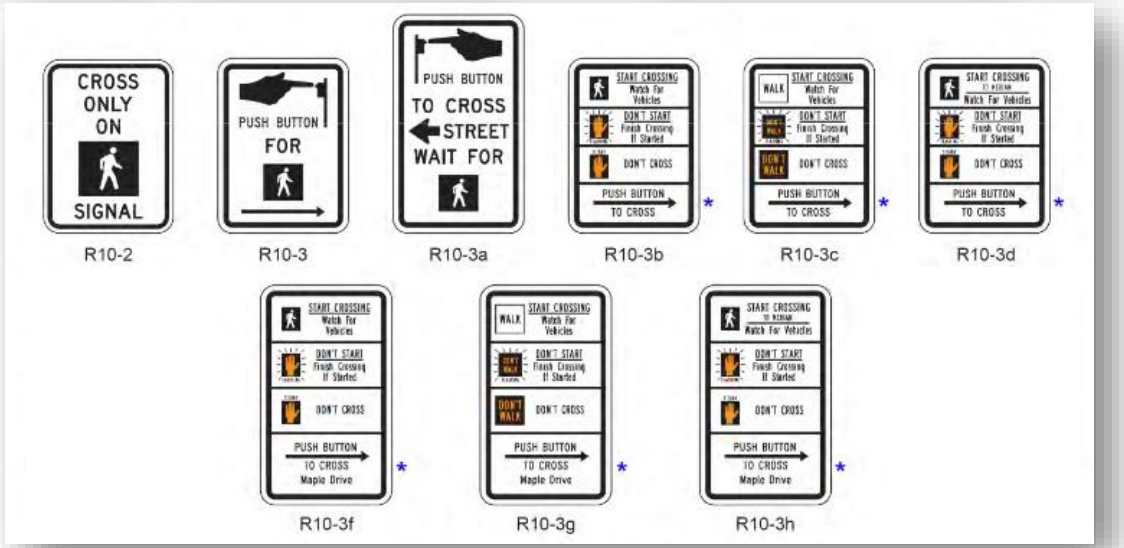
R1-5 R1-5a

R117 (CA)

R4-11

R3-11b

R10-15

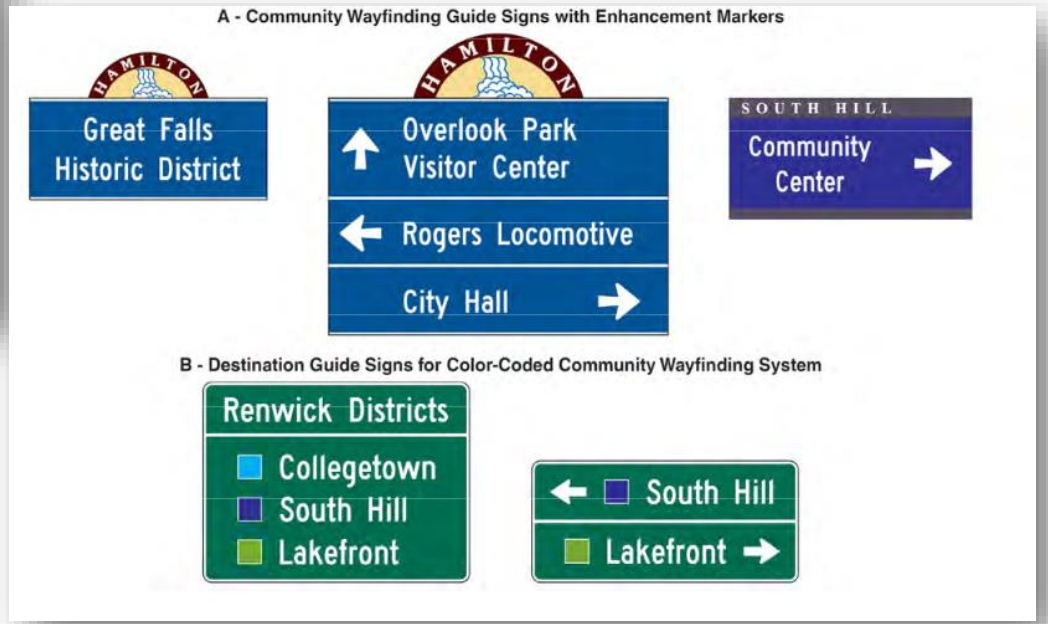


R10-2 R10-3 R10-3a R10-3b R10-3c R10-3d R10-3f R10-3g R10-3h

R3-12f

H42: Pedestrian, Bicycle and Transit Signage

Applicable Guide Signs

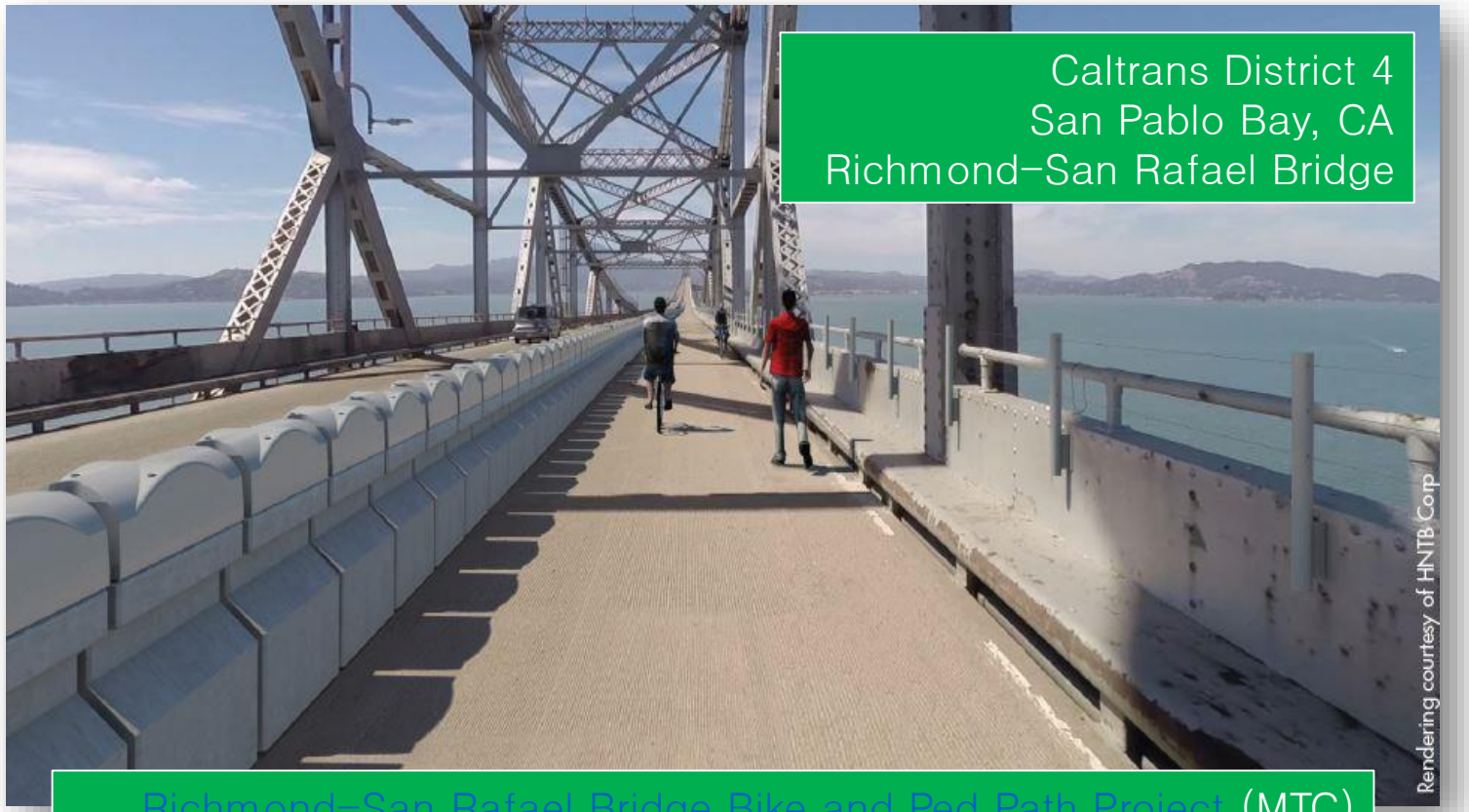


H03: Bridge Access for Pedestrians and Bicyclists

- Access for pedestrians and/or bicyclists on a bridge that is on the state highway or goes over a state highway.

Guidance:

- Sidewalk minimum 6 feet wide.
  - Recommended 8 feet wide for pedestrian comfort.
- Consider safety and accessibility at bridge approaches.
- Refer to HDM Topic 208.4 – Bridge Sidewalks for more information.



Richmond–San Rafael Bridge Bike and Ped Path Project (MTC)

H03: Bridge Access for Pedestrians and Bicyclists

Richmond–San Rafael Bridge Access Improvement Project:

- 10 feet wide Class I separated bicycle path– suitable for two way cycling.
- Path gap closure along I–580 between Marin and Contra Costa Counties

Quantifying Bridge Access in the SHOPP Tool

ID	Activity Category	Activity Detail	Unit of Measurement	Quantity	Assets in Good Condition	Assets in Fair Condition	Assets in Poor Condition	New Asset Added	Comments
H03	Streets	Bridge Access – Bike, Ped, ADA (201.999)	EA	1				1	Bike and ped path, movable barrier
H09	Streets	Path Gap Closure	EA	5				5	

List:

- Bikeway classification (if any) included in project
- Pedestrian facility (if any) included in project

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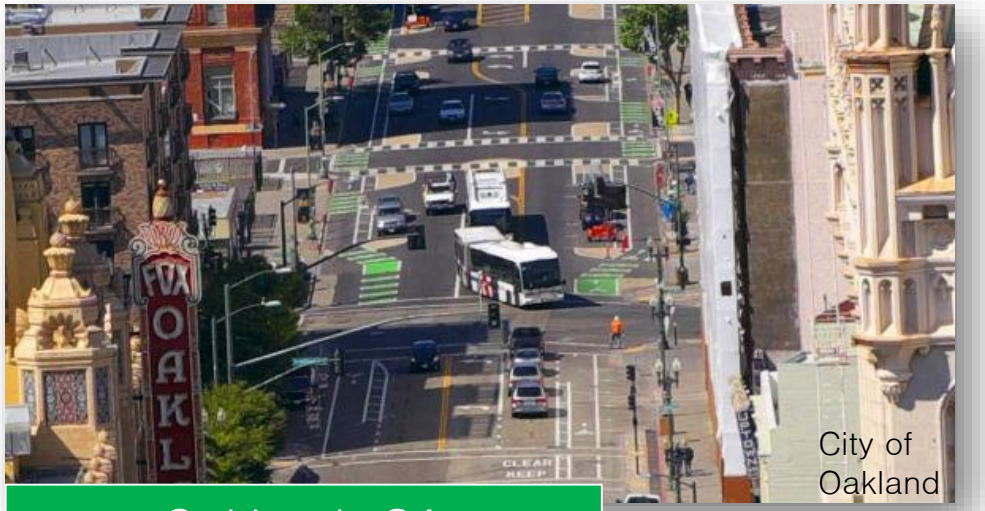
H09: Bicycle and Pedestrian Facility Gap Closure

- When a project makes a critical connection between two or more separate pedestrian or bicycle facilities.
  - The gap can be point-specific (**spot gap**), a missing link (**linear gap**), or district-wide (**area gap**).
- Creates a pedestrian or bicycle network, providing access to more destinations.
- Can connect gaps in the project facility or to intersecting network facilities.
- Can connect pedestrian or bicycle facilities.

Oakland, CA
Telegraph Avenue (before)

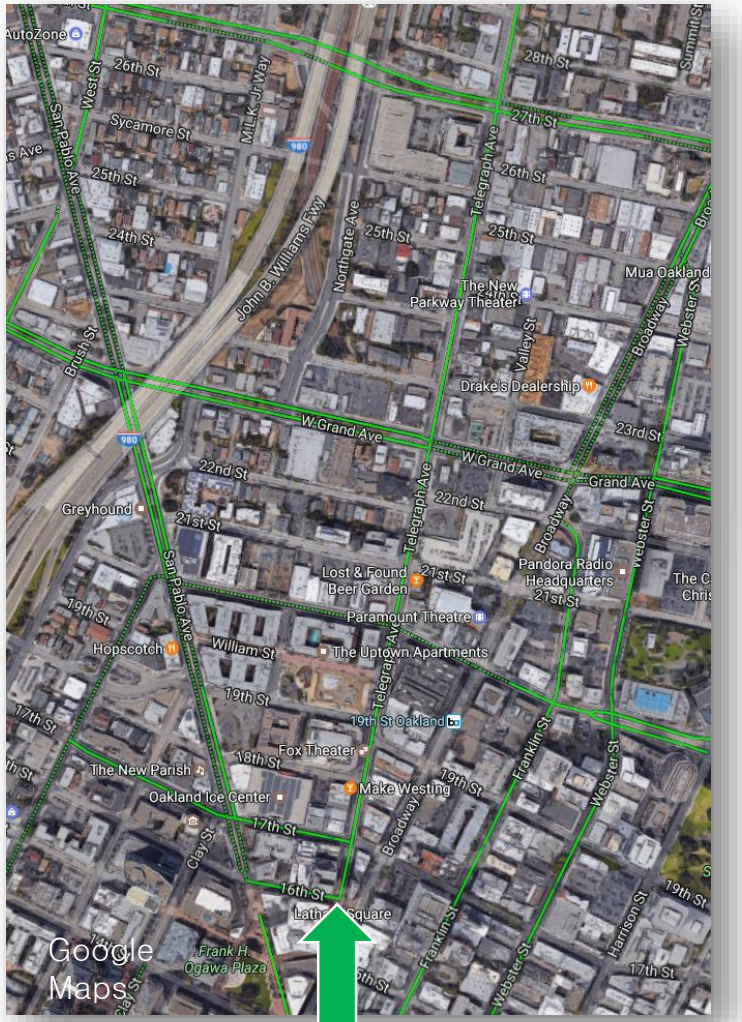


Oakland, CA
Telegraph Avenue (after)

H09: Bicycle and Pedestrian Facility Gap Closure

Example: Telegraph Avenue

- Length: 0.6 miles
- Project Complete Streets elements:
  - Road Diet
  - Class IV Separated Bikeways
  - Conflict Zone Green Paint
  - High Visibility Crosswalks
  - Bike Parking
- Connections to:
  - Bikeway facilities on Telegraph Avenue (south of the project), Grand Avenue, 20th and 27th Streets
  - Dense, urban commercial corridor
  - High quality transit: BART, AC Transit bus routes 6, 800



Telegraph Avenue:
Bicycle Network Gap Connector

Caltrans

H09: Bicycle and Pedestrian Facility Gap Closure

Telegraph Avenue Results

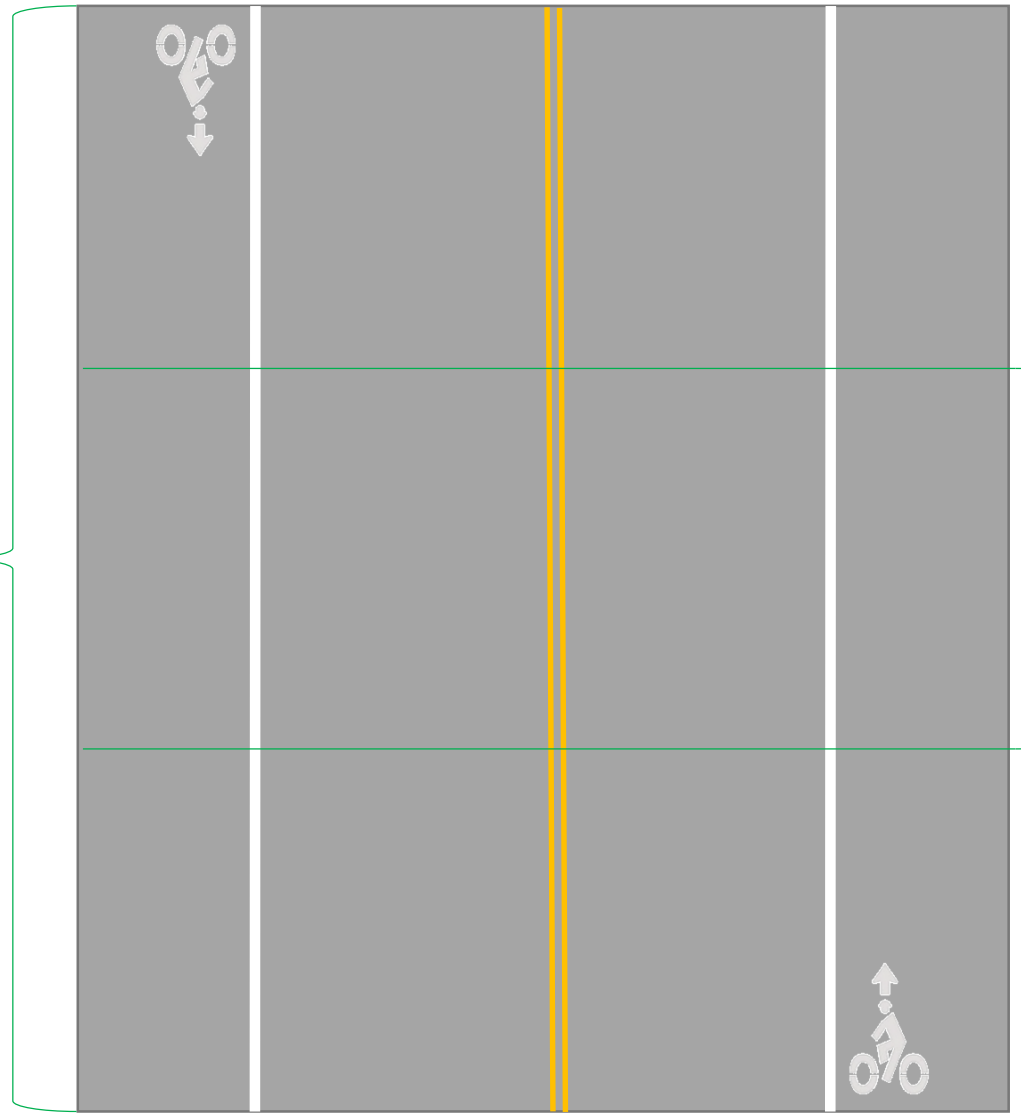
Indicator	Percent Change
Bicycle Trips	78% Increase
Walking Trips	100% Increase
Traffic Collisions	40% Decrease
Retail Sales	9% Increase
Median Car Speed	25 MPH (Posted Speed Limit)

The reported results for the Telegraph Avenue project provide a compelling example of the benefits of bicycle facility connectivity within an urban core. Closing gaps within such a neighborhood provide mobility benefits for pedestrians and bicyclists, leading to increased trips by these modes.

Source: City of Oakland
Telegraph Avenue Progress Report

Quantifying Bicycle and Pedestrian Gap Closure in the SHOPP Tool

Beginning of Bike Facility



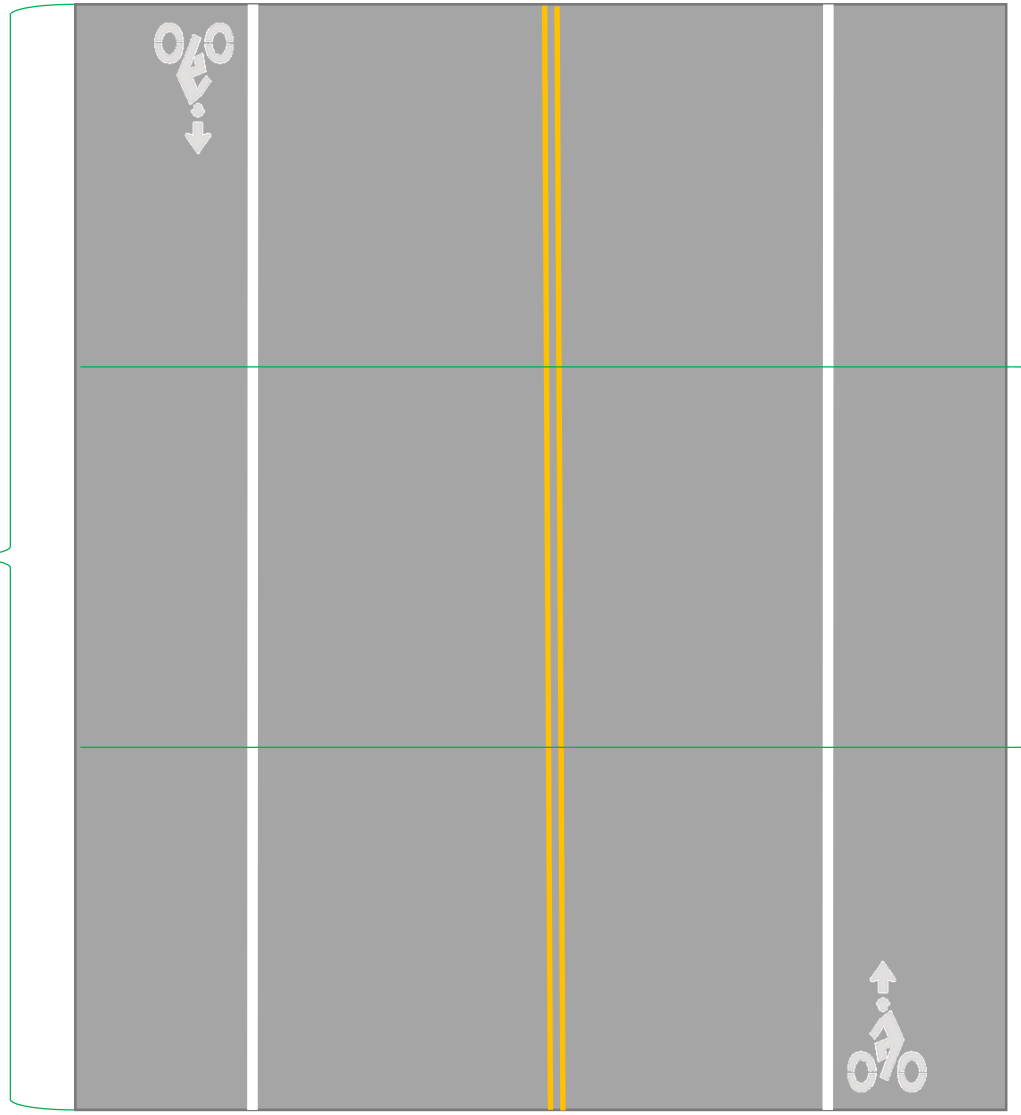
Quantify Length in Miles

Gap Closure Project Extent

End of Bike Facility

Quantifying Bicycle and Pedestrian Gap Closure in the SHOPP Tool

Beginning of Bike Facility

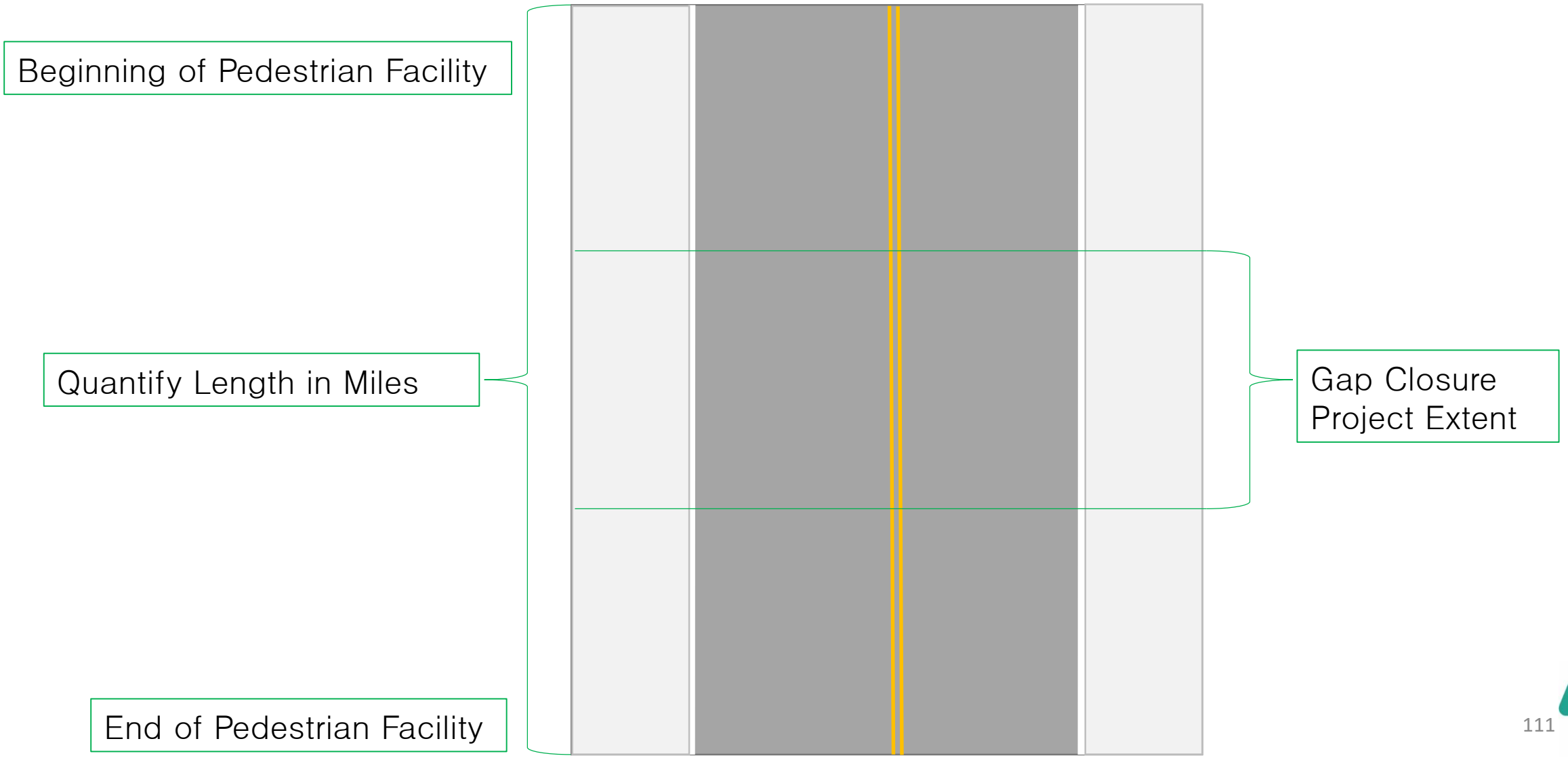


Ex. 1.5 Linear miles
Gap Closure: 1.5 miles

Ex: 0.5 miles
Class II Bike Lanes: 1.0
Lane Miles (New Asset)

End of Bike Facility

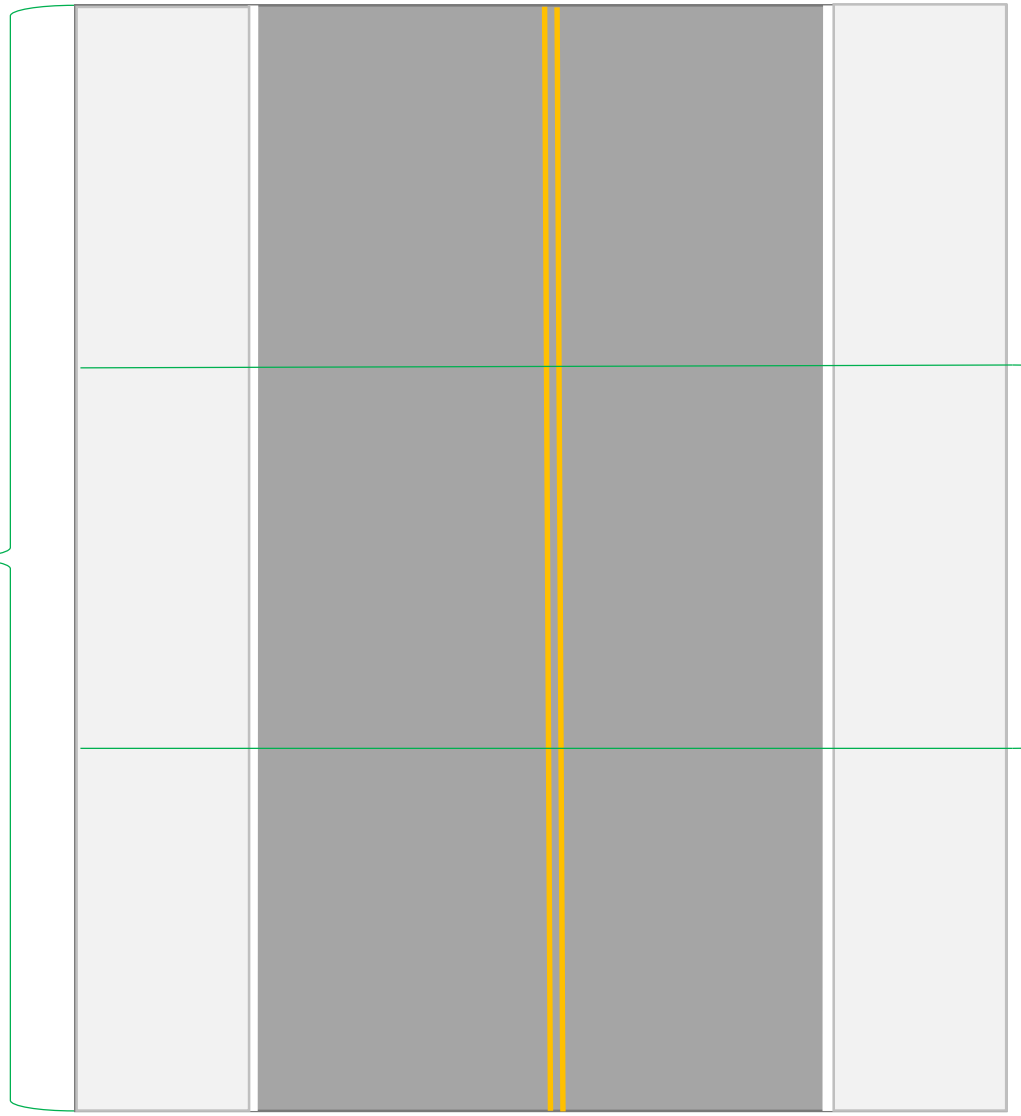
Quantifying Bicycle and Pedestrian Gap Closure in the SHOPP Tool



Quantifying Bicycle and Pedestrian Gap Closure in the SHOPP Tool

Beginning of Pedestrian Facility

Ex. 800 linear feet
Gap Closure: .15 miles



Ex: 300 linear feet
New Sidewalk: linear feet

End of Pedestrian Facility

Quantifying Bicycle and Pedestrian Gap Closure in the SHOPP Tool

Telegraph Avenue Example

ID	Activity Category	Activity Detail	Unit of Measurement	Quantity	Assets in Good Condition	Assets in Fair Condition	Assets in Poor Condition	New Asset Added	Comments
H08	Streets	Class IV Separated Bikeway (201.999)	Lane Miles	1.2				1.2	Parking–separated; bi–directional
H09	Streets	Bike Lane Gap Closure	Linear Miles	0.85				0.85	1 connect; 3 intersect
H10	Streets	Conflict zone green paint (201.999)	EA	45				45	
H12	Streets	Enhanced Crosswalk Visibility (201.999)	EA	8				8	Continental
H16	Streets	Lane Reduction (Road Diet) (201.999)	Linear Miles	0.6				0.6	

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H18: Overpass/Underpass for Pedestrians and Bicyclists

- A facility for pedestrians and/or bicycles that provides a connection either over or under a state highway facility that is separate from motor vehicle traffic.

- Pedestrian overcrossings (POC) or undercrossings (PUC) connect pedestrian walkways; bicycle overcrossings (BOC) or undercrossings (BUC) connect bikeways or bike routes and can be built to Class I or Class IV standards.

Guidance:

- Must be ADA accessible.
- 8 ft. minimum walkway; 10 ft. minimum width between railings.
- See HDM Topic 208.6, HDM Topic 309.2, HDM Topic 1003.1, DIB 82, and DIB 89 for more information.

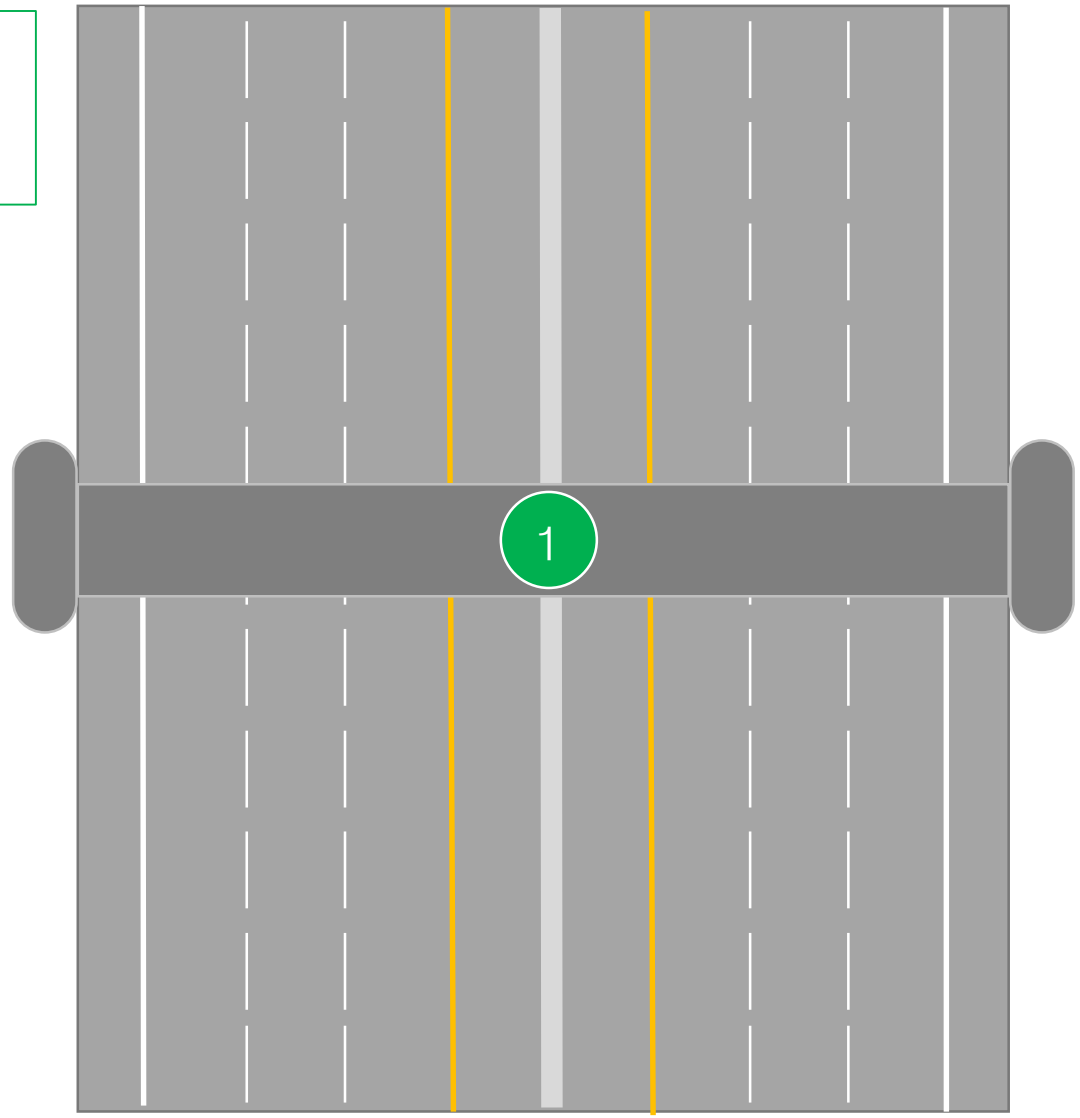
Caltrans District 3
Sacramento, CA
Old Town Underpass

Caltrans District 4
Palo Alto, CA
Footbridge (conceptual rendering)

Dezeen
64North Architecture

Quantifying Overpass/Underpass for Pedestrians and Bicycles in the SHOPP Tool

- Quantify number of overpasses/underpasses constructed.



Quantifying Overpass/Underpass for Pedestrians and Bicycles in the SHOPP Tool

ID	Activity Category	Activity Detail	Unit of Measurement	Quantity	Assets in Good Condition	Assets in Fair Condition	Assets in Poor Condition	New Asset Added	Comments
H18	Streets	Overpass/Underpass – Pedestrian & Bike (201.999)	EA	1				1	PBUC

PBUC: Pedestrian/Bike Undercrossing
PBOC: Pedestrian/Bike Overcrossing
PUC: Pedestrian Undercrossing
POC: Pedestrian Overcrossing
BUC: Bicycle Undercrossing
BOC: Bicycle Overcrossing

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H51: Automatic Active Transportation Counters

- Physical apparatus used to collect bicyclist and pedestrian volume on a specific corridor.
- Continuous count stations collect data 24 hours per day, and are intended to remain in place permanently.
- Short-duration count stations are used over a limited period of time, and can be used in multiple locations.

Guidance:

- For information on counter types, refer to Innovation in Bicycle and Pedestrian Counts.

Market Street
SF, CA
Eco-Counter
Eco-Display Classic

For SHOPP Tool Quantification, quantify each counter.

Roadsys, LLC
Cycle Information Display

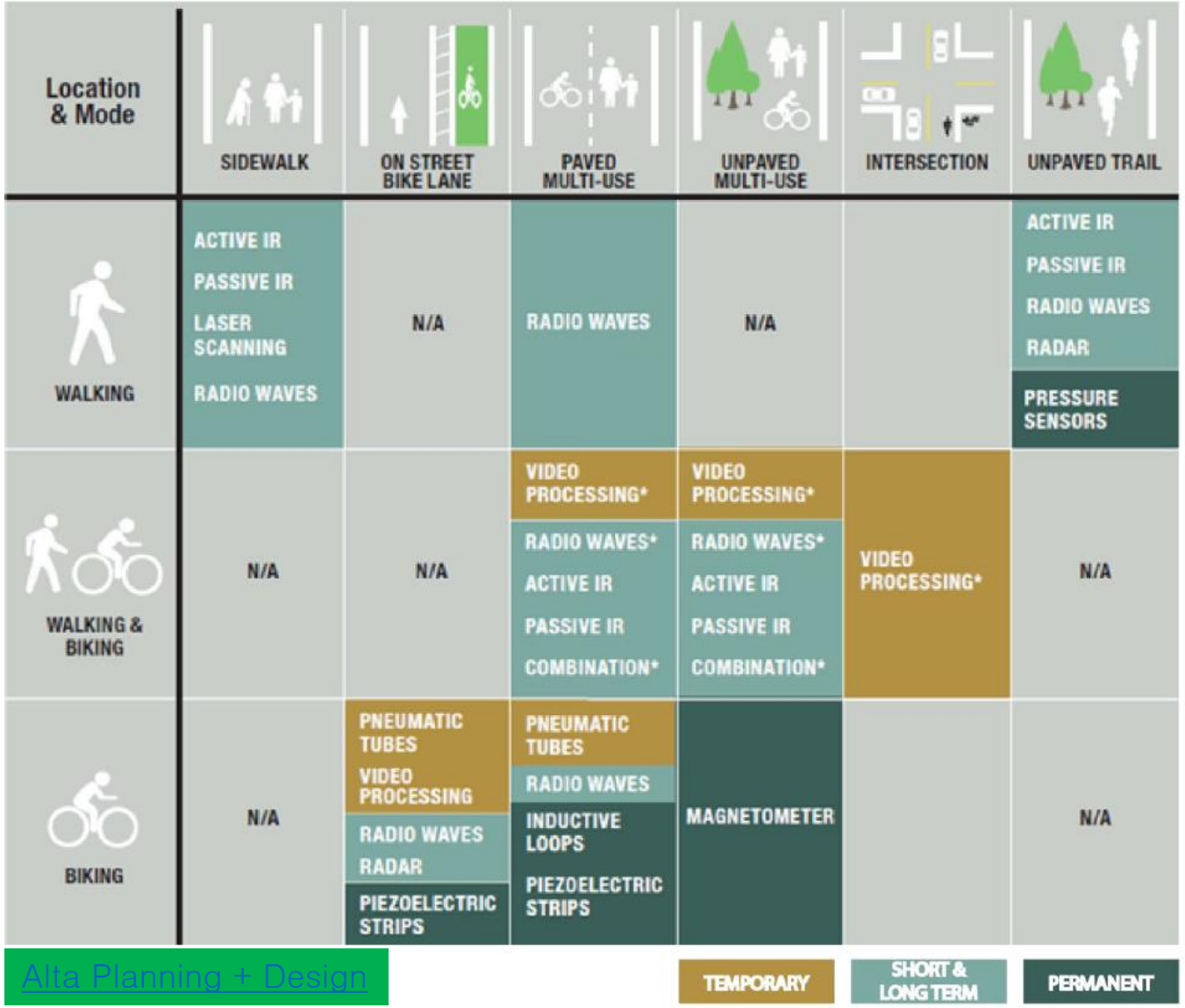
H52: Automatic Active Transportation Counters

Counter Placement:

- Depending on the location and mode monitored, different count technologies should be employed.
- Automatic counters can gather cycling volume, GPS traces from smartphone devices, map flow of cyclist, average speeds etc.

Guidance:

- Refer to the automatic counter selection matrix pictured right.
- For more information, refer to FHWA's literature review on pedestrian and bicycle data collection.



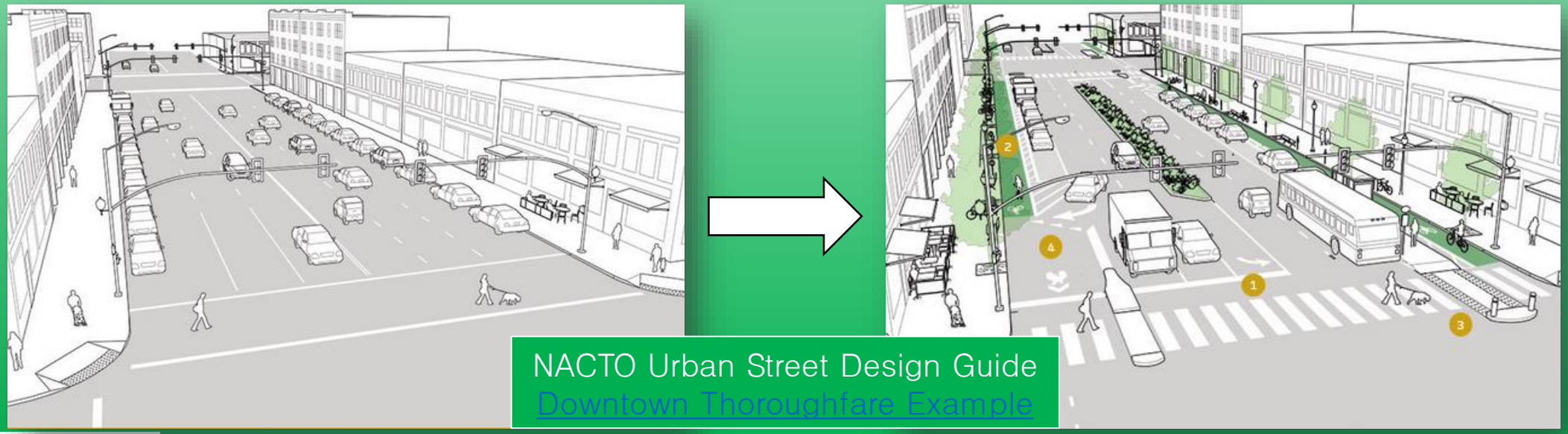
Roadspace Reallocation Elements

Element	Page Number
Lane Narrowing	121
Lane Reduction (Road Diet)	126
Curb Radius Reduction (eliminate free right)	130
Parking Reduction	131

Roadspace Reallocation Elements

Roadspace Reallocation involves the reduction of automobile travel space and/or parking to provide space for other uses, including sidewalk uses, bicycle facilities, transit facilities, etc.

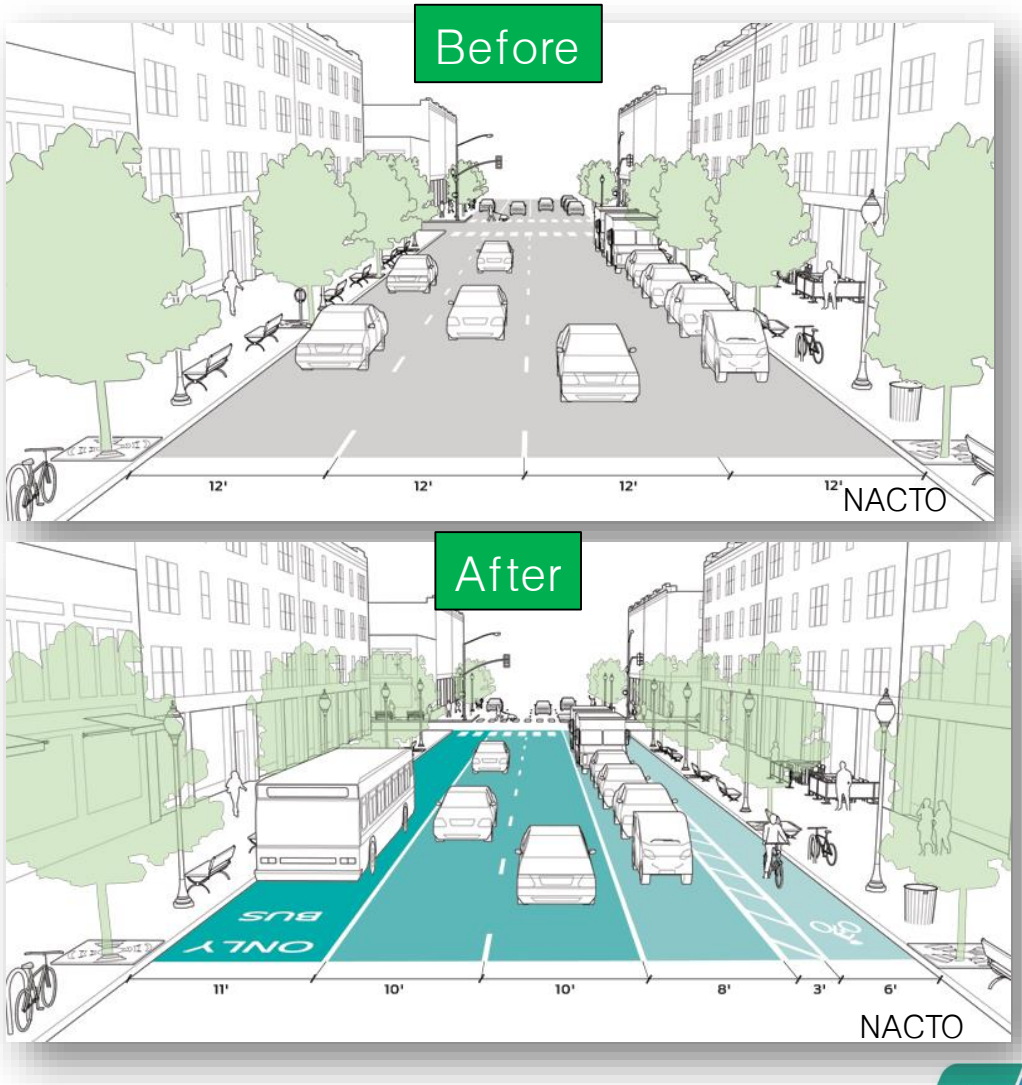
- Reallocations can transform the roadway to be more livable, walkable, bikeable, and transit-friendly.
- Should be considered in locations with constrained right of way due to abutting land uses.
- Automobile Level of Service (LOS) can be analyzed to determine the impacts of reduced automobile travel.



NACTO Urban Street Design Guide
Downtown Thoroughfare Example

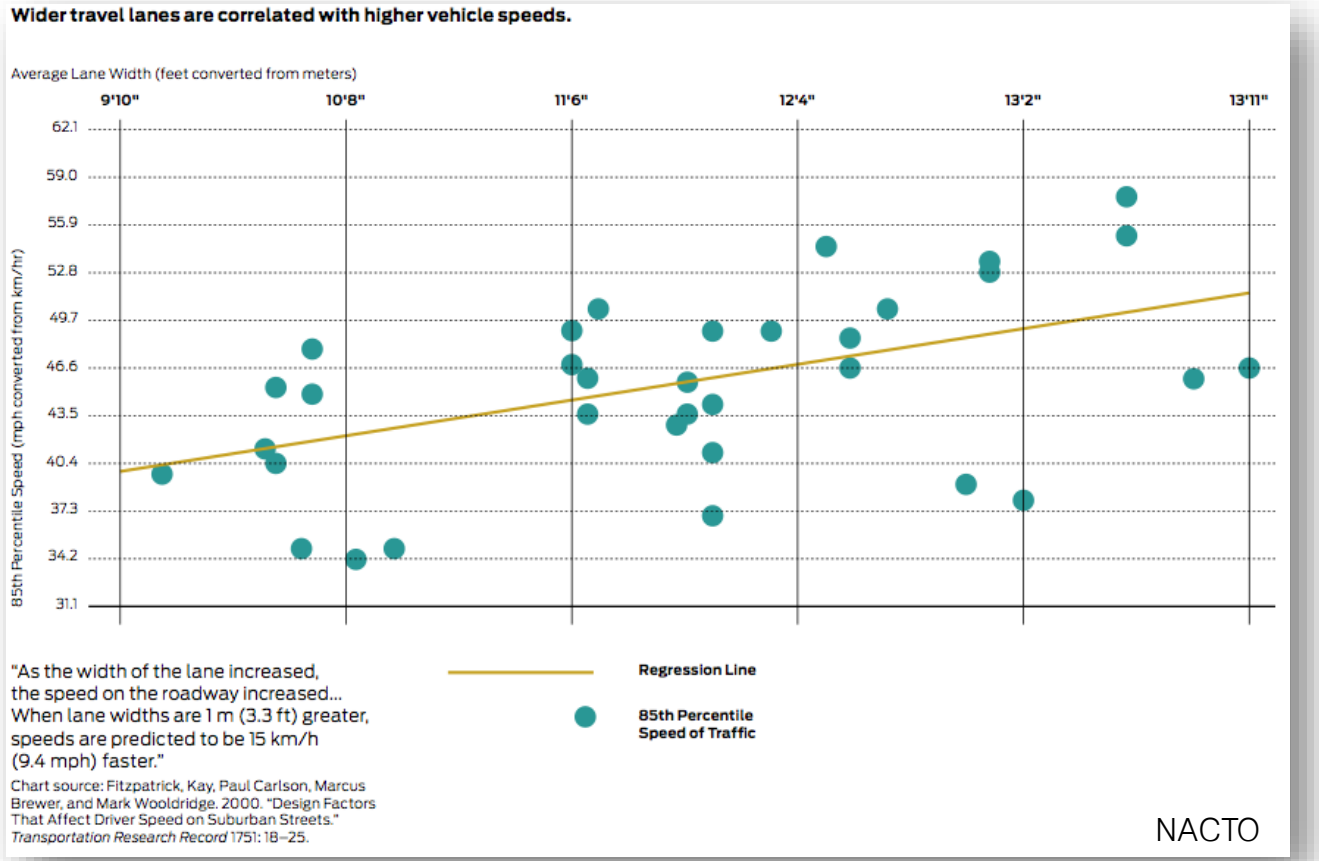
H15: Lane Narrowing

- Road space reallocation method that reduces automobile lane widths to accommodate other needs, including multi-modal transportation.
- Most relevant when cost, scope and schedule would preclude widening, due to right-of-way constraints, for complete streets facilities.
- Guidance on Lane Width:
  - Per Highway Design Manual:
    - 11 ft. minimum on conventional State highways with posted speeds less than or equal to 40 miles per hour and truck volumes less than 250 per lane in urban, city of town centers. (HDM Chapter 300, Topic 301.1)
    - The preferred lane width is 12 feet.(HDM Chapter 300, Topic 301.1)
  - Per NACTO: 10 ft. lane widths "are appropriate in urban areas and have a positive impact on a street's safety without impacting traffic operations".



H15: Lane Narrowing

Narrower travel lanes may reduce vehicle speeds while providing additional space for facilities for walking, bicycling, transit, etc.

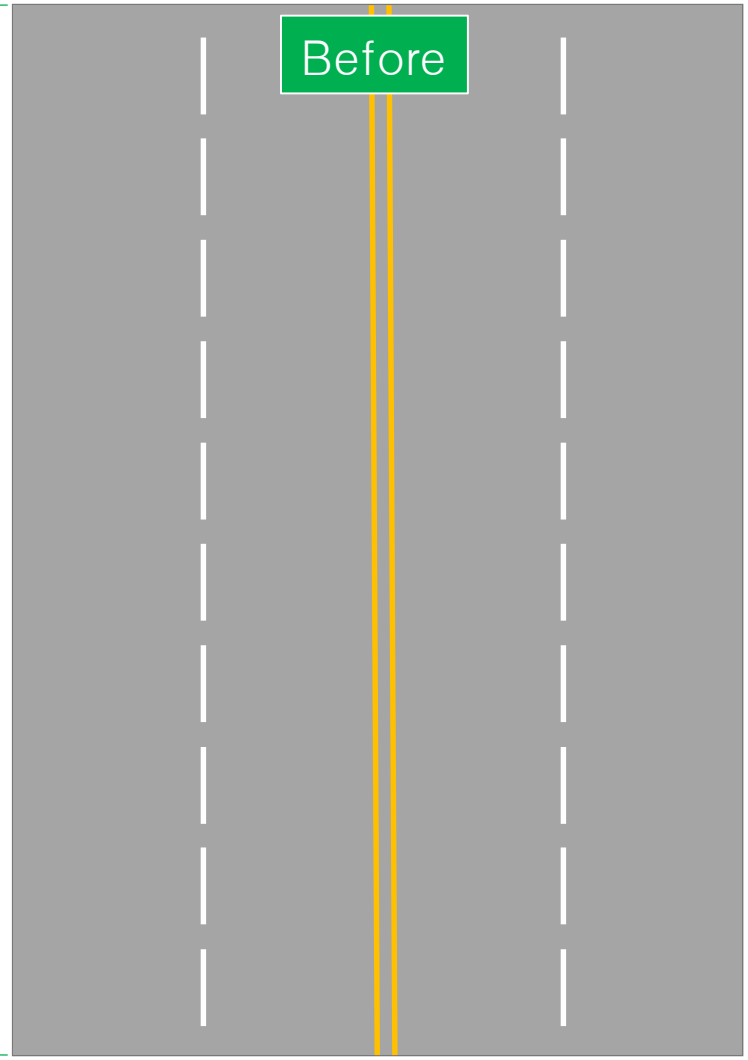


Quantifying Lane Narrowing in the SHOPP Tool

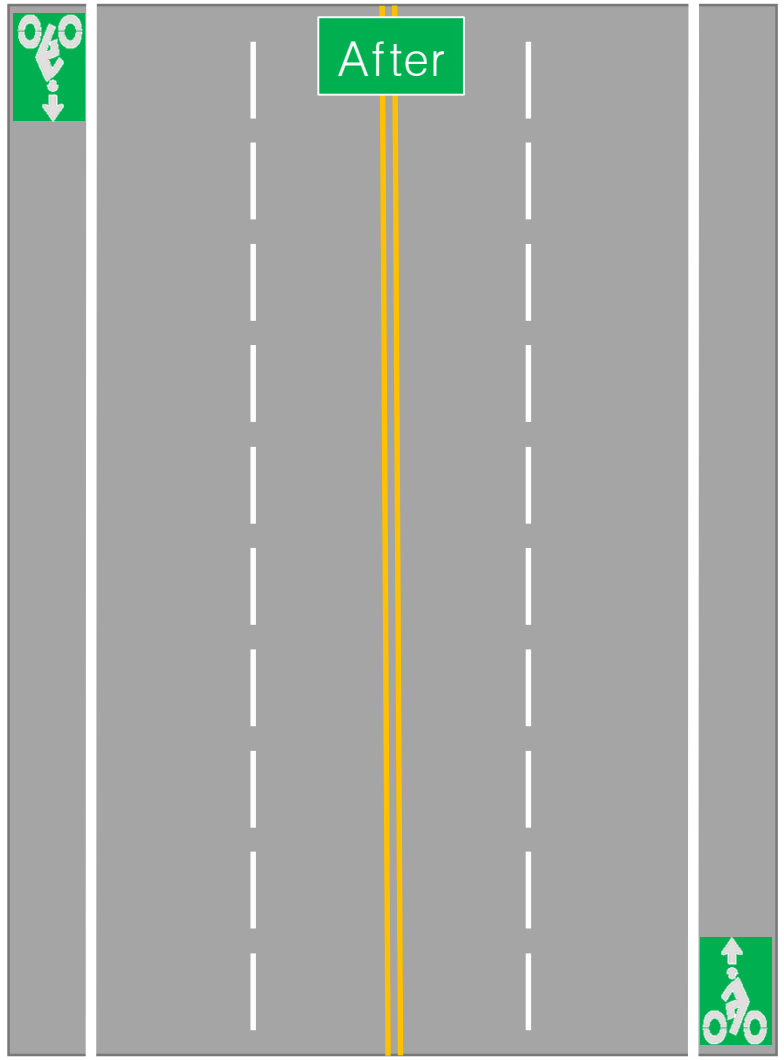
Beginning of Project

Quantify Length in Miles
Length: 1 Mile

End of Project



56 feet= 4 14-ft lanes



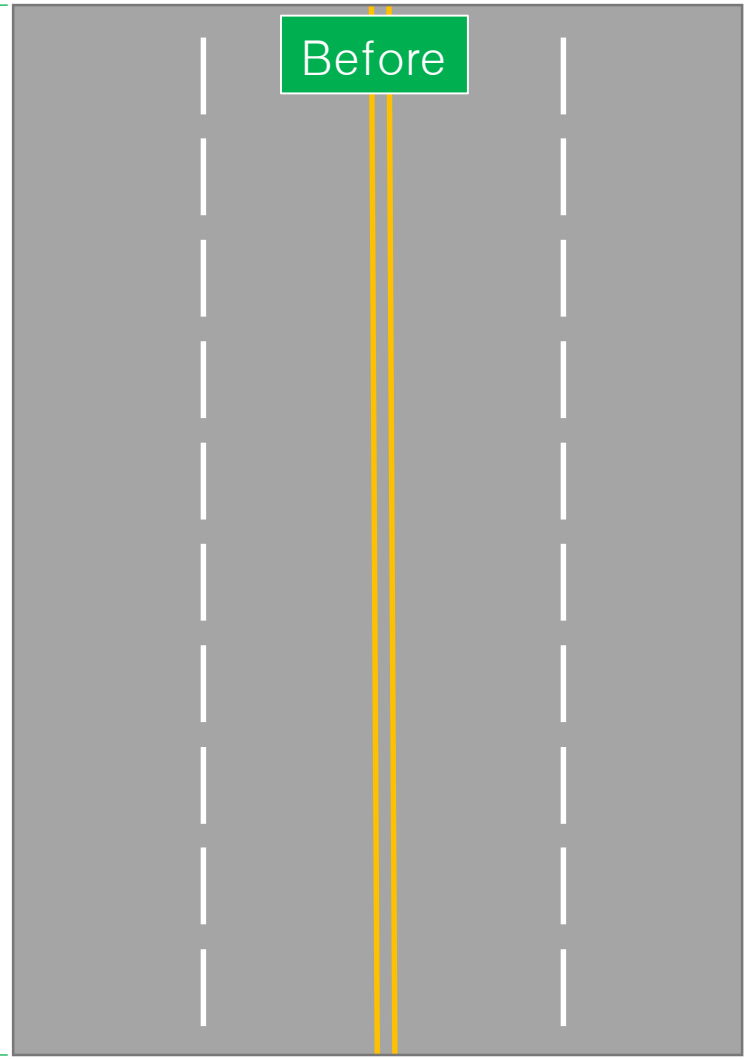
6 11 11 11 11 6

Quantifying Lane Narrowing in the SHOPP Tool

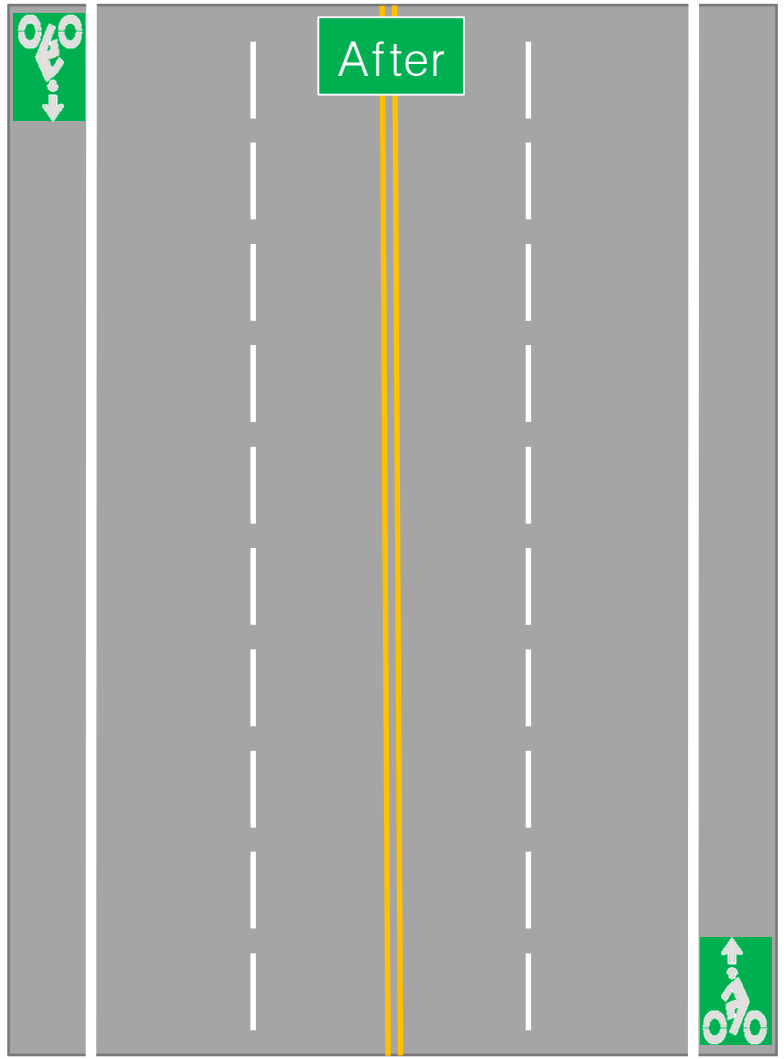
Beginning of Project

Length: 1 Mile
Lane Narrowing:
4 Miles
[4 lanes*1]
Class II: 2 Miles
Conflict zone
green paint: 2

End of Project



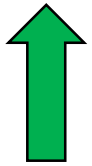
56 feet= 4 14-ft lanes

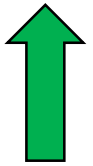


6 11 11 11 11 6

Quantifying Lane Narrowing in the SHOPP Tool

ID	Activity Category	Activity Detail	Unit of Measurement	Quantity	Assets in Good Condition	Assets in Fair Condition	Assets in Poor Condition	New Asset Added	Comments
H06	Streets	Class II Bike Lane (201.999)	Lane Miles	2				2	Bi-directional
H10	Streets	Conflict zone green paint (201.999)	EA	2				2	2 pavement marking enhancements; 1 intersection; 1 driveway
H15	Streets	Lane Narrowing (201.999)	Linear Miles	4				4	





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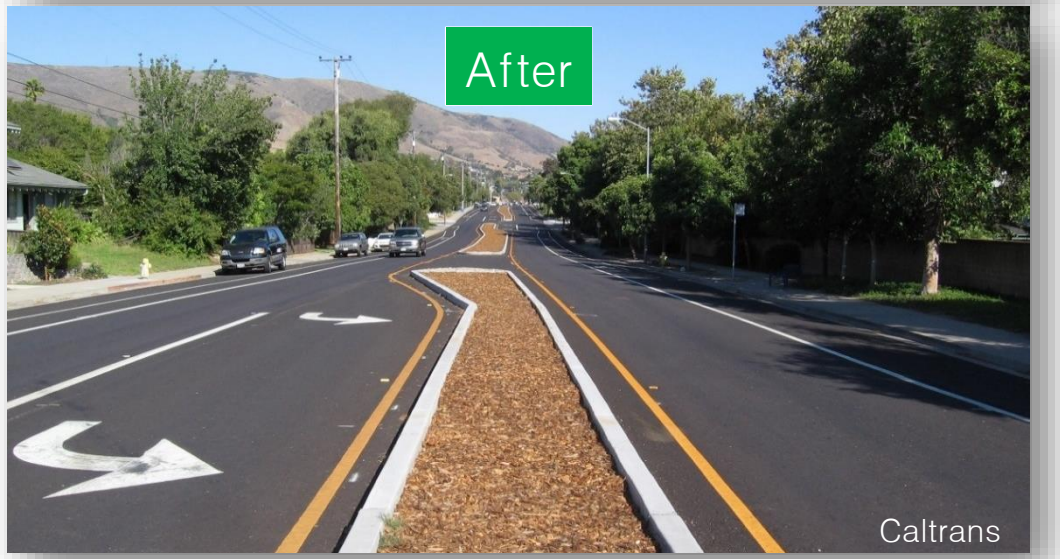
H16: Lane Reduction (Road Diet)

- Roadway reconfiguration that increases road space for other needs, including multi-modal transportation.
- Traditionally involves a 4-lane undivided roadway segment converted to a 2-lane roadway with two-way left turn lane, and bike lanes. This is referred to as a *four to three lane conversion*.
- Crash reduction factor for all road users of 19-47% depending on context (FHWA).

Guidance:

- From Pedestrian and Bicycle Information Center: Four to three lane conversions should be considered on roadways with documented safety concerns, less than 14,000 ADT, and priority bicycle and walking routes.

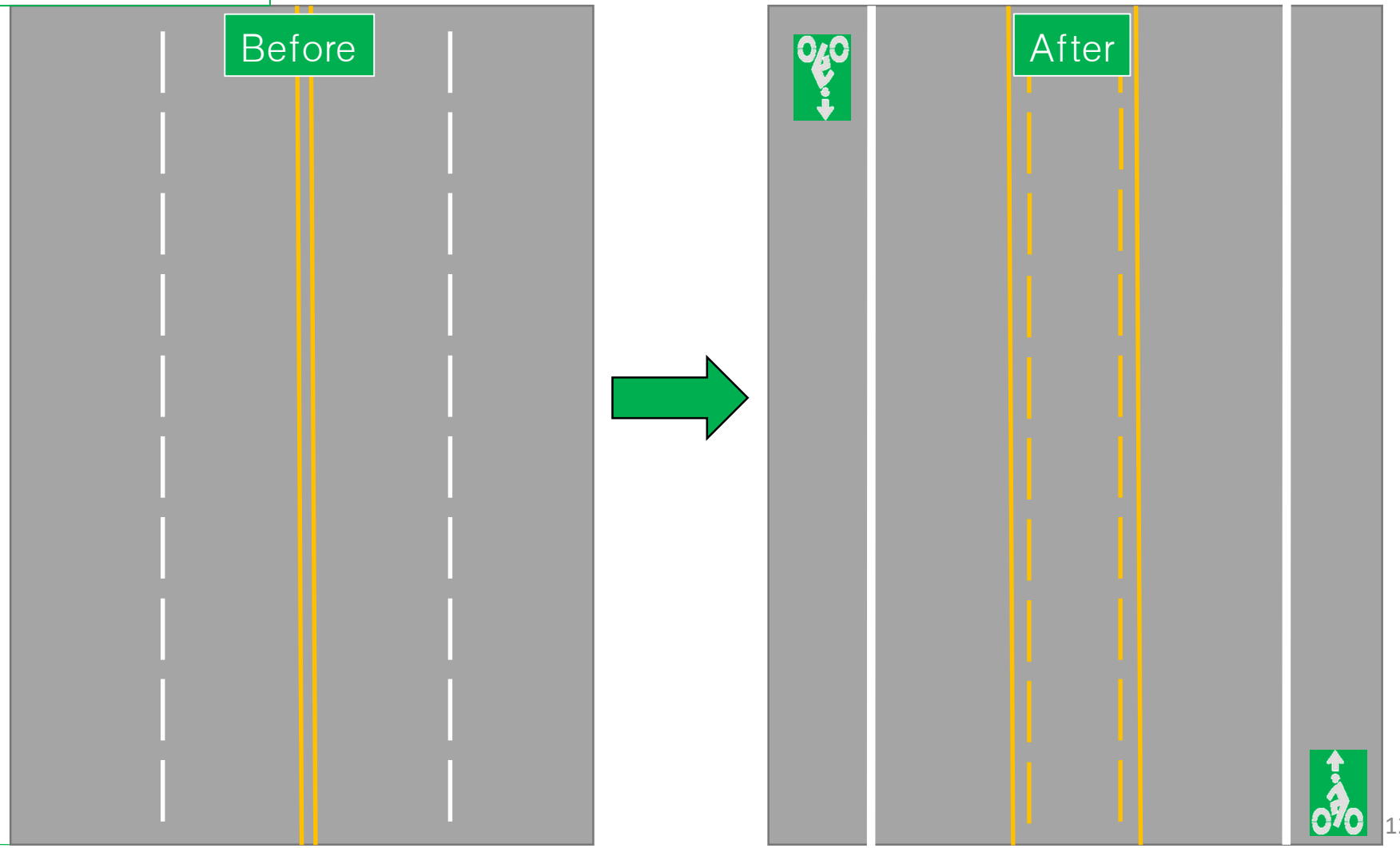


Quantifying Lane Reduction (Road Diet) in the SHOPP Tool

Beginning of Project

Quantify Length in Miles
Length: 1 Mile

End of Project

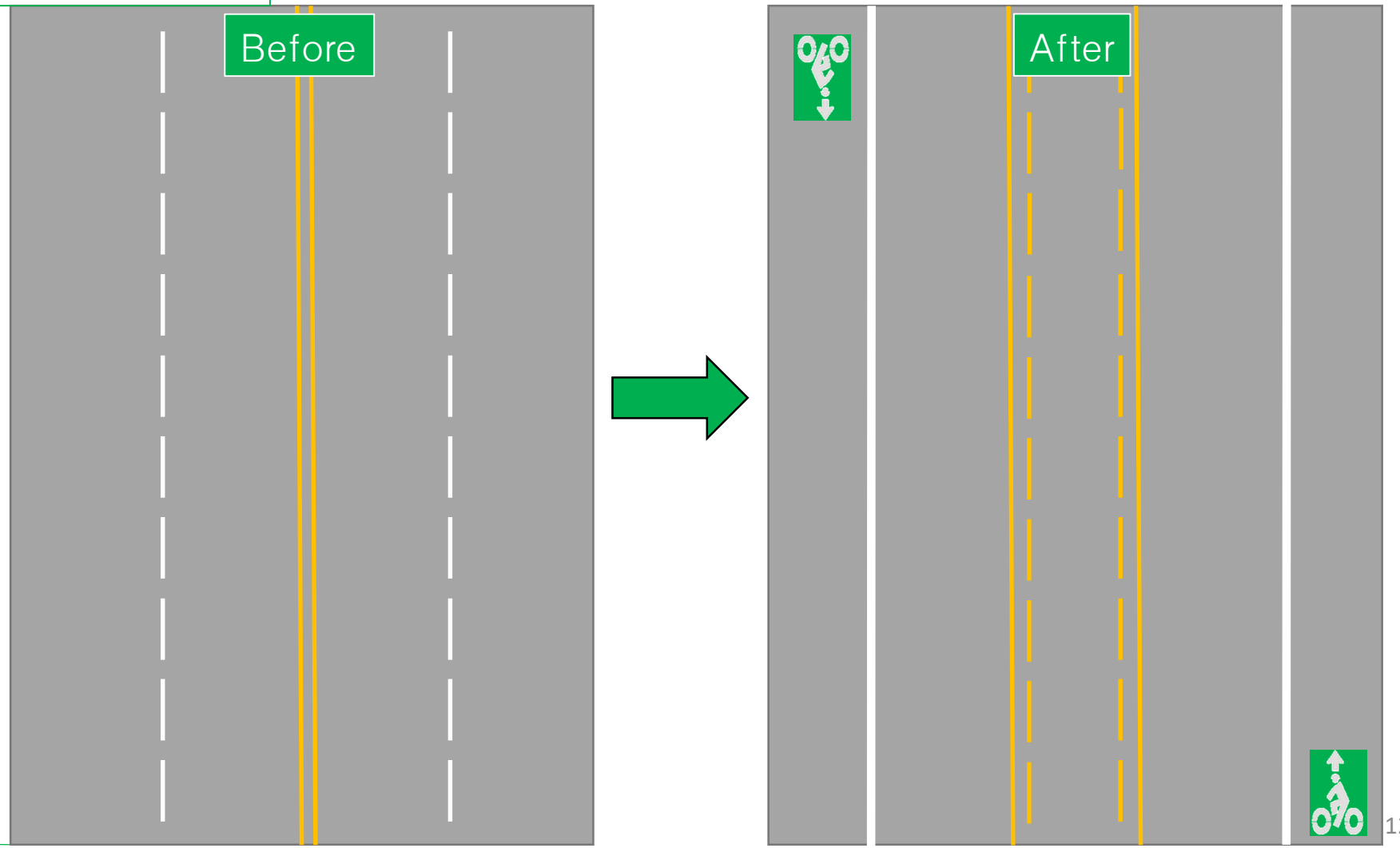


Quantifying Lane Reduction (Road Diet) in the SHOPP Tool

Beginning of Project

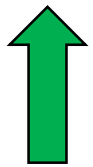
Length: 1 Mile
Lane Reduction: 1 Mile
Class II: 2 Miles
Conflict zone green paint: 2

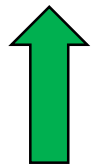
End of Project



Quantifying Lane Reduction (Road Diet) in the SHOPP Tool

ID	Activity Category	Activity Detail	Unit of Measurement	Quantity	Assets in Good Condition	Assets in Fair Condition	Assets in Poor Condition	New Asset Added	Comments
H06	Streets	Class II Bike Lane (201.999)	Lane Miles	2				2	Bi-directional
H10	Streets	Conflict zone green paint (201.999)	EA	2				2	2 pavement marking enhancements; 1 intersection; 1 driveway
H16	Streets	Lane Reduction (Road Diet) (201.999)	Linear Miles	1				1	





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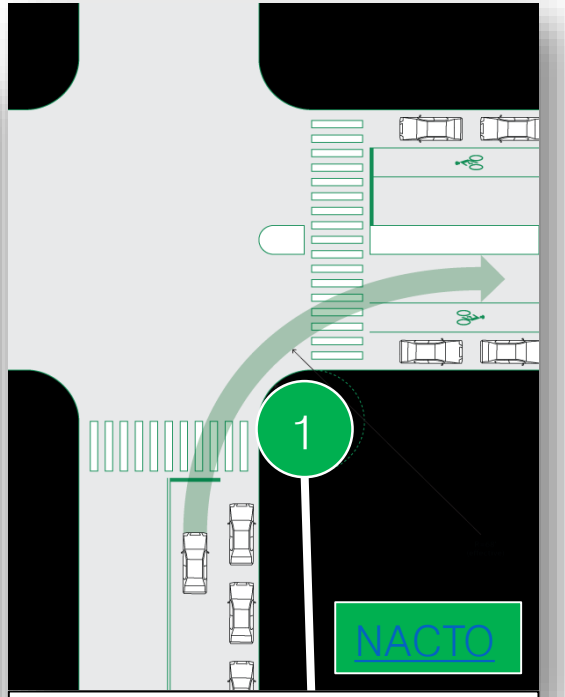
H44: Curb radius return (eliminate free right turn)

- Intersection reconfiguration that reduces the curb radius for right turning vehicles by eliminating the free right turn.
- Minimizing the curb radius creates more compact intersections, impacting vehicle turning speeds and pedestrian crossing distances while still appropriately considering the facility's design vehicle.

Refer to NACTO for more information.



For SHOPP Tool Quantification– quantify each elimination of the free right.

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H45: Street Parking Reduction

- The reduction of parking spaces to provide additional road space for multi-modal transportation or placemaking.
- This can include space for pedestrian facilities, parklets, bicycle facilities, or transit space.
- Can also be used to increase visibility of pedestrians at crosswalks.

For SHOPP Tool Quantification- quantify each reduced parking space.

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Transit Elements

Element	Page Number
Bus Pull Out and Bus Bulb	134
Park and Ride Lots	137
Transit Stop Improvements	139
Transit Boarding Island	140
New Transit Stop	141
Transit Signal Priority	144
Transit-only Lanes (BRT, LRT)	145
Transit Traveler Information	147

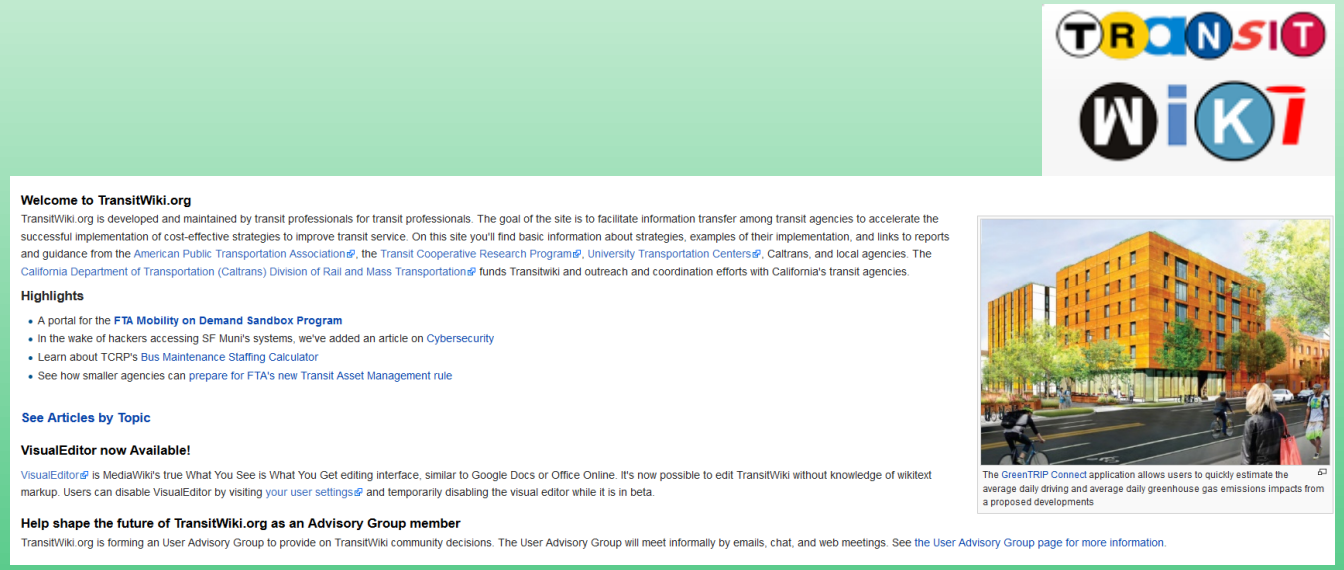
Transit Elements

Transitwiki.org:

Transitwiki is a Caltrans Division of Rail and Mass Transportation-funded website with a goal to:

"information transfer among transit agencies to accelerate the successful implementation of cost-effective strategies to improve transit service."

The website includes information on strategies, implementation, and provides reports and guidance from relevant stakeholders. Consider visiting the website to gain more knowledge on transit-related issues.



Transitwiki.org Main Page

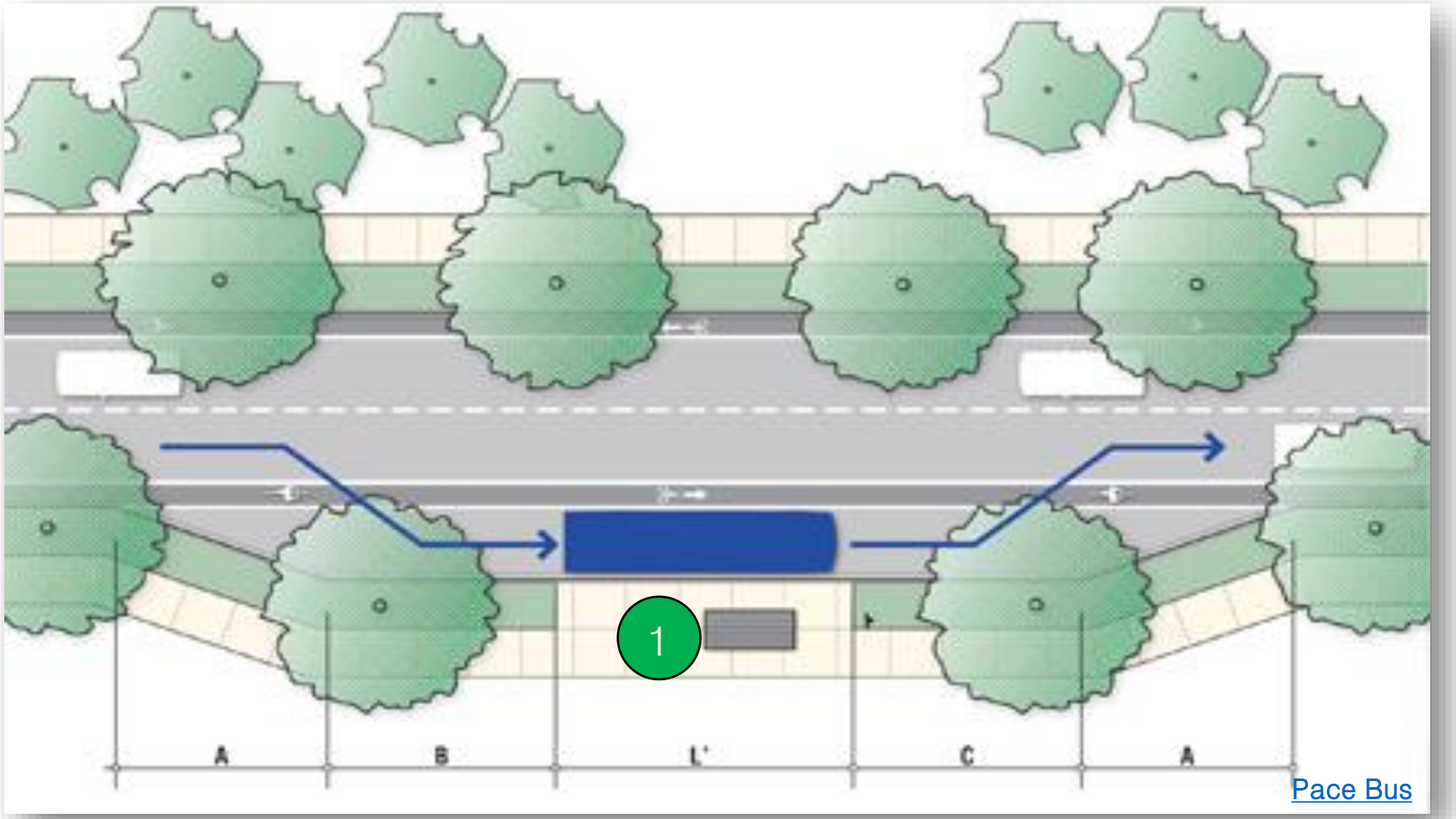
H04: Bus Pull Out/ Bus Bulb

- **Pull Out** (top right): An indentation in the curb which allows a bus to stop completely outside of the traveled way.
  - *Prioritizes through traffic which may increase bus dwell times and is best suited where stopping in-lane may cause issues.*
  - May be created by simply restricting parking.
- **Bulb** (below right): A curb extension which allows a bus to stop within the travel lane. This helps buses move faster and more reliably.

Guidance:

- Provide sufficient sidewalk width.
- Consider potential conflicts between buses and bicycles.
- See HDM Topic 303.4 or NACTO Bus Pull Out and Bulb information.

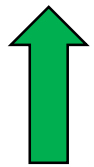
Quantifying Bus Pullouts in the SHOPP Tool

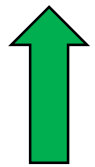


Pace Bus

Quantifying Bus Pullouts in the SHOPP Tool

ID	Activity Category	Activity Detail	Unit of Measurement	Quantity	Assets in Good Condition	Assets in Fair Condition	Assets in Poor Condition	New Asset Added	Comments
H04	Streets	Bus Bay/Turnout/Pullout (201.999)	EA	1				1	Pull Out or Bulb





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H19: Park and Ride Lots

- A parking lot facility that allows users to increase their travel options while reducing GHG, VMT, and congestion on the SHS.

Guidance:

- Consider on all projects that include new freeways, interchange modifications, lane additions, transit facilities, and HOV lanes.
- Design as a multi-modal facility – accommodate all modes of travel and ADA.
- Bus Pads should be used if buses access the park and ride lot.
- Refer to HDM Topic and Table 636.4, Topic 905, and PDPM Ch 8 pg. 52

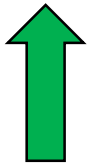
Davis, CA
Park and Ride Lot

Caltrans

Consider Electric Vehicle Charging Stations at Park and Ride Lots– refer to California's ZEV Action Plan and DGS Management Memo 16-07 for more information.

Quantifying Park and Ride Lots in the SHOPP Tool

ID	Activity Category	Activity Detail	Unit of Measurement	Quantity	Assets in Good Condition	Assets in Fair Condition	Assets in Poor Condition	New Asset Added	Comments
H17	Streets	Park and Ride Lot (201.999)	EA	1				1	



Elements to consider in a Park and Ride can include: New Transit Stop, Transit Stop improvements, crosswalk, lighting, bike parking, Electric Vehicle Charging Stations

H27: Transit Stop Improvements

- Project elements that improve transit operations or the transit user experience.
- Many assets could qualify, including:
  - Bus Pad
  - Bench
  - Transit Shelter
  - Bicycle and Pedestrian access
  - Pedestrian-scale lighting
  - Bus bulb
  - Bus-only queuing space
- Involve local transit provider for decision-making and funding.

Guidance:

- Refer to HDM Chapter 100, Topic 108.2-5 and Index 303.4 (3) for more information.

H46: Transit Boarding Islands

A solution to reduce conflicts between transit buses and bicyclists, transit islands provide:

- a separated space for transit riders to access transit vehicles.
- Class IV Separated Bikeway facility for bicyclists.
- Eliminates “leapfrogging” conflicts between bicyclists in Class II Bike Lanes and busses.
- Reduced transit vehicle dwell times.

Go to NACTO.org for more information.

1

For SHOPP Asset Quantification– quantify each boarding island

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H28: New Transit Stop

- A new, clearly marked stop for a surface transit route that calls attention to the stop and explains the transit routes servicing the stop.

Guidance:

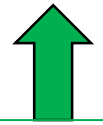
- Coordinate with local transit provider on transit route modifications.
- For more information on bus stop planning, refer to NACTO.org.

Quantifying Transit Stops in the SHOPP Tool

- Quantify improvements per transit stop improved.
- Comments section can specify assets constructed with the project.

Quantifying Transit Stop Improvements in the SHOPP Tool

ID	Activity Category	Activity Detail	Unit of Measurement	Quantity	Assets in Good Condition	Assets in Fair Condition	Assets in Poor Condition	New Asset Added	Comments
H27/ H28	Streets	Transit Stop Improvements (201.999)/ New Transit Stop	EA	1			1		Shelter, bulb, bus-only, access, light



Improvements for 1 Bus Stop or 1 New Bus Stop

Table of Contents

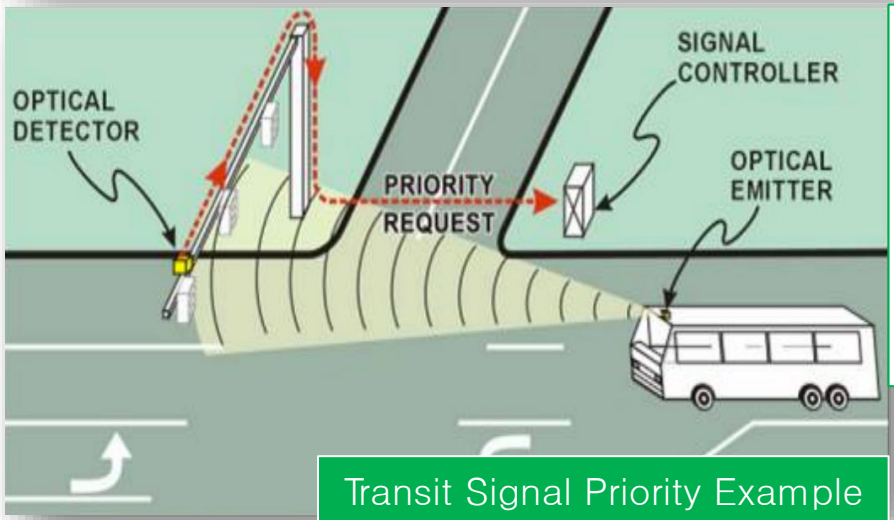
H48: Transit Signal priority (TSP)

- Traffic signal timing or phasing modifications that prioritize the through movement of transit vehicles approaching the intersection.
- It is recommended to utilize transit signal priority in conjunction with transit-only lanes (BRT and LRT).
- TSP detection can be accomplished by Loop Detection, Light-based Detection, Sound-based Detection, Radio-based Detection, and Satellite-based GPS detection.
- On-board and Off-board systems must work together for successful TSP operation.
- Recommended for traffic signals at which transit vehicles experience delays.
- Can be used to improve transit travel reliability and on-time performance.

Guidance:

Refer to Caltrans' Advanced Transit Signal Priority project, USDOT Transit Signal Priority (TSP: A Planning and Implementation Handbook and NACTO for more information.

Omnitrans SbX Green Line BRT Station
San Bernardino, CA



Transit Signal Priority Example
Kittelson and Associates, Inc.

For SHOPP Asset Quantification – quantify each signal with transit priority.

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H49: Transit-Only Lanes

Bus Rapid Transit (BRT): From FTA-

- "A high-quality bus-based transit system that delivers fast and efficient service that may include dedicated lanes, busways, traffic signal priority, off-board fare collection, elevated platforms and enhanced stations."
- Because BRT contains features similar to a light rail or subway system, it is often considered more reliable, convenient and faster than regular bus services."
- "With the right features, BRT is able to avoid the delays that can slow regular bus services like being stuck in traffic and queuing to pay on board".

Guidance:

Refer to Caltrans' Bus Rapid Transit: A Handbook for Partners, relevant BRT-related Caltrans policies, and the ITDP BRT Planning Guide for more information.

Omnitrans SbX Green Line BRT Station
San Bernardino, CA

Omnitrans SbX Green Line Bus Lanes
San Bernardino, CA

San Bernardino Sun

For SHOPP Tool Quantification- quantify linear mile. Write BRT in the Comments section.

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H49: Transit-Only Lanes

Light Rail Transit (LRT):

- A mode of passenger public transportation that operates using trains on fixed rails in exclusive or shared right-of-way.
- Types of light rail transit include [from VTPI TDM Encyclopedia]:
  - Streetcar- a steel wheel on rail transit mode, operating on-street, sharing the pavement with other vehicles, with little or no priority signaling at intersections.
    - Example: SF Muni
  - Light Rail Transit- a streetcar system that has extensive priority signaling at intersections and at least 30% of it's route operating on 'reserved rights-of-ways'. LRT may be grade separated but must retain the ability to operate in mixed traffic. Light rail which operates on grade separated ROWs are more commonly referred to as Light Metro's.
  - Light or Heavy Metro: A transit mode that operates on a fully grade separated (separated from street level) 'rights-of-ways'.

Sacramento Regional Transit Blue Line LRT
Sacramento, CA

Caltrans District 7
Los Angeles Metro Green Line LRT in I-105 ROW
Los Angeles, CA

For SHOPP Tool Quantification- quantify linear mile. Write LRT in the Comments section.

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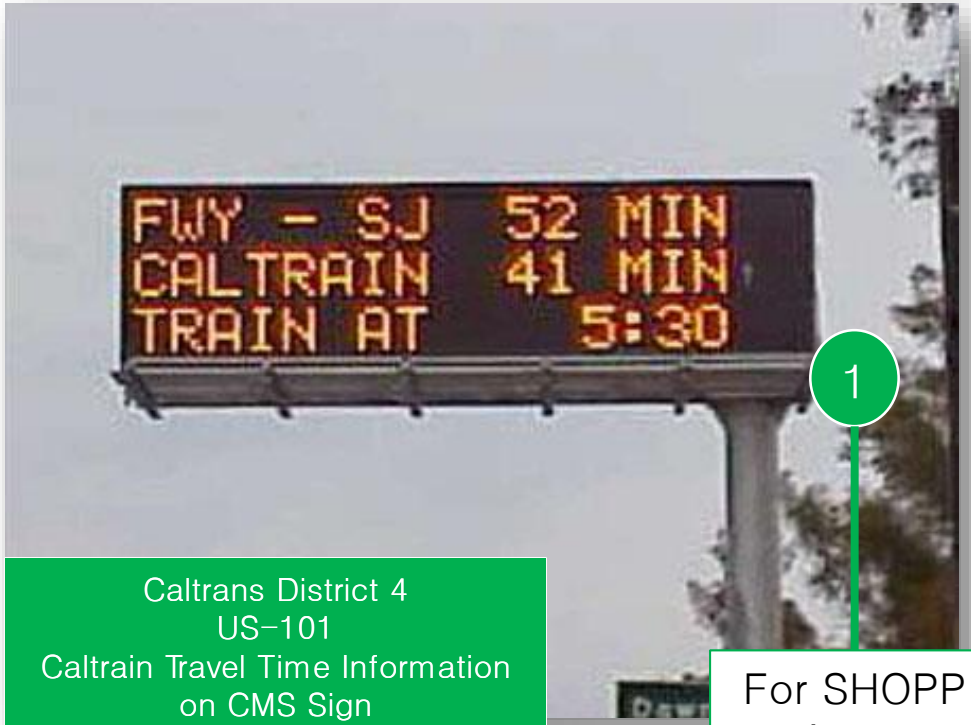
H47: Transit Traveler Information

- Including transit traveler information on Caltrans' Changeable Message Signs.
- Frequently involves the inclusion of accurate information on vehicle arrival times, service disruptions, relative travel times to the freeway corridor.
- Assists current and potential riders in making more informed pre-trip and en-route decisions.
- Providing this information along congested freeway corridors may encourage freeway users to switch to public transit.

Guidance:

- Refer to FTA Guidance for more information.



Caltrans District 4
US-101
Caltrain Travel Time Information on CMS Sign
USDOT ITS Joint Program Office

For SHOPP Asset Quantification – quantify each CMS with transit traveler information.

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Landscaping Elements

Element	Page Number
Vegetative Street Swales	150
Landscaped Area	153

Landscaping Elements

The benefits of Landscaping Elements:

- Stormwater Management– allow infiltration of stormwater to reduce runoff and flooding.
- Water Quality– improve water quality through filtration of pollutants.
- Public Health– improve air quality
- Climate Mitigation– reduce climate change impacts such as heatwaves.
- Active Transportation– provide shade and other benefits to encourage pedestrian and bicycle trips.
- Livability– create a more enjoyable and aesthetic place.

Refer to Caltrans' Landscape Architecture Program for more information.

Planting Design

Main Street, California

H52: Vegetative Street Swales

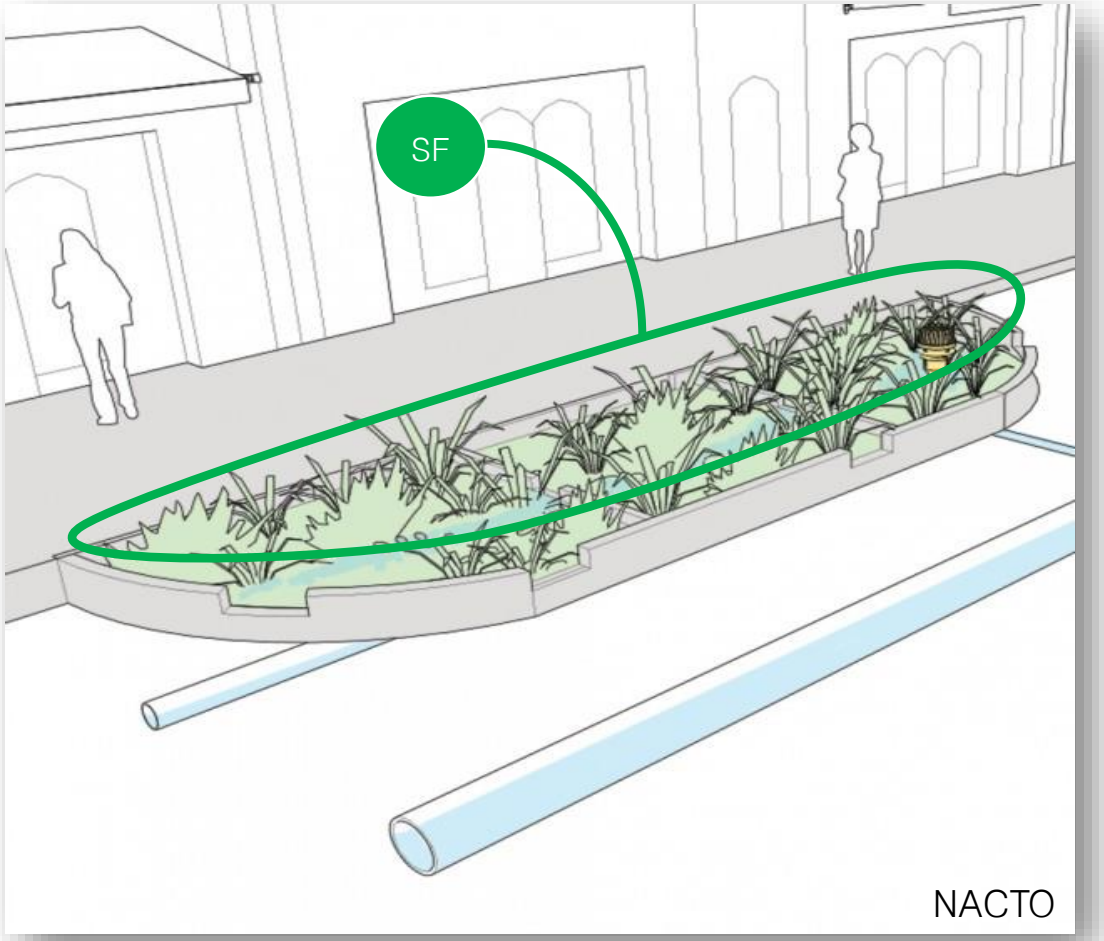
- Planted areas designed to capture, treat, slow, and infiltrate storm water runoff as it moves downstream.
- Can be integrated with medians, bulb outs, and other public space
- Acts as a traffic calming measure, improves aesthetics of area and can support pollinators and wildlife.

Guidance:

- Refer to HDM Topic 861.11 and Biofiltration Swale Design Guidance for more information. NACTO is also an informative resource on swales.

Sacramento, CA
16th Street (formerly SR-160)

Quantifying Vegetative Street Swales in the SHOPP Tool

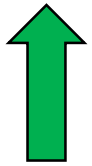


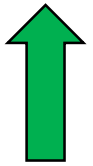
Street Swales measured via square feet (SF) and details can be added in the comments box of the SHOPP tool.

Vegetative Streets Swales were originally quantified using an each metric; with this new update, please use H52 to quantify swales in square feet.

Quantifying Vegetative Street Swales in the SHOPP Tool

ID	Activity Category	Activity Detail	Unit of Measurement	Quantity	Assets in Good Condition	Assets in Fair Condition	Assets in Poor Condition	New Asset Added	Comments
H21	Streets	Vegetative Street Swale (201.999)	SF	250				250	





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H53: Landscaped Areas

Landscaped areas provide sustainability and livability benefits in a wide range of State Highway System environments. Site-appropriate trees and plants:

- Encourage bicycling, walking and transit use by improving the quality of the public space, providing shade, and reducing traveler stress-especially when sited as a buffer between auto traffic and active transportation modes.
- Enhance the natural environment by improving air quality, treating storm water, reducing urban heat islands, supporting pollinators and wildlife, and sequestering carbon /GHGs.
- Improve visual quality which enhances community identity, improves property values, and supports local businesses.
- Increase user safety through traffic calming effects.

Guidance:

- Refer to the Caltrans Landscape Architecture Design website.
- *Please note- Activity Detail H23: Vegetative Buffer between cars/bikes/peds has been changed to H53: Landscaped Areas. As such, use the associated square feet quantifications and H53 activity detail for these assets in the SHOPP Tool.*

Caltrans District 3
West Sacramento, CA
Tower Bridge Gateway (former SR-275)

Caltrans District 3
Auburn, CA
High St. (SR-49)

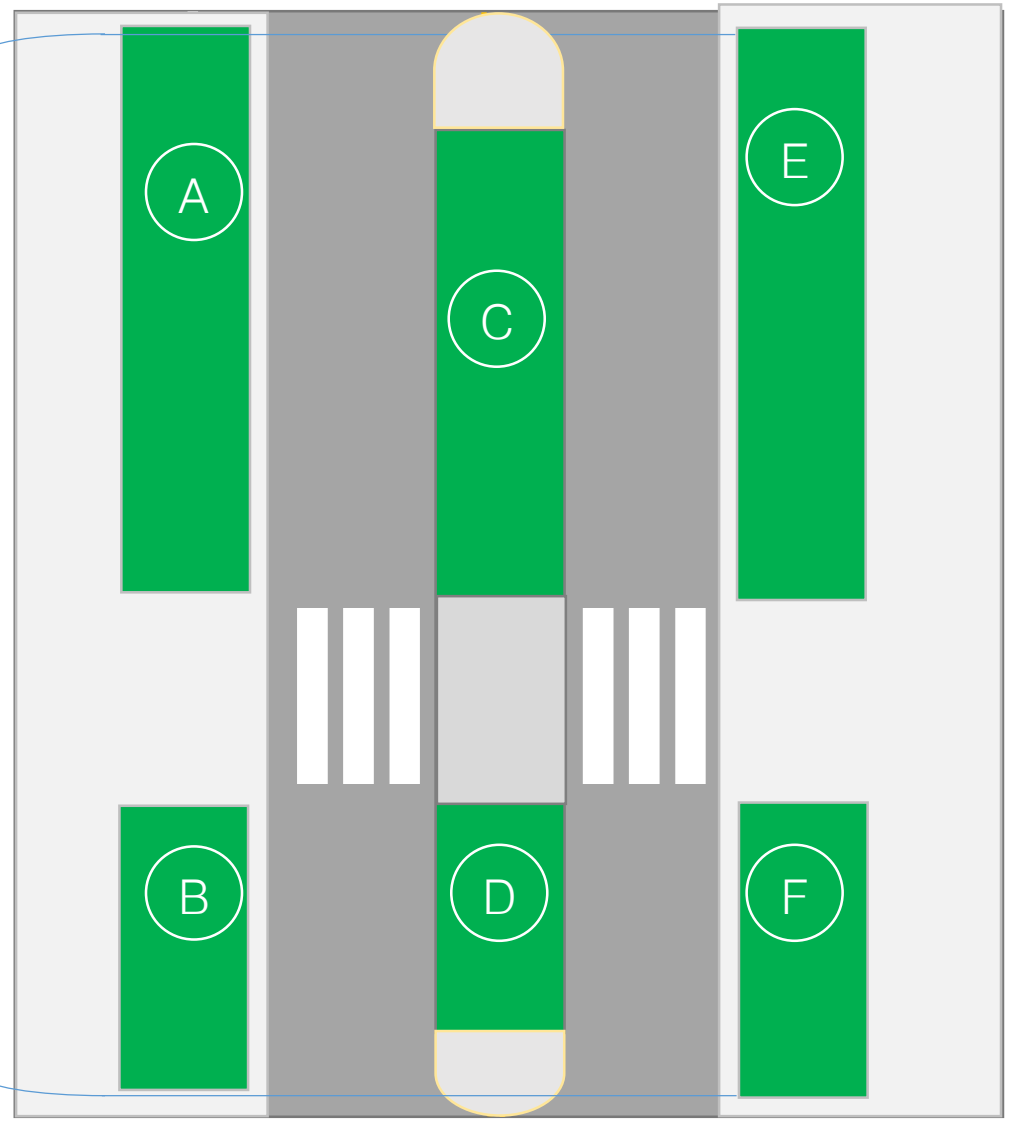
Quantifying Landscaped Area in the SHOPP Tool

Quantify landscaped areas via square feet (SF).

Landscaped Areas were originally quantified using an 'each' metric; with this new update, please use H53 to quantify landscaped areas in square feet.

Square Feet: 575 SF total

(Area A: 150 SF)
(Area B: 50 SF)
(Area C: 125 SF)
(Area D: 50 SF)
(Area E: 150 SF)
(Area F: 50 SF)



"Landscaped Areas" appropriate for use in variety of freeway, conventional highway, and main street environments.

Quantifying Landscaped Area in the SHOPP Tool

ID	Activity Category	Activity Detail	Unit of Measurement	Quantity	Assets in Good Condition	Assets in Fair Condition	Assets in Poor Condition	New Asset Added	Comments
H23	Streets	Landscaped Area (201.999)	SF	575				575	

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