

A7

Development of Recommendations and Segmentation (Methods)



To: City of Sacramento

From: Mauricio Hernández, Alta Planning + Design

CC: Cole Peiffer, Alta Planning + Design

Date: January 24, 2024

Re: Sacramento Active Transportation Plan - Recommendation Development Approach and Data (FINAL)

This document outlines the approach and methodology for developing recommendations for the City of Sacramento Active Transportation Plan. This methodology relies on using consistent data and a clear process to apply federal, state, and city design guidance in an objective and context sensitive manner. This memo outlines the proposed methodology and data to use for the development of recommendations.

Applicable Guidance

The applicable guidance to follow for developing recommendations includes:

- City of Sacramento Design and Procedures Manual – Section 15
 - Establishes a baseline for recommendations impacting roadway design
- City of Sacramento Pedestrian Crossing Guidelines – Treatment Applications Guide
 - Informs the selection of pedestrian crossing treatments
- Caltrans 7th Edition Highway Design Manual (HDM) – Chapter 1000 Bicycle Transportation Design
 - Informs the design and implementation of bicycle facilities. References FHWA Bikeway Selection Guide
- Caltrans Design Information Bulletin Number 94 – Complete Streets Contextual Design Guidance
 - Informs decision to maximize the use of the public right of way to achieve sustainable and equitable mobility
- Caltrans Design Information Bulletin Number 89-02 – Class IV Bikeway Guidance
 - Informs the design and implementation of Class IV bicycle facilities
- FHWA Bikeway Selection Guide
 - Informs facility type recommendation based on roadway speed, volume, and urban/rural context
- FHWA Small Town and Rural Multimodal Networks
 - Informs rural bicycle and pedestrian recommendations
- FHWA Safe Transportation for Every Pedestrian (STEP)
 - Informs pedestrian improvements
- FHWA Proven Safety Countermeasures
 - Supplements pedestrian and bicycle recommendations as needed based on location

Recommendation Development Approach

Bicycle Recommendations Considerations

Alta will vet each corridor recommendation for feasibility and need based on the five criteria listed below. This methodology does not include analyzing bicycle projects at the intersection level.

1. Criteria 1 – Parallelism

What parallel infrastructure is present within ¼ mile of the roadway being considered? A higher multiplier will be assigned to roadways with existing infrastructure that provides greater separation between people biking and motorists.

- a. Bike lanes (Class II) = 1x; Separated Bikeways (Class IV) = 3x; Shared-Use Paths (Class I) = 5x; no points awarded for Bike Routes (Class III) facilities
- b. Corridors will also be assigned points based on their respective multiplier divided by the existing mileage of the corridor. For example, a 2-mile corridor with the following facilities within ¼ mile:
 - i. 0.75 miles of Shared-Use Paths (Class I)
 - ii. 1.2 miles of Separated Bikeways (Class IV)
 - iii. 0.25 miles of Bike Routes (Class III)

This corridor would receive 3.75 points

- i. 0.75 miles x 5 (shared-use paths multiplier) = 3.75
- ii. 1.2 miles x 3 (separated bikeways multiplier) = 3.75
- iii. 0.25 miles * 0 (bike routes multiplier) = 0

Final Scores would equal the facility points by class divided by the total mileage for the corridor.

Formula:

- i. (Facility Points by Class) / Mileage of corridor = parallelism score
- ii. (3.75 + 3.75 + 0) / 2 = 3.75 points

2. Criteria 2 – Planned/Funded Projects

This criterion is intended to help focus implementation and identify potential project synergies with planned/funded projects

- a. What type of planned/funded facility does this corridor connect to?
 - i. Bike lanes (Class II) = 1x; Separated Bikeways (Class IV) = 3x; Shared-Use Paths (Class I) = 5x; no points awarded for Bike Routes (Class III) facilities
- b. Is this facility within 1/4-mile of a parallel planned/funded facility?
 - i. Bike lanes (Class II) = 1x; Separated Bikeways (Class IV) = 3x; Shared-Use Paths (Class I) = 5x; no points awarded for Bike Routes (Class III) facilities

This criteria assumes that the City will provide Alta with a shapefile of all existing planned / funded projects which are candidates for project synergies.

3. Criteria 3 – Roadway Context

What facility is recommended for this roadway based on *speed* and *traffic* volumes?

This criteria assumes the use of data from OSM and ESRI Living Atlas. This is based on the FHWA Bikeway Selection criteria.

4. Criteria 4 – Existing and Future Land Use

- a. How concentrated/dense is the adjacent land use within ¼ mile?
 - ii. Higher scores for more intense / dense land uses
 - iii. The greater the existing intensity / density the greater the immediate demand
- b. How much residential and job growth is projected in the next 20 years in within ¼ mile? Using estimates from the Travel Demand Model, Alta will assess the estimated growth rates for residential and job growth in each TAZ and assign a higher score for corridors within areas of higher projected growth

5. Criteria 5 – Roadway Reconfiguration Feasibility Index & Usable Space

This analysis will only be conducted on roadways where a facility is recommended and appropriate based on Criteria 1-4 AND the recommended facility type would likely require widening the roadway such as a Shared Use Path (Class I) or separated bikeway (Class IV). Alta will develop a shapefile based on available parcel data which identifies the typical Right-of-Way width along each segment. This data layer will be used to identify potential Right-of-Way pinch-points along these recommended facility types. This includes identifying potential under-crossings and over-crossings which may need to be considered.

Using the available AADT data from Esri Living Atlas, Alta will identify roadways which may be candidates for a road diet based on their current segment traffic volumes, number of lanes, and identified need for greater accommodation for active transportation modes (i.e., people walking, biking or rolling). This will be based on **sketch planning level** Volume / Capacity (V/C) ratios identified in collaboration with City Staff. We will work with city staff to determine acceptable standards for AADT to determine possible road diet candidates.

Pedestrian Recommendation Considerations

Pedestrian facility uses and need varies across contexts and the application of pedestrian facilities should be sensitive to those variations. As such, develop recommendations for sidewalks and other pedestrian facilities, as appropriate based on guidance, using the following criteria:

1. Sidewalks should be installed on *at least one side* of the roadway for all **local roads**.
2. Roadways should have sidewalks *on both sides* and not be high-stress (LTS 3+4) if they satisfy one or more of the following conditions:
 - a. Adjacent land-use is Commercial / Residential within ¼ mile of the missing sidewalk.
 - b. There is a light-rail & Amtrak stops on the roadway within ¼ mile of the missing sidewalk (1,000 feet for bus stops).
 - c. The roadway with missing sidewalk is identified in the Primary Network Gap analysis.
3. Roadways within ¼ mile radius of schools (ex., elementary, middle, high school) should have sidewalks on BOTH sides of the street and not be high-stress (LTS 3+4)
4. Pedestrian crossings should be prioritized at **signalized intersections**.

Case Studies

Six Case Study Areas were chosen for an analysis of common pedestrian and bicycle infrastructure challenges that exist in Sacramento today. These Case Study Areas were selected based on feedback from the Community Planning Team to be representative of the active transportation issues in the focus planning areas of Fruitridge/Broadway (FB), North Sacramento (NS), and South Sacramento (SS). Recommendations to mitigate issues identified in a Case Study Area may apply to similar issues found in other parts of the City. The recommendations will inform changes that could be made throughout the City that exhibit the same characteristics. The themes and Case Study Areas evaluated as part of this project are included in the table below.

	CASE STUDY AREAS	Steve Jones Park	Charles Robertson Park	Robla Elementary School	Will C. Wood Middle School	Irene B. West Elementary	Hiram Johnson High School
	FOCUS PLAN AREA	SS	NC	NC	FB	SS	FR
THEMES	Major Barriers/ Major Roadways	X	X			X	X
	Schools and Neighborhood	X	X		X	X	X
	Neighborhood Main Streets				X		
	Connections to Parks/ Recreation	X		X			
	Connections to Transit		X		X		X
	Connections to Trails			X	X		

Roadway Classifications

Alta will develop recommendations for roadways which have the FHWA functional classification of arterial or collector only. Alta will collaborate with the 15-minute Neighborhood project team to identify key intersections and nodes with local roadways. Alta will not provide recommendations for roadway segments on roads with the local functional classification.

Recommendation Development Rounds

The first round of recommendation development will build directly off of the identified gaps included as part of the Gap Identification memo. These represent roadways with high collision rates, high stress levels, and high active trip potential. These roadways should be prioritized for a more thorough review and development of more precise recommendations and will be the focus of the first round of recommendation development. The provided shapefile *Sacramento Streets for People ATP Primary Network Gap Corridors* includes all identified primary corridor network gaps and the shapefile *Sacramento Streets for People ATP Primary Network Gap Intersections* includes all identified primary intersection network gaps.

The second round of recommendation development will supplement the Primary Network Gaps and be focused on identifying recommendations across the remaining study network based on the above established criteria.

Data Needs

Alta will use the following data files to support recommendation development under this task:

Data	Recommended Source
Posted Speed Limit	Open Street Map (OSM)
Average Daily Traffic Volumes	ESRI living Atlas
Existing/Available Right-of-Way	Parcel Based Analysis (Alta)
Primary Network Gaps	Alta analysis



To: City of Sacramento

From: Mauricio Hernández, Cole Peiffer, Alta Planning + Design

Date: September 19, 2024

Re: Sacramento Streets for People – Intersection Recommendation Typology Memorandum (FINAL)

Introduction

This memo summarizes the proposed methodology for identifying improvements at intersections and crossing locations for people walking, biking, and rolling in conjunction with corridor recommendations identified through the *Streets for People Plan*. This document is intended to provide a straightforward method for determining the most appropriate improvements for people walking and biking at various intersection types based on their context (i.e., traffic volume, number of vehicle lanes, and speed limit).

The document also provides a decision matrix to help City staff identify the most appropriate countermeasure to improve the safety, connectivity, and comfort of people crossing at specific intersections. This decision matrix and related countermeasures were developed using applicable state and federal guidance.

Intersection Typologies

The recommended improvements developed through the *Streets for People Plan* include intersections and mid-block crossing locations. The nature of each intersection within the network is unique and requires more direct review and consideration than is achievable within the city-wide scale *Streets for People* project. However, intersections with similar contexts (i.e., volumes, number of lanes, and speed limits) are candidates for comparable improvements to enhance safety, connectivity, and comfort for people walking and biking based on national guidance and best practices.

Applicable Guidance

The intersection typology decision matrix was developed in accordance with the most recent federal, state, and industry guidance based on the roadway and land use contexts. This guidance represents best practices for selecting and applying the most appropriate countermeasures to improve conditions for people walking, biking, and rolling at intersections. The following documents and resources inform the decision matrix at the end of the memo:

FEDERAL GUIDANCE:

- Federal Highway Administration (FHWA) Guidance
 - Safe Transportation for Every Pedestrian (STEP)¹
 - Proven Safety Countermeasures²
 - Ped Bike Safe³
- National Cooperative Highway Research Program (NCHRP)
 - Safety at Midblock Pedestrian Signals⁴

STATE GUIDANCE:

- Caltrans Guidance
 - Traffic Calming Guide: A Compendium of Strategies⁵
 - Design Information Bulletin 94: Complete Streets Contextual Design Guidance⁶
 - Pedestrian Safety Countermeasures Toolbox⁷

INDUSTRY GUIDANCE:

- National Association of City Transportation Officials (NACTO)
 - Don't Give Up At The Intersection⁸

¹ Safe Transportation for Every Pedestrian (STEP), FHWA, 2021, <https://highways.dot.gov/safety/pedestrian-bicyclist/step>

² Proven Safety Countermeasures, FHWA, <https://highways.dot.gov/safety/proven-safety-countermeasures>

³ PedBikeSafe, FHWA, PedBikeSafe.org: <http://www.pedbikesafe.org/pedsafe/countermeasures.cfm>

⁴ Research Report 1030: Safety at Midblock Pedestrian Signals, NCHRP, <https://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=4941>

⁵ Traffic Calming Guide: A Compendium of Strategies, 2024, Caltrans, https://dot.ca.gov/-/media/dot-media/programs/safety-programs/documents/traffic-calming/final-traffic-calming-guide_v2-a11y.pdf

⁶ Design Information Bulletin-94 Complete Streets: Contextual Design Guidance, 2024, <https://dot.ca.gov/-/media/dot-media/programs/design/documents/dib-94-010224-a11y.pdf>

⁷ Pedestrian Safety Countermeasures Toolbox, Caltrans, 2019, <https://dot.ca.gov/-/media/dot-media/programs/safety-programs/documents/ped-bike/caltrans-ped-safety-countermeasures-toolbox-a11y.pdf>

⁸ Don't Give Up At The Intersection, NACTO, 2019, NACTO Don't Give Up At The Intersection: <https://nacto.org/publication/dont-give-up-at-the-intersection/protected-intersections/>

Intersection Typology Decision Matrix

The intersection typology decision matrix below helps to identify when different improvements are recommended, when they are acceptable, and when they are not appropriate based on the context of the intersection or crossing locations under consideration. To use the matrix, identify the control type to the left and then use the average daily traffic (ADT) and number of lanes to determine the appropriateness of a specific treatment. Traffic volumes are divided into three levels:

- Low Volume: <9,000 ADT
- Medium Volume: 9,000 – 15,000 ADT
- High Volume: 15,000+ ADT

The matrix also identifies considerations for how the posted speed limit changes the appropriateness of various treatments. This is especially important for uncontrolled crossing locations where a traffic signal or stop sign is not present. For more information about any of the treatments identified, please see the resources identified at the bottom of the table.

Table 1 - Intersection Typology Decision Matrix

Uncontrolled	Treatment	Avg. Daily Traffic (ADT)	1 to 2 Total lanes	3 Total lanes	4 or 5 Total lanes	Considerations	Reference
	High Visibility Crosswalk	<9,000	R	R	R	Additional treatments for roads 35+ mph	FHWA STEP
		9,000 to 15,000	R	R	R	Additional treatments for roads 35+ mph	
		15,000+	R	R	R	Combined with other treatments on roads above 15,000 ADT and speed limits above 25 mph	
	Raised Crosswalk	<9,000	R	R	NR	Recommended on roadways with <9,000 ADT and <30 mph speed limits	PEDSAFE
		9,000 to 15,000	NR	NR	NR		
		15,000+	NR	NR	NR		
	RRFB	<9,000	A	A	NR	Recommended on 2-3 lane roads 40+ mph	FHWA STEP
		9,000 to 15,000	R	R	NR	Recommend PHB for 40+ mph roads	
		15,000+	NR	R	NR	Recommend PHB for 35+ mph roads	
RRFB w Pedestrian Refuge Island	<9,000	A	A	A	Recommended on 40+ mph 2-3 lane roads	FHWA STEP	
	9,000 to 15,000	R	R	NR	Recommend PHB for 40+ mph roads		
	15,000+	A	R	NR	Recommend PHB for roadways with 35+ mph speed limits		
PHB	<9,000	A	A	R	Recommended for 40+ mph roads	FHWA STEP	
	9,000 to 15,000	R	R	R	Recommended for 35+ mph roads		
	15,000+	R	R	R	Recommended for 1-2 lane 40+ mph roads; 3 lane 35 mph roads; 4+ lane 30+ mph roads		
PHB w Pedestrian Refuge Island	<9,000	NR	A	R	Acceptable on 1-2 lane 40+ mph roads	FHWA STEP	
	9,000 to 15,000	NR	A	R	Acceptable on 1-2 lane 40+ roads		
	15,000+	NR	A	R	Acceptable on 1-2 lane 40+ mph roads		
Pedestrian Signal	<9,000	NR	NR	A	Acceptable on 4+ lane roadways with 35+ mph speed limits	NCHRP 1030	
	9,000 to 15,000	NR	NR	A	Acceptable on 4+ lane roadways with 35+ mph speed limits		
	15,000+	NR	NR	A	Acceptable on 4+ lane roadways with 35+ mph speed limits		
Notes:							Not Recommended (NR)
1. All crossing improvements should include High Visibility Crosswalks and apply PROWAG standards.							Acceptable (A)
2. A greater level of engineering review and consideration should be applied for intersections with 5 or more approaches.							Recommended (R)
3. Intersection improvements should consider consolidating or removing slip lanes ("free-right turns") to eliminate pork-chop islands.							

Controlled	Treatment	Avg. Daily Traffic (ADT)	1 to 2 Total lanes	3 Total lanes	4 or 5 Total lanes	Considerations	Reference
	High Visibility Crosswalk	<9,000	R	R	R	Should be combined with other treatments above 15,000 ADT	FHWA STEP
		9,000 to 15,000	R	R	R		
		15,000+	R	R	R		
	Raised Crosswalk	<9,000	R	R	NR	Recommended on roadways with <9,000 ADT and <30 mph speed limits	PEDSAFE
		9,000 to 15,000	NR	NR	NR		
		15,000+	NR	NR	NR		
	Pedestrian Refuge Island	<9,000	A	R	R	Recommended on roadways with 35 mph speed limits and 9,000+ ADT	FHWA STEP
		9,000 to 15,000	A	R	R		
		15,000+	A	R	R		
Longer Pedestrian Interval	<9,000	A	R	R	Higher pedestrian volumes and/or slower walking speeds (e.g. 3.0 ft/sec for locations with many elderly or young pedestrians)	PEDSAFE	
	9,000 to 15,000	A	R	R			
	15,000+	A	R	R			
Protected Intersection	<9,000	A	A	R	Recommended where bicycle facilities intersect. Applicable at any size intersection with roadways of any volume.	NACTO Don't Give Up At The Intersection	
	9,000 to 15,000	A	A	R			
	15,000+	A	A	R			
Notes:							Not Recommended (NR)
1. All crossing improvements should include High Visibility Crosswalks and apply PROWAG standards.							Acceptable (A)
2. A greater level of engineering review and consideration should be applied for intersections with 5 or more approaches.							Recommended (R)
3. Intersection improvements should consider consolidating or removing slip lanes ("free-right turns") to eliminate pork-chop islands.							