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Technical Memorandum

DATE:	November 26, 2025
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FROM:	Andrew Lee, PE, TE, PTOE & Pete Ruscitti, Parametrix
SUBJECT:	Assessment of Eastbound Protected Bikeway Concept for Solano Avenue between Masonic Avenue & Tulare Avenue

The proposed street layout for the 3,300' section of Solano Avenue between Masonic Avenue and Tulare Avenue, known as the "Eastbound Protected Bikeway" concept in the City's communication materials, is depicted as a sample cross-section in Figure 1. It features an asymmetrical bikeway and parking layout consisting of a shared bicycle-vehicle lane in the westbound downhill direction (alongside parallel parking) and protected bicycle lane in the eastbound uphill direction (alongside angled parking). A full draft conceptual plan is attached. This memorandum describes the concept in further detail and reviews technical considerations for its design and implementation.

Figure 1: Sample Cross-Section (Looking East)

The proposed curb-to-curb cross-section from north to south (westbound to eastbound) is:

- 8' westbound parallel parking (modified from existing 45-degree angled parking)
- 11' westbound shared vehicle lane (bike route/Class III bikeway indicated with shared-lane marking or "sharrow")
- 16' eastbound vehicle lane
- 14' eastbound 60-degree angled parking (modified from existing 45-degree angled parking)
- 11' eastbound protected bikeway (4' buffer with parking stops and 7' bikeway)

Executive Summary

The proposed layout would balance the interests of multiple modes and achieve several of the City's objectives:

- Maximize space efficiency within the corridor's constrained right-of-way
- Preserve a substantial amount of on-street parking compared to the current condition
- Provide new benefits for active transportation

This technical memorandum is divided into sections for each of the categories summarized below:

Guidance for Asymmetrical Bikeways: This is a recognized treatment to balance multimodal demands on constrained, sloped streets. The separated eastbound bikeway, characterized as a "climbing lane," would provide a more comfortable experience for uphill biking/rolling where speeds tend to be lower than motor vehicle traffic. The westbound direction would remain a shared lane, taking advantage of the fact that biking/rolling speeds in the downhill direction tend to approach motor vehicle speeds (around 15-25 mph, or Solano Avenue's 20 mph posted speed limit). However, the existing motor vehicle volume above 8,000 average daily traffic (ADT) exceeds the guidelines for shared lane facilities. As such, the westbound biking/rolling facility would be appropriate only for stronger, more confident riders.

Design Features & Considerations: This concept reflects a design approach that is consistent with applicable national and state design guidance and best practices. The eastbound protected bikeway provides 7' of rideable width, and the 4' buffer zone plus 14' of angled parking creates 18' of lateral separation from moving traffic. Although parking is not "daylighted" in advance of driveways or cross streets, the configuration provides staging space for turning vehicles to achieve adequate sightlines. The westbound shared lane does not provide an ideal biking/rolling experience due to high motor vehicle volumes, but its downhill nature makes it more appropriate for a shared facility than the eastbound side. Shared-lane markings and signage will guide lateral positioning, which is essential for downhill cyclists traveling at speeds comparable to vehicles.

Some elements of the concept remain uncertain at this early stage of development and will require further evaluation and refinement. This includes design factors related to parking, loading, and public transit—discussed further below—as well as behavioral factors that may not be fully understood until the concept is implemented. This includes the potential for double-parking, wrong-way travel in the protected bikeway, or other unpredictable behavior in response to the new cross-section. While the intent of the design is to calm traffic and create a more balanced multimodal corridor, the long-term behavioral outcomes of vehicles, cyclists, and pedestrians will depend on real-world use and observation.

Parking, Loading & Curb Management: The proposed concept results in a potential net parking loss of 11 spaces or 6%, balancing a gain of 24 potential spaces or 30% on the eastbound (south) side with a loss of 35 potential spaces or 34% on the westbound (north) side. After subtracting space for bus stops, driveways, and areas needed to provide clearance from crosswalks and driveways, this parking estimate considers all remaining curb space as potential parking spaces regardless of whether such curb space is currently designated as a loading zone, accessible parking, or parklet. Future phases of the project may identify additional short-term loading zones, accessible parking, or time-limited spaces based on frontage conditions and user needs.

Some elements of the concept remain uncertain at this early stage of development and will require further evaluation and refinement. This includes analyzing the potential impacts on biking/rolling

comfort and traffic operations from westbound parallel-parking movements and potential double-parking. Additionally, the narrowed travel lanes may require additional designated loading zones to allow access to the commercial district without disrupting traffic flow. This would require allocating additional space from general parking along Solano Avenue and/or on side-street approaches.

Public Transit Integration: All bus stops broadly conform to AC Transit design guidelines for in-lane stops, although further site-specific evaluation will be necessary to refine stop lengths, bus turning paths, accessibility features, and potential amenities. The concept also removes existing bus stops at several locations consistent with recommendations from the 2019 *Solano Avenue Complete Streets and Corridor Revitalization Study.*

Appendices: This memorandum concludes with an appendix documenting similar facilities that have been implemented across California and Washington, plus a conceptual plan showing the entire corridor in a roll-plot format annotated with parking counts and other considerations.

Table 1 summarizes the various considerations addressed in this memorandum.

Table 1: Summary of Considerations

Category	Westbound	Eastbound
Biking/Rolling Conditions	■ Class III shared lane leverages natural downhill speeds, but lacks dedicated space for biking/rolling ■ High motor vehicle volumes exceed guidelines, limiting biking/rolling to strong & confident riders only ■ Potential for door-zone conflicts alongside parallel parking	■ Protected bikeway offers comfortable uphill biking/rolling experience ■ Encroachment of ~1' gutter pan reduces rideable surface in some locations ■ Potential for wrong-way riders due to lack of protected westbound facility, but 7' width plus 4' buffer provides passing space if needed
Pedestrian/ Walking Conditions	■ Largely maintains sidewalks ■ Reduces size of curb extensions, increasing crossing distances	■ Largely maintains existing sidewalks ■ Removes curb extensions, increasing crossing distances
Operations & Intersection Conflicts	■ Double-parked vehicles may impede traffic flow or encourage users to encroach into opposing lane	■ Potential visibility challenges for entering/exiting vehicles; mitigated by 18' staging area & overall slow speeds
Drainage & Maintenance	■ Requires re-establishment of inlets where curb extensions are modified ■ Standard sweepers can be used	■ Requires re-establishment of inlets where curb extensions are removed ■ Consistent curb line simplifies flow ■ Requires compact sweepers
Parking, Loading & Curb Management	■ Net loss of 35 potential parking spaces ■ Additional space for loading, ADA, or parklets will reduce parking further	■ Net gain of 24 potential parking spaces ■ Additional space for loading, ADA, or parklets will reduce parking further ■ Conflicts may arise from loading activity crossing separated bikeway
Public Transit Integration	■ Removes stop at Ramona Ave per *Complete Streets* study; removal of stop at Tacoma Ave requires further study ■ Requires further development of stop lengths, bus turning paths, ADA access & potential amenities	■ Likely requires boarding islands between bikeway & bus stop ■ Removes stops at Ramona Ave & Ventura Ave per *Complete Streets* study ■ Requires further development of stop lengths, bus turning paths, ADA access & potential amenities

Guidance for Asymmetrical Bikeways

This type of asymmetrical bikeway treatment is a recognized tool in urban design standards for hilly corridors, constrained streets, and mixed-use environments where available space or curbside demands prevent symmetrical facility placement. Two leading publications provide the most guidance for this type of asymmetrical bikeway facility:

- ***NACTO Urban Bikeway Design Guide (3rd edition):*** Section 3.1.3: Bikeway Operations

  "Where necessary, the asymmetrical application of constrained bike lanes or protected bike lanes may still be appropriate, as these designs will improve safety for everyone on the street."
- ***AASHTO Guide for the Development of Bicycle Facilities (5th Edition):*** Section 9.10: Bicycle Lanes on One Side of a Two-Way Street

Additional guidance documents, including the *FHWA Separated Bike Lane Planning & Design Guide* and the *Caltrans HDM Chapter 1000,* emphasize the overall importance of a context-sensitive, flexible design approach for bikeways in constrained environments and the selection of facility types based on factors such as roadway conditions, traffic operations, and adjacent land uses. Taken together, these sources provide a clear foundation for the proposed asymmetrical bikeway layout. While empirical data on identical configurations may be limited, the frequency with which similar designs have been implemented in urban corridors across the U.S. supports the conclusion that this approach is reasonable and aligned with accepted standards.

A key characteristic that makes this layout advantageous for Solano Avenue is its slope. The 3,300' segment reviewed in this memorandum has an average slope of 3.1% uphill in the eastbound direction. The steepest portion is the 600' segment between Key Route Boulevard and Ramona Avenue where the maximum slope is 5-6%. In these types of conditions, uphill biking/rolling tends to travel at 5-10 mph while downhill riders often travel closer to 15-25 mph, more closely matching motor vehicle traffic.

As discussed below, Solano Avenue's existing motor vehicle volume above 8,000 ADT exceeds the guidelines for shared lane facilities. As such, the westbound biking/rolling facility would be appropriate only for stronger, more confident riders.

Design Features & Considerations: Westbound (Downhill) Side

The proposed westbound configuration for Solano Avenue between Tulare Avenue and Masonic Avenue maintains a shared lane (Class III bikeway) for bicycles and motor vehicles. This configuration leverages the corridor's westward downslope, where riders naturally travel at speeds closer to motor vehicles (often 15-25 mph downhill), reducing the need for dedicated bike space while retaining curbside functions.

This design approach is consistent with guidance from NACTO, Caltrans, the *California Streets & Highways Code,* and emerging practices in constrained urban corridors with hilly topography. The key references for design guidance are:

- *NACTO Urban Bikeway Design Guide (3rd Edition)*
- *Caltrans HDM Chapter 1000*

- *California Manual on Uniform Traffic Control Devices (2026 draft)*
- *California Streets & Highways Code §891.9*

Cross-Section & Shared Lane Configuration

The westbound cross-section contains:

- 7-8' parallel parking lane along the north curb
- 11' shared motor vehicle/biking/rolling travel lane
- Sidewalk maintained along the north side

This layout follows the Class III bikeway treatment with shared lane markings or "sharrows," which are one part of a larger toolkit for bike routes in urbanized settings. The *NACTO Urban Bikeway Design Guide*—which is the basis for most recommendations in the *Active Transportation Plan* update currently in progress—recommends speeds of no more than 25 mph for shared bike facilities with a maximum motor-vehicle volume of 3,000 average daily traffic (ADT). To achieve NACTO's highest "All Ages and Abilities" standard, the maximums are 20 mph (which matches the current posted speed limit) and 2,000 ADT.

The concept reviewed in this memorandum does not present an ideal condition for westbound biking/rolling, but rather is a compromise to balance multimodal demands. While Solano Avenue generally meets the speed guidelines above, its motor-vehicle volume above 8,000 ADT substantially exceeds the guidelines for shared-lane facilities—and therefore this westbound biking/rolling facility would be appropriate only for stronger, more confident riders.

The proposed 11' westbound lane would include shared lane markings (sharrows) and R9-20 "Bicycles May Use Full Lane" signage, in accordance with the draft 2026 *California Manual on Uniform Traffic Control Devices* and *California Streets & Highways Code §891.9.* Specific marking placement includes:

- Initial sharrow within 50' of each intersection
- Spacing of 50'-250' thereafter
- Marking centered 13' from curb face where adjacent to parking

These markings support lateral positioning away from the door zone and discourage sidewalk or wrong-way riding, as affirmed by FHWA evaluations of shared lane markings.

Pedestrian/Walking Realm & Curb Extensions

With the exception of some corner treatments as described below, the concept presented in this memorandum fits within the street's existing curb-to-curb width. As such, it would preserve the existing pedestrian realm largely as-is, with little to no change in sidewalk widths and amenities.

To accommodate this cross-section at intersections, some existing curb extensions ("bulb-outs") at corners along the north side must be reduced in size at:

- Ramona Avenue
- Carmel Avenue
- San Carlos Avenue
- Santa Fe Avenue

- Neilson Street
- Peralta Avenue

These reductions are required to preserve a consistent 11' shared lane and parallel parking throughout the corridor. Although this slightly increases pedestrian crossing distances at these intersections, it preserves a consistent lane width and unobstructed path of travel for all users. Where feasible, future design refinements may consider offset or floating curb extensions that preserve pedestrian space without intruding into the travel lane.

Operations & Intersection Conflicts

By maintaining an 11' westbound lane, the concept encourages traffic calming, reinforcing the corridor's 20 mph posted speed limit. Downhill bicyclists, often traveling between 15-25 mph, are generally able to maintain pace with vehicle traffic, reducing overtaking conflicts. However, the narrowed lanes and conversion to parallel parking may encourage double-parking, which may impede traffic flow or encourage users to encroach into the eastbound travel lane.

At intersections and driveways, bicyclists benefit from clear sightlines and consistent lane control. Unlike protected lanes, which can introduce turning conflicts, the shared lane strategy places bicycles in a more visible position within the vehicular stream, improving mutual awareness.

However, the lack of dedicated bicycle space means that this treatment may feel less comfortable for less confident riders, especially during peak periods, in proximity to large vehicles, and when vehicles are double-parked or making parallel-parking maneuvers. Emphasis on signing, markings, enforcement, and driver education is essential to reinforce the shared lane environment.

Drainage & Maintenance

The modification of existing curb extensions and the re-establishment of a straight curb and gutter will alter existing drainage patterns. The concept reviewed in this memorandum assumes maintaining a continuous curb and gutter along the north side; however, design features such as inlet spacing likely will need to be adjusted to ensure proper stormwater collection. Westbound parallel parking runs next to the north curb, and stormwater runoff will follow that path. Key considerations include:

- Ensuring existing inlets are re-established at the curb line where curb extensions are removed
- Maintaining or adding catch basins at new low points
- Preserving a consistent cross slope to support drainage and ADA compliance

From a maintenance standpoint, sweeping operations can occur within the shared lane using standard-width equipment. Sharrow markings and lane signage must be maintained and refreshed regularly.

Design Features & Considerations: Eastbound (Uphill) Side

The proposed eastbound bikeway on Solano Avenue is designed as a Class IV protected facility running along the south side of the street. The corridor rises at an average 3.1% grade, with sections approaching 5-6% in the eastern segment. These slope conditions justify separation between uphill bicyclists—typically traveling at 5-10 mph—and faster-moving vehicles. The key references for design guidance are:

- *Caltrans Design Information Bulletin (DIB) 89-01: Class IV Bikeway Guidance*
- *Caltrans HDM Chapter 1000*
- *FHWA Separated Bike Lane Planning & Design Guide*
- *NACTO Urban Bikeway Design Guide (3rd Edition)*

Cross-Section & Physical Separation

To create the protected bikeway within the constrained right-of-way, the corridor's eastbound cross-section is reconfigured to include:

- 16' eastbound travel lane
- 14' angled parking zone
- 4' painted buffer equipped with parking curb stops
- 7' bikeway, located curbside
- Sidewalk along the southern curb, maintained in most locations

The bikeway itself provides 7' of clear width, meeting the *Caltrans DIB 89-01* preferred clear width for Class IV facilities. In some locations, a 1' gutter pan is included within this zone; however, even with this encroachment, the design maintains at least 6' of unobstructed, rideable surface, which is greater than the Caltrans minimum standard for rideable width of 5'. It is also advisable to be above the minimum standard of rideable width for this facility due to the potential for wrong-way cyclists to use the protected bikeway.

The adjacent 4' buffer exceeds the minimum width of 3' prescribed by the *Caltrans DIB 89-01* for parking-protected bikeways. This allows for overhang from parked vehicles and provides an additional safety factor appropriate for this preliminary level of design.

The resulting 18' separation between the vehicular travel lane and the bikeway—including angled parking and buffer—offers substantial protection for bicyclists. While vertical elements such as flexible delineators are not used, the striped buffer and physical curb stops between angled parking stalls and the bikeway create clear visual and spatial separation.

Pedestrian/Walking Realm & Curb Extensions

Similar to the westbound side—with the exception of curb extensions as described below—the concept presented in this memorandum fits within the street's existing curb-to-curb width. As such, it would preserve the existing pedestrian realm largely as-is, with little to no change in sidewalk widths and amenities.

The concept reviewed in this memorandum does require the removal of all existing curb extensions on the south side of Solano Avenue. These curb extensions—originally installed to improve pedestrian visibility and reduce crossing distances—obstruct the proposed alignment of the separated bikeway.

Operations & Intersection Conflicts

Parking-protected bikeways are a well-established tool in national and state-level bicycle design guidance, although the specific characteristics of the concept reviewed in this memorandum are somewhat unique. The *FHWA Separated Bike Lane Planning & Design Guide* defines separated (protected) bike lanes and explicitly identifies on-street parking as one of the acceptable forms of physical separation between bicyclists and motor vehicle traffic. Similarly, *Caltrans Design Information Bulletin (DIB) 89-01: Class IV Bikeway Guidance* defines Class IV separated bikeways as on-street bikeways separated from motor traffic by a physical barrier, including on-street parking. The NACTO *Urban Bikeway Design Guide (3rd Edition)* further treats protected bike lanes (including parking-protected variants) as standard, context-sensitive tools for building high-comfort, all-ages and abilities bikeway networks on urban streets.

Notably, these design guidelines do not distinguish between parallel and angled parking configurations. As a result, the use of angled parking as the protecting element in the concept reviewed here reflects an application of professional engineering judgment and emerging case studies, rather than a prescriptive, angle-specific standard.

This deviation is mitigated by the corridor's design geometry and the typical behavior of users of slow-speed streets. On local streets like Solano Avenue, corner sight distance criteria from traditional highway design manuals are applied more flexibly than on higher-speed arterials, with a greater emphasis on context-sensitive tools such as daylighting at crosswalks. In practice, drivers on constrained city streets often slowly encroach toward or partially into crosswalk areas to assess gaps and turning safety before entering the travel lane. This Solano Avenue concept relies on this operational behavior and the low posted speeds on the local main street as compared to highway-style sight distance tables.

Within this framework, the proposed parking-protected uphill bikeway on Solano Avenue creates approximately 18' of lateral separation between bicyclists and moving traffic. While the angled parking introduces additional visual clutter compared to parallel parking, the 18' envelope occupied by parked vehicles and the buffer provides a generous area for turning drivers space to slowly encroach, align themselves, and look for approaching traffic in the travel lanes. Similarly, vehicles entering intersections or driveways from the eastbound travel lane can turn across the 18' staging area at low speeds, allowing for visibility checks before crossing the bikeway. While this condition does not meet strict FHWA "daylighting" guidelines around driveways, the available maneuvering and staging space serves as a mitigation to enable safer interactions at driveways.

Additionally, because the parking-protected facility is located on the uphill side where biking/rolling users are expected to travel at relatively lower speeds (5-10 mph), this provides crossing vehicles more time to react as compared to a flat or downhill segment.

Taken together, the use of parking as a separating element, the 18' of staging space provided by the angled parking and buffer, and the anticipated lower speeds in the uphill direction support the conclusion that the proposed parking-protected bikeway conforms with prevailing design standards for sight distance and driveway operations on local streets. While detailed intersection and driveway

design will still be required in later phases, the concept as currently shown is consistent with accepted guidelines for parking-protected bikeways.

Drainage & Maintenance

By keeping the bikeway at street level and removing curb extensions, existing drainage patterns will shift as surface runoff flows naturally along the curb line. As with the westbound side, design should maintain adequate inlet spacing and evaluate locations for catch basins at low points.

From a maintenance standpoint, the inclusion of a buffer zone preserves access for service vehicles and personnel. However, the bikeway's narrower protected space will require compact sweepers to effectively clean the facility, and regular sweeping will be necessary to manage debris accumulation.

Parking, Loading & Curb Management

The concept reviewed in this memorandum includes reconfiguration of on-street parking in both directions to accommodate multimodal improvements. While a significant portion of existing parking is potentially retained, the configuration, location, and total number of spaces are adjusted to align with the proposed cross sections and design constraints.

After subtracting space for bus stops, driveways, and areas needed to provide clearance from crosswalks and driveways, this parking estimate considers all remaining curb space as potential parking spaces regardless of whether such curb space is currently designated as a loading zone, accessible parking, or parklet. Future phases of the project may identify additional short-term loading zones, accessible parking, or time-limited spaces based on frontage conditions and user needs. Additionally, side streets may offer supplemental parking to offset localized reductions.

Overall, as summarized below and detailed in the attached conceptual plan, the proposed concept results in a net corridor-wide parking loss of 11 potential spaces or 6%, balancing a gain of 24 spaces or 30% on the eastbound (south) side with a loss of 35 potential spaces or 34% on the westbound (north) side.

Table 2: Parking Summary

Street Side	Existing Conditions	Potential Proposed Concept	Potential Quantity Change	Potential Percent Change
Westbound (Downhill) Side	104	69	- 35	- 34%
Eastbound (Uphill) Side	80	104	+ 24	+ 30%
Total	184	173	- 11	- 6%

Westbound (Downhill) Parking

On the westbound side, the design proposes a conversion from 45-degree angled parking to parallel parking along the north curb. This change accommodates a shared lane (Class III bikeway) that enables downhill bicyclists—traveling at vehicle-comparable speeds of 15-25 mph—to share the lane with motor vehicles. Parallel parking presents competing benefits and tradeoffs compared to angled parking for both motor vehicles and biking/rolling:

- Provides clearer sight lines of the adjacent eastbound travel lane for drivers exiting spaces.
- May be more difficult for drivers to enter compared to angled parking, and introduces a new risk to biking/rolling users in the form of "dooring" (motor vehicle users opening doors into the bikeway).

Considering these factors and the overall goals of the project to balance competing multimodal demands, eastbound parallel parking provides a reasonable solution that minimizes potential tradeoffs.

This reconfiguration from angled to parallel parking results in a net loss of 35 spaces on the westbound side, reducing parking from 104 existing spaces to 69 proposed. Most blocks along the corridor experience a small reduction (2–5 spaces), with cumulative effects across the full alignment. Estimated parking changes at this stage of analysis—not including potential future changes to accommodate additional ADA parking or loading zones—are:

- **Tulare to Ventura Avenue:** –5 spaces (14 → 9)
- **Tacoma to Peralta Avenue:** –4 spaces (13 → 9)
- **Pomona to Key Route Boulevard:** –4 spaces (8 → 4)

Despite these reductions, the parallel parking layout provides improved operational safety by:

- Eliminating vehicle back-out conflicts into a shared bike lane
- Enhancing visibility at intersections and driveways
- Allowing for better lane control and consistent lane width for cyclists

However, parallel parking also can be slower or less convenient for some drivers, and also leaves less passing room in the event of double-parking. The City will need to set curb management policies governing on-street parking, loading, accessible parking, and other elements that will likely reduce the supply of on-street parking estimated in this draft concept.

Eastbound (Uphill) Parking

In the eastbound direction, the proposed design retains and slightly expands on-street parking along the south curb by changing the angled parking from an existing condition of approximately 45 degrees to 60 degrees. This angled parking not only serves commercial frontage and short-term curb use but also plays a critical role in buffering the Class IV bikeway.

To implement the full cross section all south side curb extensions are proposed to be removed. This removal ensures that a continuous parking and bikeway alignment can be achieved without introducing pinch points or irregular cross sections. Notably, while curb extensions are being removed, the corridor gains a net increase in eastbound parking spaces. Based on segment-level analysis—and not including potential future changes to accommodate additional ADA parking or loading zones—the number of parking spaces on the eastbound side increases from 80 existing spaces to 104 proposed, for a net gain of 24 spaces. Key changes by block include:

- **Ramona to Carmel Ave:** +5 spaces (11 → 16)
- **Ordway to Ventura Ave:** +5 spaces (8 → 13)
- **Pomona to Ramona Ave:** +3 spaces (9 → 12)
- **Peralta to Ordway Ave:** +4 spaces (10 → 14)
- **Ventura to Tulare Ave:** +2 spaces (5 → 7)

The angled parking configuration maintains vehicular convenience while also calming eastbound traffic by visually narrowing the lane. In constrained commercial corridors, this combined function of parking as both an access feature and a protective element is an accepted practice.

Public Transit Integration

The project section of Solano Avenue is currently served by two AC Transit bus routes:

- Line 18: Local service connecting University Village, Berkeley, and Oakland. Generally operates at 15-minute service frequency all day in both directions.
- Line G: Commuter service connecting El Cerrito, Albany, and Berkeley to the San Francisco Salesforce Transit Center. Generally operates four morning trips to San Francisco in the 7-9am peak period and four afternoon trips from San Francisco in the 4-7pm peak period.

The concept under review in this technical memorandum removes an existing pair of bus stops at Ramona Avenue (in both directions) consistent with recommendations from the 2019 *Solano Avenue Complete Streets and Corridor Revitalization Study.* That study also recommended the removal of the existing bus stop pair at Tacoma Avenue/Ventura Avenue. The draft concept presented here removes the eastbound stop at Ventura Avenue, but does not modify the westbound stop at Tacoma Avenue as this requires further study of this unique intersection. If the Tacoma Avenue bus stop is removed, it could provide an additional two parallel parking spaces in the westbound direction, but this is not assumed in the current parking estimates.

All bus stops broadly conform to AC Transit's *Transit-Supportive Design Guidelines* and were reviewed by AC Transit staff. The draft concept assumes an in-lane boarding configuration for each stop, which minimizes curbside impacts and avoids the space and circulation challenges posed by pull-out bays in a constrained corridor. In-lane boarding also enables buses to stop directly in the travel lane without having to re-merge, improving efficiency and dwell time performance. On the eastbound side, where a protected bikeway is proposed, this configuration will require boarding islands between the bikeway and travel lane to facilitate safe and accessible boarding.

These assumptions for the integration of public transit will require further development review as the project progresses. Specifically, additional design coordination should include more detailed site-specific evaluations of stop lengths, bus turning paths, ADA access, and potential transit-user amenities.

Appendix: Examples of Similar Facilities

To support the feasibility of the proposed concept for Solano Avenue, the project team conducted a brief review of other urban corridors where similar bicycle facility treatments have been implemented. These examples are not intended to be direct performance evaluations, as detailed before-and-after data on bicycle volumes, collision history, or user satisfaction was not available for most of the corridors reviewed. Instead, they serve as qualitative references, offering a comparative look at how other jurisdictions have applied similar design strategies in contextually relevant environments.

Each of the selected corridors shares key characteristics with Solano Avenue, such as mixed commercial and residential land uses, asymmetrical bikeway configurations, parking-protected bikeways, transit service, and constrained rights-of-way requiring creative curbside trade-offs. While the specific design details vary, these examples demonstrate that similar approaches have been successfully implemented in diverse urban settings.

The intent of including these examples is to show that the proposed concept for Solano Avenue is not unprecedented. Rather, it reflects an emerging design pattern in multimodal street planning. Given the number and diversity of comparable corridors where these treatments have been deployed, it is reasonable to conclude that the proposed bikeway concept—particularly the use of a protected climbing lane and shared downhill lane—has a practical foundation and is likely to function effectively in this context. Table 3 lists the example locations and some of their key characteristics, with further discussion on the following pages.

Table 3: Case Studies of Similar Facilities

Street	Land Use Context	Asymmetrical Bikeway	Parking Protected Bikeway	On-Street Parking
Polk Street San Francisco	Commercial/ residential mixed use	X		Parallel both sides
20th Avenue San Francisco	Residential	X		Parallel both sides
Fremont Avenue Seattle	Commercial/ residential mixed use	X		Parallel both sides
Voltaire Street San Diego	Commercial/ residential mixed use	X		Parallel both sides
Avenue 51 Los Angeles	Commercial; residential	X		Parallel both sides
Hearst Avenue Berkeley	Institutional; park	X		Reverse angle one side; parallel one side
Lincoln Boulevard San Francisco	Park	X		None
Bay Street San Francisco	Residential; park; school	X	X	Reverse angle one side; parallel one side

Polk Street, San Francisco

Between Union and California Streets, Polk Street in San Francisco (sometimes referred to as "Lower Polk") features a downhill shared bike route (Class III bikeway) approximately 12-13' wide paired with an uphill bike lane approximately 6-7' wide without buffer. Both sides of the street have parallel parking, parklets, and curb extensions. The street also serves a local bus route operated by San Francisco MTA.

Table 4: Key Characteristics, Polk Street

Street	Land Use Context	Asymmetrical Bikeway	Parking Protected Bikeway	On-Street Parking
Polk Street San Francisco	Commercial/ residential mixed use	X		Parallel both sides

Figure 2: Polk Street, San Francisco

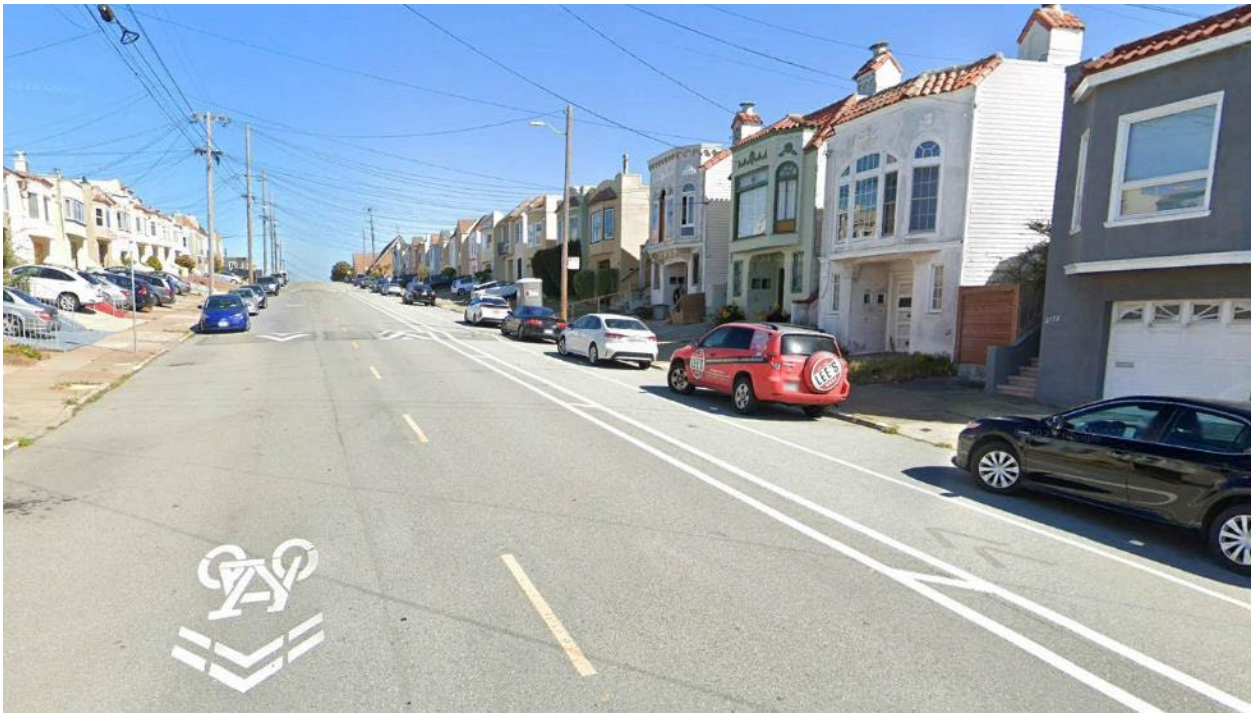
20th Avenue, San Francisco

20th Avenue in San Francisco's Sunset neighborhood features a shared bike route (Class III bikeway) approximately 12-13' wide paired with an uphill buffered bike lane approximately 8' wide (6' lane with 2' buffer). The street also includes speed humps and parallel parking on both sides.

Table 5: Key Characteristics, 20th Avenue

Street	Land Use Context	Asymmetrical Bikeway	Parking Protected Bikeway	On-Street Parking
20th Avenue San Francisco	Residential	X		Parallel both sides

Figure 3: 20th Avenue, San Francisco



Fremont Avenue, Seattle

Fremont Avenue in Seattle's Fremont neighborhood features a downhill shared bike route (Class III bikeway) approximately 10-11' wide paired with an uphill bike lane approximately 5' wide without buffer. Both sides of the street have parallel parking, plus painted curb extensions with delineators near key intersections. The street also serves a local bus route operated by King County Metro.

Table 6: Key Characteristics, Fremont Avenue

Street	Land Use Context	Asymmetrical Bikeway	Parking Protected Bikeway	On-Street Parking
Fremont Avenue Seattle	Commercial/ residential mixed use	X		Parallel both sides

Figure 4: Fremont Avenue, Seattle

Voltaire Street, San Diego

Voltaire Street in San Diego's Point Loma neighborhood has a downhill shared bike route (Class III bikeway) approximately 11' wide paired with an uphill striped bike lane approximately 5.5'-6' wide without buffer. Both sides of the street have parallel parking, and the street also serves a local bus route operated by San Diego MTS.

Table 7: Key Characteristics, Voltaire Street

Street	Land Use Context	Asymmetrical Bikeway	Parking Protected Bikeway	On-Street Parking
Voltaire Street San Diego	Commercial/ residential mixed use	X		Parallel both sides

Figure 5: Voltaire Street, San Diego

Avenue 51, Los Angeles

Avenue 51 in Los Angeles's Highland Park neighborhood features a downhill shared bike route (Class III bikeway) approximately 10'-11' wide paired with an uphill bike lane approximately 5' wide without buffer. Both sides of the street have parallel parking.

Table 8: Key Characteristics, Avenue 51

Street	Land Use Context	Asymmetrical Bikeway	Parking Protected Bikeway	On-Street Parking
Avenue 51 Los Angeles	Commercial; residential	X		Parallel both sides

Figure 6: Avenue 51, Los Angeles

Hearst Avenue, Berkeley

Hearst Avenue in Berkeley, east of Oxford Street on the UC Berkeley campus, has a separated westbound and eastbound roadway due to existing grades. The downhill (westbound) side features a shared bike route (Class III bikeway) approximately 12'-13' alongside parallel parking and a loading zone. The uphill (eastbound) side features a buffered bike lane approximately 5'-6' wide with 1'-2' buffer, and no parking. The street also serves several local bus routes operated by AC Transit and UC Berkeley.

Table 9: Key Characteristics, Hearst Avenue

Street	Land Use Context	Asymmetrical Bikeway	Parking Protected Bikeway	On-Street Parking
Hearst Avenue Berkeley	Institutional; park	X		Reverse angle one side; parallel one side

Figure 7: Hearst Avenue, Berkeley

Lincoln Boulevard, San Francisco

Lincoln Boulevard in San Francisco's Presidio district features a downhill shared bike route (Class III bikeway) approximately 12' wide paired with an uphill buffered bike lane approximately 6'-8' wide (4'-6' lane plus 1'-2' buffer). The street does not include parking on either side.

Table 10: Key Characteristics, Lincoln Boulevard

Street	Land Use Context	Asymmetrical Bikeway	Parking Protected Bikeway	On-Street Parking
Lincoln Boulevard San Francisco	Park	X		None

Figure 8: Lincoln Boulevard, San Francisco

Bay Street, San Francisco

Bay Street in San Francisco, between Fillmore Street and Laguna Street, has an asymmetrical bikeway design that provides a different example than the previous cases. While Bay Street's curb-to-curb width of approximately 80' is not an apt comparison to Solano Avenue, its uphill side contains a bikeway protected by angled parking, similar to the proposed concept for eastbound Solano Avenue. The bikeway is approximately 12' wide (8' bike lane with a 4' buffer) and borders Moscone Park and a middle school, including several driveways. The parking is reverse-angle, which differs from the proposed Solano concept, but the two cases are functionally similar in terms of bikeway operation.

Table 11: Key Characteristics, Bay Street

Street	Land Use Context	Asymmetrical Bikeway	Parking Protected Bikeway	On-Street Parking
Bay Street San Francisco	Residential; park; school	X	X	Reverse angle one side; parallel one side

Figure 9: Bay Street, San Francisco