SANDAG

CHAPTER 3
TRANSPORTATION ASSESSMENT AND RECOMMENDATIONS

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Contents

3.0 Introduction

This chapter evaluates near-term, quick-build improvements and identifies which may be more suitable for high-opportunity transit corridors across the San Diego region. The evaluation was informed by the corridor performance analysis from Chapter 1, continued research, and input from partners and the community. The recommendations outlined in this document aim to address urgent challenges related to transit delay, safety, and access, particularly in communities that rely most on public transportation. They reflect a regional effort to deliver meaningful transit upgrades now, while longer-term investments continue to advance through planning and design.

The primary audiences for this chapter are:

- Transit operators (MTS and NCTD): to identify corridors where near-term improvements can deliver operational benefits. To learn more about quick-build treatments, including non-standard materials and products.
- Jurisdictions: to give some ideas of what corridors may provide opportunities for partnership, and where right-of-way or political considerations may affect implementation.
- Community members: to understand a transparent, defensible process that documents how quick-build treatment recommendations are informed by data analysis, community feedback, and agency input.

This memo is organized into two sections:

3.1 Quick-Build Treatments

- A high-level outline of what quick-build treatments are out there, and what their use cases, costs, and drawbacks are.

3.2 Recommended Treatments for Opportunity Corridors

- Looks deeper into the highest-scoring corridors from Chapter 1 and summarizes the existing issues and opportunities for each; recommends potential treatments.

3.1 Quick-Build Treatments

Quick-Build Treatment Matrix

The Quick-Build Treatment Matrix is a tool designed to help identify practical, low-cost transit improvements that can be delivered in the near term. It consolidates 16 strategies that can respond to challenges identified through the corridor performance analysis and stakeholder engagement.

The matrix reflects lessons learned from previous quick-build projects implemented within the San Diego region and best practices from around the country. Focusing on treatments that have already been implemented, it aims to give a reference for what options are out there to improve transit in the near term.

Each of the 16 treatments is classified into one of five functional categories:

1. Bus stop and shelter enhancements
2. Curbside enhancements
3. Street and intersection enhancements
4. Lighting, signage, and wayfinding
5. Bus priority lanes

To guide decision-making, the matrix incorporates information on safety performance, ridership potential, equity impacts, and contextual fit. These criteria build on the corridor scoring process, ensuring that treatment choices remain grounded in both data and context. Cost tiers and implementation timelines are also included to support early phasing assessments and identify opportunities to coordinate with other roadway projects.

Table 3.1 summarizes the treatments considered through this process. While not every strategy will be suitable for every setting, the matrix offers an initial reference point to build upon.

The Level of Investment and Complexity columns were recorded in the table as low, medium, and high. Table 1 is a general overview, and specific details on what factors went into determining level of investment and complexity can be found in Appendix 3A. For the purpose of this document, these factors were kept at a higher level.

Table 1: Quick-Build Treatment Matrix

Quick-Build Treatment	What issues do they address?			Level of Investment	Complexity
	Safety	Accessibility	Reliability		
Bus Stop and Shelter Enhancements					
Temporary Bus Bulbs/Platforms	X	X	X	Medium	Low
Alternative Bus Stop Seating		X		Low	Low
Bus Stop Adjustments			X	Low	Low
Curbside Enhancements					
Bus Zone Lengthening			X	Medium	Low
Parking Removal			X	Low	Low
Beautification	X	X		Varies	Low
Street and Intersection Enhancements					
Transit Signal Priority (TSP)			X	High	High
Intersection Queue Jump/Bypass			X	High	Medium
Transit Only/Keep Clear Markings	X		X	Low	Low
Crosswalk and Pedestrian Improvements	X	X		Medium	Low
Lighting, Signage, and Wayfinding					
Solar-Powered LED Lighting	X	X		Low	Low
High-Contrast Wayfinding and Signage		X		Low	Low
Bus Priority Lanes					
Dedicated Bus Lanes			X	High	High
Peak-Period Bus Lanes			X	High	High
Bus Priority/Right Turn Lanes			X	High	High
Bus-Bike Shared Lanes	X		X	High	High

Appendix 3A: Quick-Build Profiles

The matrix above is a highly abridged version of the information presented in Appendix 3A. This appendix compiles research into concise "one-pagers" that outline the benefits, use-cases, costs, and other key considerations for each treatment type. It is intended as a reference for additional detail and to elaborate on the themes identified in Table 1. For more detailed information on the treatments, which will be extensively referenced in section 3.2 of this document, see Appendix 3A.

The one-pagers also include the sources that the Project Development Team (PDT) used to gather information on all of the treatments, such that readers can find out more about case studies and where in the San Diego region these treatments have already been used.

Appendix 3B: Treatment Cost Calculator

Appendix 3B is a repository of cost information that offers two complementary resources to support understanding of quick-build project costs and development of preliminary cost estimates.

- Cost data repository: The tables in this repository compile unit costs for the different products and treatments described in Appendix 3A. This includes pricing for specific products and materials, estimated implementation costs, and cost ranges from recent projects in the region.
- Interactive tool: This tool allows users to develop bottom-up, project-level cost estimates. By entering project details, including quantities of desired treatments or products, the tool generates a preliminary estimate of total implementation cost.

While most jurisdictions and larger organizations have standardized processes for performing cost estimation (i.e. cost estimate handbooks), there are many stakeholders without access to such resources. Additionally, there are many quick-build treatments, including modular products, custom designs, or other non-standard treatments, which are captured in this repository. This calculator can be a handy tool for the public or other stakeholders to interact with and visualize the advantages and disadvantages of quick-builds, in regards to cost. For example, users can see the relationship between low-cost, temporary treatments, and how their lower lifespans can affect maintenance costs.

The cost calculator was used to develop the unit cost estimates identified in Appendix 3A and to support the recommended improvements on the corridors. While costs were only estimated for the two top corridors for design, all the treatments identified in the profiles and matrix can be found and estimated by using the cost calculator.

Note that this calculator is for high-level estimation purposes only, and only uses data available to the public, such as **Caltrans Contract Cost** data. This data and calculator are not used internally by SANDAG to create detailed engineering cost estimates and was used for this project to highlight a range of possible costs for the implementation and maintenance quick-build materials. These costs are not guaranteed to be accurate and should be confirmed before including in any future projects.

3.2 Recommended Treatments for Opportunity Corridors

In Chapters 1 and 2, the PDT collaborated with transit operators, community-based organizations, local jurisdictions, and transportation engineers to identify priority corridors where quick-build improvements could deliver the greatest near-term impact. Each corridor was selected based on a combination of corridor-level data, stakeholder input, and engineering feasibility.

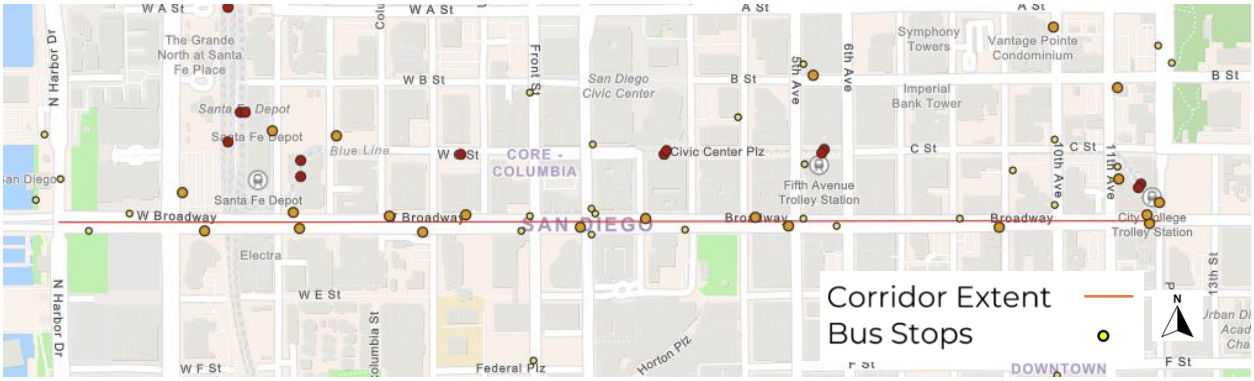
In this section, the top five selected corridors from each of the NCTD and MTS service areas were analyzed in more detail to understand what opportunities exist for near-term improvements. Engineering staff played a critical role in evaluating physical constraints, such as right-of-way availability, signal infrastructure, and sidewalk width to ensure that recommended treatments could be implemented with minimal disruption. Such expertise helped refine the initial list of potential interventions, focusing recommendations on treatments that are both responsive to performance issues and technically viable within the corridor's spatial and regulatory context.

Although all selected corridors present opportunities for meaningful improvements, the viability of specific treatments varies depending on local physical constraints, jurisdictional readiness, and long-term maintenance capacity. In a region as complex as San Diego, with overlapping agency responsibilities and diverse community contexts, each recommendation reflects a careful balance between what is desired, what is feasible, and what aligns with broader transit priorities and available resources.

Additionally, the following analyses are high-level and qualitative and should be used only as examples of how project teams can assess corridors early on and assign recommended potential treatments for further analysis. Future implementation of any of the recommended treatments would require further study and collaboration between SANDAG and partner agencies after On the Move.

MTS Corridor for Design

Downtown (Broadway)



Characteristics

- Safety
- On-Time Performance
- High Ridership

Treatment Opportunities and Suitability

- Bus platforms (Medium)
- Pedestrian curb extensions (High)
- Parking Removal (Medium)
- Bus/Bike Shared Lane (Medium)
- Bus Priority/Right Turn Lanes (Medium)

Analysis and Recommendations

Through the corridor evaluation completed in Chapter 1, the Downtown (Broadway) Corridor rose to the top due to its high ridership, issues with on-time performance, and safety.

The PDT evaluated different quick-build bus treatments for deployment in the corridor through stakeholder outreach, site visits, and case study research. Based on scoring results, Broadway was selected as the corridor to advance to conceptual design for the MTS service area.

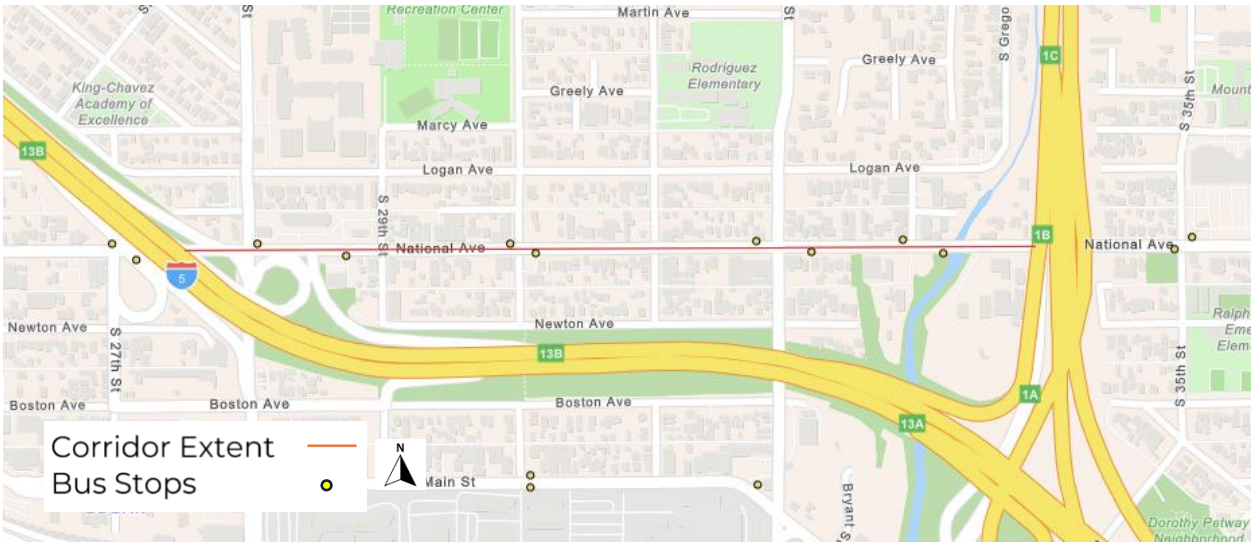
See Chapter 4A for a full analysis of existing conditions, recommendations for quick-build improvements, and conceptual design drawings for this corridor.

Other MTS Corridors

The PDT conducted high-level assessments and developed initial recommendations for the other four highest-scoring corridors in the MTS area. This section narrows down the range of available quick-build treatments for each of the corridors and presents recommendations expected to deliver the greatest benefit, based on corridor characteristics and insights from the Corridor Scoring process. For more information on the treatments recommended in the following sections, see Appendix 3A.

Logan Heights

National Avenue from SR 15 to I-5



Characteristics

- On-Time Performance
- High Ridership
- Delay

Qualitative Analysis

Bus Stops and Shelters

- Bus stop seating: Some stops on the corridor lack seating (EB National Avenue & 30th Street and EB/WB National Avenue & 33rd Street) and would benefit from quick-build seating installation.
    - i.e. Simme Seats (product) or Bus Cube (product)
- Bus stop consolidation: Bus stops in this corridor are very close together (800 feet apart or closer), and some are less frequently used. By thoughtfully consolidating select stops, riders could experience faster trips, while transit agencies could reinvest savings into other service improvements.
- Bus platforms: Some stops (e.g. *WB National Avenue & 30th Street*) could benefit from bus platforms, due to road being a wide single-lane street where buses must exit and reenter traffic.
    - i.e. Zicla Bus Platform (product)

Curbside

- Beautification: Southeastern San Diego has programs and organizations that fund murals, art installations, and other beautification efforts across the region. Southeastern Economic Development Corp., for example, has funded both small- and large-scale murals at bus stops in Shell Town (near Logan Heights).

Street and Intersections

- Queue jumps: Intersections likely do not have room for queue jumps, due to narrow road geometry. Additionally, many of the intersections are not signalized.
- Crosswalk and pedestrian improvements: While the intersection at National Ave. & 30th St. has continental crosswalks, most of the other intersections, including a large intersection at National Ave. & 28th St., lack crosswalks and pedestrian facilities and could consider quick-build safety improvements.

Lighting, Signage, and Wayfinding

- Bus Stop lighting: Many stops lack lighting and would benefit from quick-build lighting solutions, especially along the eastern end of the corridor.
    - i.e. SEPCO Bus Stop Lighting Pole (product)

Bus Priority

- Bus priority lanes: Not highly feasible due to lack of roadway right-of-way. Additionally, it is not a high-volume bus service corridor.

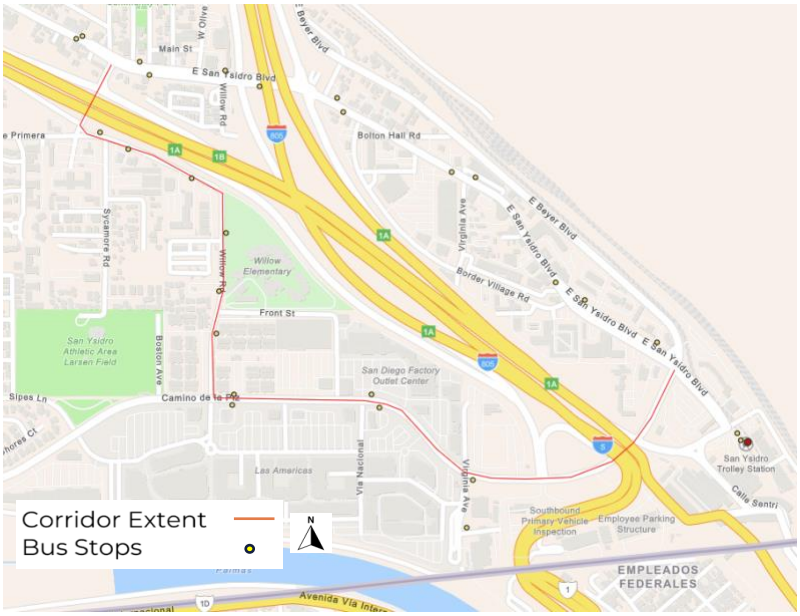
Community and Jurisdiction Support

Feedback from the SANDAG Social Equity Working Group indicates that there is a desire for improved investment in safety treatments for pedestrians and bus stop users, as the corridor belongs to a historically disadvantaged community. The corridor is a significant connection from the civic core to southeast San Diego, and Route 12 is one of the highest ridership local routes.

It only serves MTS Route 12; but *Rapid 212* is a planned future route along this roadway, which could serve as the impetus for implementing near-term, quick-build improvements. There could be potential for quick-builds in priming the corridor for eventual Rapid implementation. The older, thinner, streets and sidewalks would likely need improvements to accommodate a new Rapid route and could benefit from quick-build pilots.

San Ysidro

Camino de la Plaza and Willow Road from San Ysidro Boulevard to Calle Primera



Characteristics

- Safety
- Delay
- On-Time Performance

Qualitative Analysis

Bus Stops and Shelters

- Bus stop seating: Some stops on the corridor do not have seating (Willow Rd & 241-265 and Willow Rd & Calle Primera) and would benefit from quick-build seating implementation.
    - i.e. Simme Seats (product) or Bus Cube (product)
- Bus stop consolidation: Two of the bus stops (Willow Road and Sycamore) and Willow Road and Calle Primera) are very close together (less than 600 feet apart), with both being lower ridership stops (less than 50 riders per day). By thoughtfully consolidating select stops, riders could experience faster trips, while transit agencies could reinvest savings into other service improvements.

Curbside

- Beautification: Murals and art installations at South San Diego bus stops have been done in the past to improve rider experience and community trust. (i.e. **West Otay Mesa**). On Willow Road, there is potential to beautify bus stops near Willow Elementary, making them safer and more comfortable for students.

Street and Intersections

- Queue jumps: There may be potential for queue jumps along Camino de la Plaza. Via Nacional, for example, may have room in the existing right-turn pocket/bus stop to allow buses to jump the queue.
- Crosswalk and pedestrian improvements: Intersections at Calle Primera and Via De San Ysidro could be made into continental crosswalks. Additionally, Calle Primera & Sycamore Rd. bus stop is on the side of the street without sidewalks, necessitating that pedestrians cross the street in an unsafe manner. A quick-build pedestrian crosswalk could potentially create a connection to that stop and increase accessibility.
    - i.e. US Reflector Modular Pedestrian Refuge Island (product)

Lighting, Signage, and Wayfinding

- Bus stop lighting: There is potential for lighting at many stops along the corridor, including most stops on the Willow Road segment. For example, Willow Rd and Calle Primera (in front of Willow Elementary), should be well lit for the safety of students.
    - i.e. SEPCO Bus Stop Lighting Pole (product)

Bus Priority

- Bus priority lanes: Improvements along Camino de la Plaza may require substantial capital investment to see significant improvements to delay or on-time performance. Many proposed quick build treatments, including bus priority, are not feasible on sections of Willow Road, due to older residential street geometry.

Community and Jurisdiction Support

MTS strongly supported prioritizing this corridor and initially preferred San Ysidro as the corridor from the MTS service area to advance to conceptual design. However, after further assessment, the PDT determined that the bus priority improvements would involve major infrastructure changes that created feasibility concerns, and therefore the corridor was not pursued.

The corridor along Calle Primera should be a priority for bus treatments, such as queue jumps or other capital-intensive treatments. The significant existing bus and auto traffic, and potential addition of two new planned routes (*Rapid* 640 and 688) necessitate such improvements. Along Willow Road, improvements should aim to bring level of amenities up to standard and to reduce potential conflicts between community and through-traffic.

Genesee (University City)

La Jolla Village Drive to SR 52

Characteristics

- High Ridership
- Delay
- Accessibility

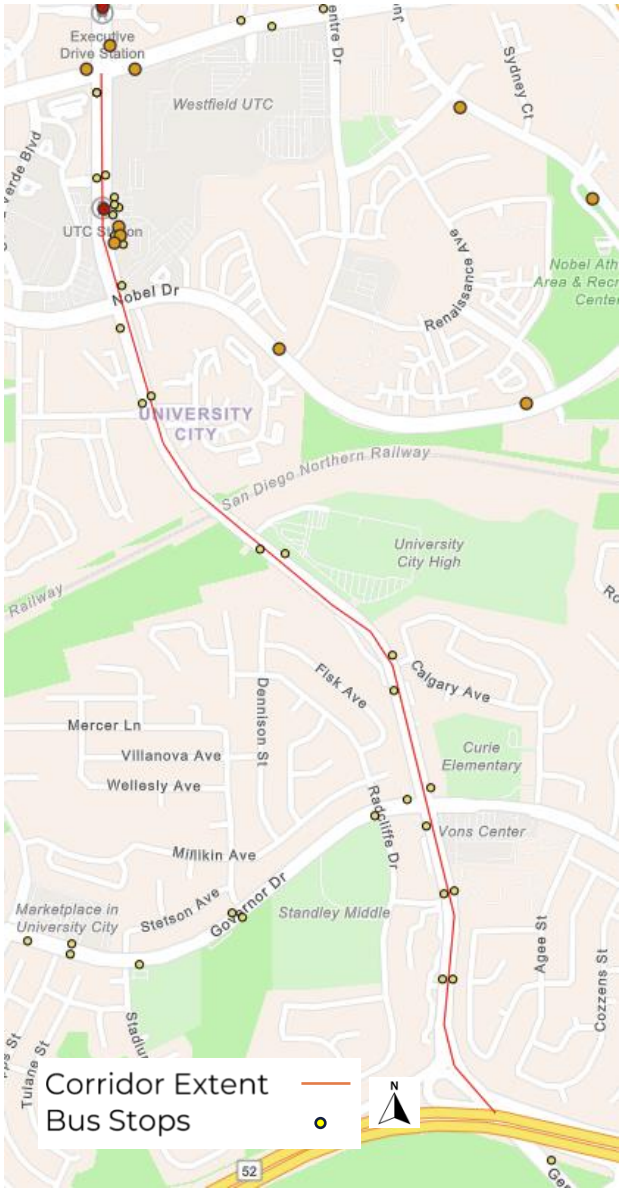
Qualitative Analysis

Bus Stops and Shelters

- Bus stop seating: Some stops on the corridor do not have seating (NB Genesee Avenue & April Court, and NB Genesee Avenue & Calgary Drive) and would benefit from quick-build seating installation.
    - i.e. Simme Seats (product) or Bus Cube (product)

Street and Intersections

- Transit signal prioritization and queue jumps: The corridor scoring showed significant peak-period delay along the corridor, especially along the southern part of the corridor. There may be room for queue jumps at specific intersections (i.e. Genesee and Governor Dr.) while the northern part of the corridor, near UTC mall, may be more complex than quick-builds could solve.
- Crosswalk and pedestrian improvements: Many intersections lack crosswalks and pedestrian facilities and could consider quick-build implementation. Genesee and Nobel could use improved continental crosswalks. Given the wide roadways, modular median products could improve the comfort of crossing for pedestrians.
    - i.e. US Reflector Modular Pedestrian Refuge Island (product)



Lighting, Signage, and Wayfinding

- Bus stop lighting: Many stops lack lighting (e.g. SB Genesee Avenue & Radcliffe Lane) and would benefit from quick-build lighting solutions, especially on the southern end of the corridor.
    - i.e. SEPCO Bus Stop Lighting Pole (product)

Bus Priority

- Bus priority lanes: While this corridor may have a wide right-of-way, its high traffic volumes and importance as an arterial for north-south traffic may make implementation of bus priority lanes difficult, in a quick-build fashion.

Community and Jurisdiction Support

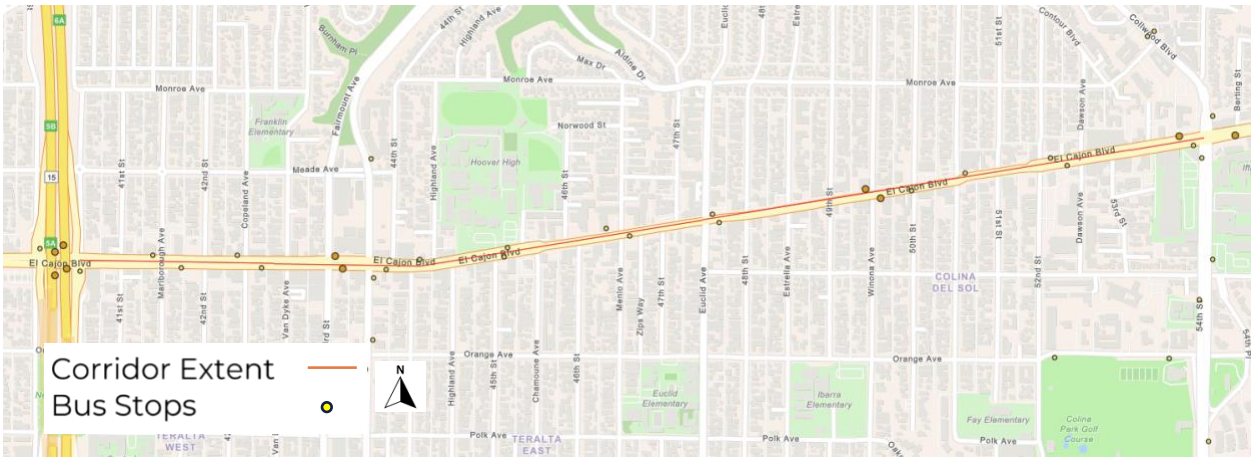
The northern segment of the Genesee corridor has seen recent significant infrastructure improvements. However, peak-period congestion on the southern portion of Genesee, continues to be an issue for drivers and transit users.

Genesee is one of the highest ridership corridors in the system, providing service to Westfield UTC mall (and major transfer activity at the UTC Transit Center) and UC San Diego proposed *Rapid* 41 on corridor could spur additional support for improved near-term bus treatments.

Conversations with the City of San Diego during PDT meetings indicated that the city would strongly support improvements to bus priority along the corridor, especially as a precursor to the proposed *Rapid 41* bus improvements. While there is potential to improve the stop experience and reduce delay through intersection treatments, there may be more difficulty in implementing bus priority along the corridor.

El Cajon Boulevard

SR 15 to 54th Street



Characteristics

- Safety
- On-Time Performance
- High Ridership
- Priority Facilities

Qualitative Analysis

Bus Stops and Shelters

- Bus stop seating: Some stops on the corridor do not have seating (EB/WB El Cajon Boulevard & Euclid Avenue, El Cajon Boulevard & Altadena Avenue) and would benefit from quick-build seating installation.
    - i.e. Simme Seats (product) or Bus Cube (product)
- Bus stop consolidation: Many bus stops on the corridor are very close together (less than 800 feet apart), with some being lower-ridership stops (less than 50 riders per day). While this is feasible, it would possibly be a more involved effort requiring corridor-wide analysis to equitably redistribute stops, which would be beyond the level of a quick-build.
    - i.e. similar to **30th Street Bus Stop Rebalancing (MTS)**
- Bus platforms: Some stops (e.g. WB El Cajon Boulevard & 52nd Street) could possibly see benefits from bus platforms to keep buses from having to exit and reenter traffic. These stops are tighter to pull in and out of than other stops, due to nearby driveways.

Street and Intersections

- Transit signal prioritization and queue jumps: On El Cajon Boulevard, TSP infrastructure already exists as it was installed for the Mid-City Rapid project. While some improvements are possible, it is likely that a corridor-wide implementation of improved signal improvements would be beyond the scope of a quick-build.

- Crosswalk and pedestrian improvements: The cross-streets are narrow and relatively easy to cross (parallel to El Cajon Boulevard). However, some intersections (i.e. 49th St.) have curb cuts for pedestrians, but no pedestrian signage, crosswalk, or other safety features. While improvements have been undertaken recently, especially west of Menlo Ave., there are safety concerns at many unsignalized intersections.
    - i.e. Rapid Rectangular Flashing Beacon
    - i.e. US Reflector Modular Pedestrian Refuge Island (product)

Lighting, Signage, and Wayfinding

- Bus stop lighting: Many stops lack lighting and would benefit from quick-build lighting solutions. The prioritization of these stops could be undertaken as part of a larger assessment of stop amenities along the El Cajon Boulevard corridor. Higher ridership stops should likely be prioritized.
    - i.e. SEPCO Bus Stop Lighting Pole (product)

Bus Priority

- Bus priority lanes: Exist at the eastern end of the El Cajon Boulevard busway until the corridor reduces in width, where the lane ends. A bus priority lane any further east than this would require the constriction of general traffic to one lane, which may be infeasible, depending on traffic conditions on the corridor.

Community and Jurisdiction Support

Many partners support the implementation of quick-build projects along El Cajon Boulevard, especially as major capital improvements are already in the planning process. Quick-build solutions can address delays while long-term capital improvements are being finalized. High ridership and commercial density make this corridor a priority for layered investments.

While bus priority east of Fairmount Avenue is likely infeasible, there are numerous improvements that could be implemented to serve the local Route 1 stops in a better manner, as well as to improve the general pedestrian experience along the corridor.

The PDT received positive feedback from the SANDAG Transportation Committee, that communities in District 9 of San Diego have been complaining of planning fatigue along the El Cajon and University Ave. corridors. Continued construction of capital projects in the area are also issues for many. As such, quick-builds could give desired improvements with less planning and construction disruption.

NCTD Corridor for Design

Northern Oceanside

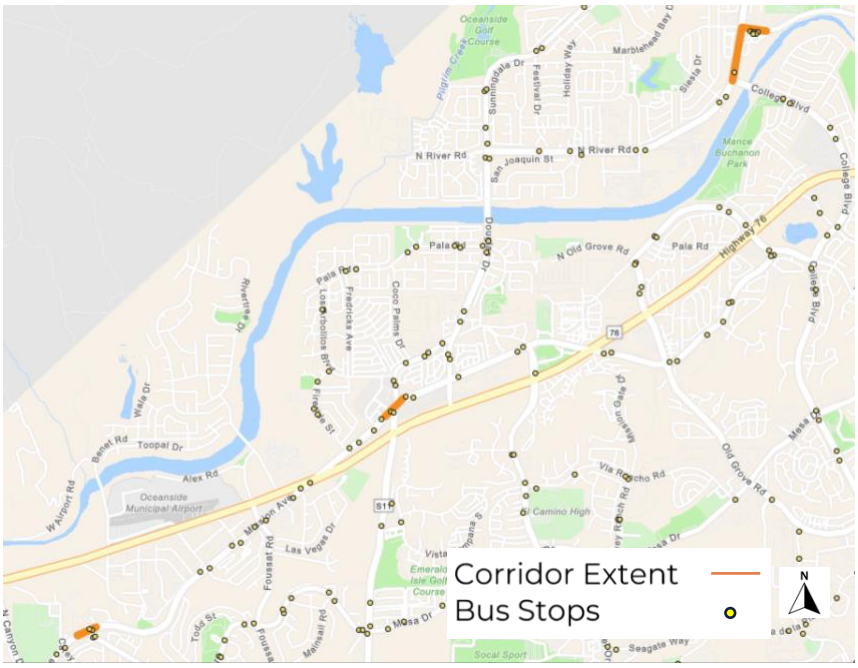
Mission Ave. & Amick St/Mesa Dr. - Mission Ave. & El Camino Real – N. River Rd. & College Blvd.

Characteristics

- Safety
- Transit Propensity
- On-time performance

Treatment Opportunities and Suitability

- Queue jumps (High)
- Bus stop seating (High)
- Stop relocation (Medium)
- Pedestrian Improvements (High)



Analysis and Recommendations

Through the corridor evaluation completed in Chapter 1, the Northern Oceanside Corridor rose to the top due to its high ridership, issues with timely performance, and safety.

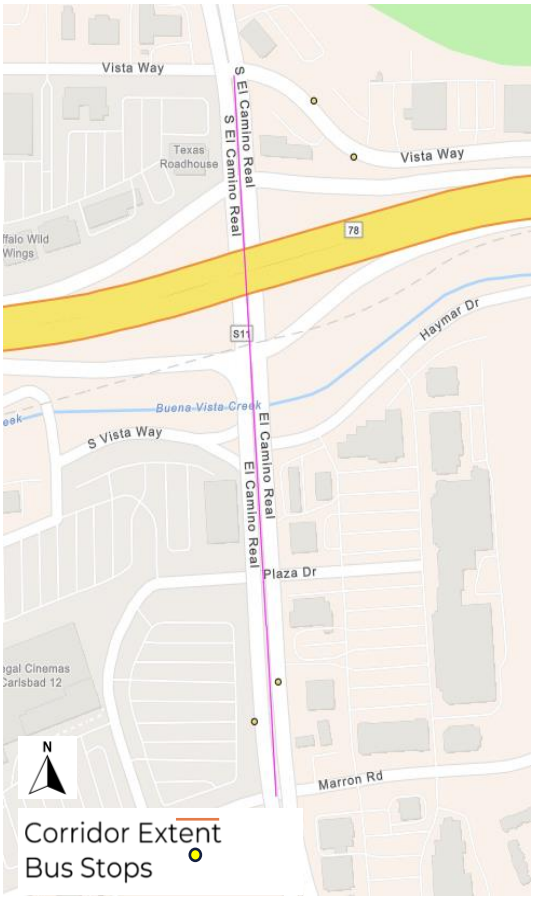
The PDT evaluated various quick-build bus treatments for deployment in the corridor through stakeholder outreach, site visits, and case study research. Based on scoring results, Northern Oceanside was selected as the corridor to advance to conceptual design for the NCTD service area.

See Chapter 4A for a full analysis of existing conditions, recommendations for quick-build improvements, and conceptual design drawings for this corridor.

Other NCTD Corridors

S. El Camino Real

Marron Road to Vista Way



Characteristics

- Safety
- On-time performance

Qualitative Analysis

Bus Stops and Shelters

- Bus stop seating: Some stops on and near the corridor do not have seating (WB Vista Way & El Camino Real and WB/EB El Camino Real & Camino Town) and would benefit from quick-build seating installation.
    - i.e. Simme Seats (product) or Bus Cube (product)

Street and Intersections

- TSP and queue jumps: Corridor has high crash rates and demonstrates consistent bus delays at intersections. There is potential for signal-related improvements, as on-time performance was one of the noted issues. Likely space for a queue jump at either Marron Road or Vista Way, given wide right-of-way.
- Crosswalk and pedestrian improvements: Very large arterial roads with poor crossing amenities, notably at Haymar Drive and Plaza Drive. Slip lanes on those two intersections make pedestrian crossing dangerous. Signage, better striping, and continental crosswalks could improve the experience.

Lighting, Signage, and Wayfinding

- Bus stop lighting: Many stops lack lighting (e.g. WB/EB El Camino Real & Camino Town) and would benefit from quick-build lighting solutions, especially at the northern end of the corridor.
    - i.e. SEPCO Bus Stop Lighting Pole (product)
- Wayfinding and signage: Corridor is a strong candidate for coordinated signage and visibility improvements. For example, confusing signage at El Camino Real and Marron Road bus stop could be improved to better show location of nearby walking trail.

Bus Priority

- Bus priority lanes: While this corridor may have a wide right-of-way, its high-traffic volumes and importance as an arterial for north-south auto traffic may make implementation of bus priority lanes difficult.

Community and Jurisdiction Support

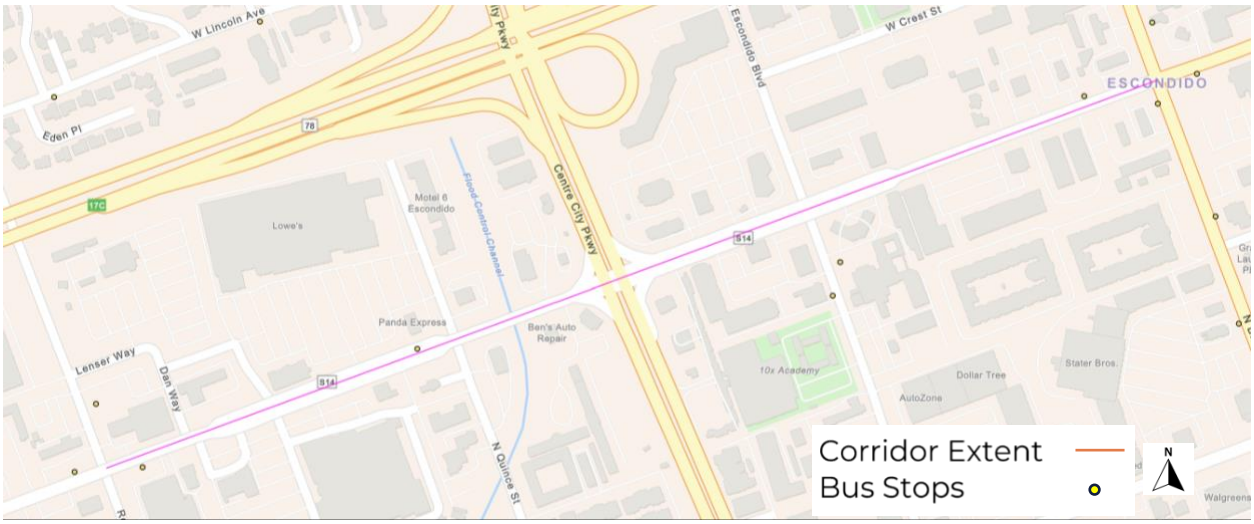
This corridor is split between the cities of Oceanside and Carlsbad, and success of a project along this corridor would rely on collaboration between the two jurisdictions. The City of Oceanside was supportive of treatments along other corridors; however, the City of Carlsbad was not consulted as part of this project.

The corridor is a significant north-south connection for the NCTD service area. Car-centric land use creates safety and accessibility issues, especially in sections of the corridor near freeway entrances and driveways. Potential for bus priority measures at wide intersections with favorable geometry.

Proposed *Rapid* 485 would pass through the corridor and could be a catalyst for improvements at bus stops, pedestrian crossings, and even for intersection treatments, such as queue jumps.

Mission Avenue (Escondido)

Rock Springs Road to Broadway



Characteristics

- Transit propensity
- On-time performance
- Accessibility

Qualitative Analysis

Bus Stops and Shelters

- Bus stop seating: Some stops on and near the corridor do not have seating (WB/EB Mission Avenue & Rock Springs Road and WB Mission Avenue & Broadway) and would benefit from quick-build seating installation.
    - i.e. Simme Seats (product) or Bus Cube (product)

Curbside

- Beautification: The area has aging stop and pedestrian infrastructure that make the waiting experience uncomfortable. Beautification, like **Escondido Expressions**, a program to put murals on traffic utility boxes, could improve the areas near bus stops.

Street and Intersections

- Crosswalk and pedestrian improvements: Multiple intersections with aging pedestrian amenities. Mission Ave. and Quince, a significant crossing for pedestrians accessing commercial areas and the Escondido Transit Center, has poor crosswalk amenities. Continental crosswalks and other amenities could be beneficial
    - i.e. Rapid Rectangular Flashing Beacon

Lighting, Signage, and Wayfinding

- Bus stop lighting: Many stops lack lighting (e.g. EB Mission Avenue & Rock Springs Road) and would benefit from quick-build lighting solutions. Stops with the highest ridership and good seating and shade could benefit from lighting (i.e. Mission Av & Quince St).
    - i.e. SEPCO Bus Stop Lighting Pole (product)

Community and Jurisdiction Support

TSP may not be feasible as a quick-build implementation due to the complexity of signal coordination. Staff from the City of Escondido did not respond to requests to discuss potential improvements. However, on December 13, 2023, the City Council adopted resolution 2023-172, stating its "objection to the removal or repurposing of any travel lanes for purposes of accommodating State or NCTD climate goals."

Mission Avenue experiences significant safety issues and high rates of pedestrian conflict. The wide arterial has significant foot traffic and is located in a disadvantaged community. Car-centric land use creates safety and accessibility issues.

Proposed *Rapid* 440 would pass through the corridor, and the transit experience could be improved in the meantime to improve ridership and potential for Rapid implementation.

Mission Road (San Marcos)

Las Posas Road to Knoll Road

Characteristics

- High Ridership
- Delay
- Safety

Qualitative Analysis

Bus Stops and Shelters

- Bus stop seating: One stop on the corridor does not have seating (Mission Road & Aberdeen Avenue) and would benefit from quick-build seating installation.
    - i.e. Simme Seats (product) or Bus Cube (product)

Street and Intersections

- TSP: There is potential for signal improvements along the corridor, to improve operations and ensure buses are on time at Palomar College Transit Center. No immediately visible locations for queue jumps or transit lanes, but could be possible given the width of the roadway.

Lighting, Signage, and Wayfinding

- Bus stop lighting: Some stops, along the corridors, particularly older ones (e.g. Mission Road & Aberdeen Avenue), lack lighting and would benefit from quick-build lighting solutions.
    - i.e. SEPCO Bus Stop Lighting Pole (product)

Community and Jurisdiction Support

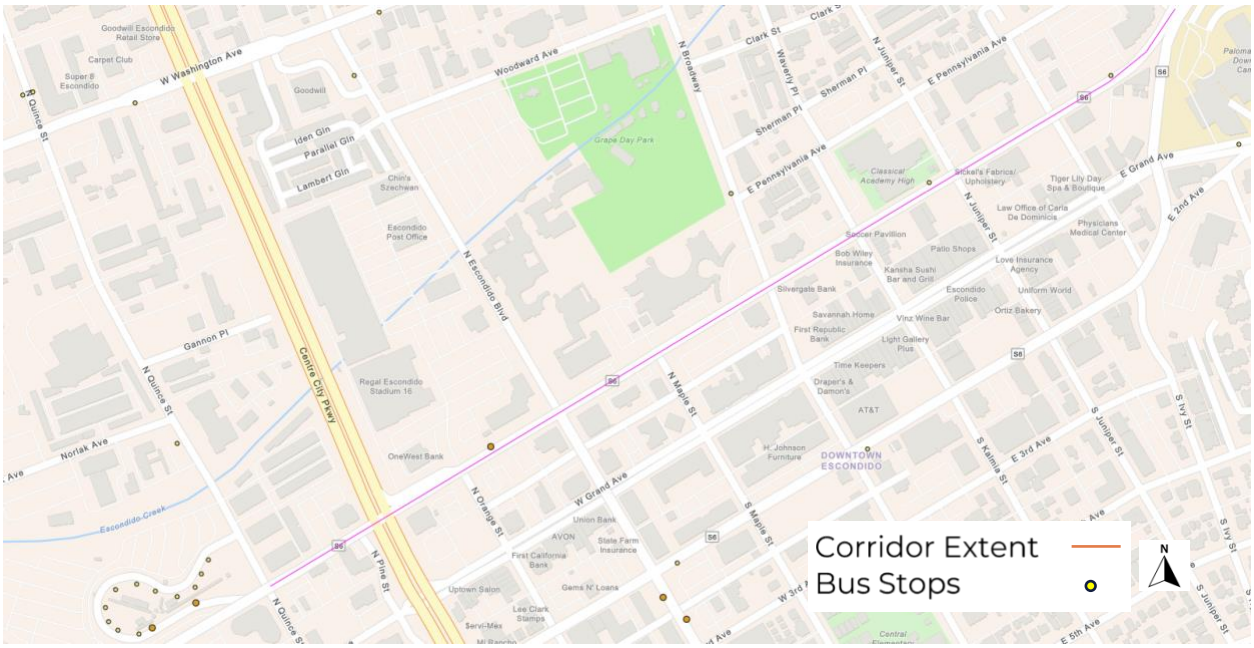
This corridor is located near a SPRINTER station and California State University San Marcos, both of which drives transit use. On February 13, 2024, San Marcos City Council adopted resolution 2024-9264 "establishing a policy regarding the design of certain transit facilities on local roads." This resolution indicates the city does not support bus-only facilities that would require the elimination or modification of general-purpose vehicle lanes or medians. While this means that bus priority lanes on this corridor would be infeasible, queue jumps could still be possible at intersections with room to incorporate one into a turning lane or other space.

City of San Marcos participated in the Mobility Workshop on March 20, 2025. During the workshop they noted that the city would not support bus priority treatments that may impact general traffic operations but expressed interest in improvements that benefit all modes.

This corridor is a high ridership corridor due to proximity to a SPRINTER station and Palomar College Transit Center. As the nearby area continues to develop, peak-period delay may worsen, and bus priority measures could mitigate impacts to the transit center. Proposed *Rapid* 440 may require higher levels of transit priority but would be subject to the community support issues above.

West Valley Parkway (Escondido)

Hickory Street to Quince Street



Characteristics

- Delay
- Transit Propensity
- Safety

Qualitative Analysis:

Bus Stops and Shelters

- Bus stop seating: One stop on the corridor does not have seating (Valley Parkway & Ivy Street) and would benefit from quick-build seating installation.

Curbside

- Beautification: Beautification, like **Escondido Expressions**, which is a program to put murals on traffic utility boxes, could improve the areas near bus stops. The stops in front of Classical Academy High or Escondido City Hall, for example, are aging and could be improved to benefit students and those visiting the downtown area.
- Parking removal: Some stops (Valley Parkway & Ivy Street, for example) have street parking very close to the existing stop. Extending the red curb paint could give buses more space to load and unload.

Street and Intersections

- TSP: There is existing TSP serving Route 350, between Quince Street and Escondido Boulevard. There is potential for an extension along West Valley Parkway to serve routes further east.
- Queue jumps: There is an existing queue jump at the intersection of West Valley Parkway and Centre City Parkway. Additional queue jumps along the corridor may be possible due to the wide right-of-way.
- Crosswalk and pedestrian improvements: Many intersections on the corridor (e.g. Ivy Street and W. Valley Parkway) entirely lack pedestrian crossing equipment or amenities and would benefit significantly from quick-build implementation. West Valley Parkway is a wide road, and some creative solutions may be necessary to make it safer for pedestrians at unsignalized crossings.
    - i.e. Rapid Rectangular Flashing Beacon
    - i.e. US Reflector Modular Pedestrian Refuge Island (product)

Lighting, Signage, and Wayfinding

- Bus stop lighting: Some stops lack lighting and would benefit from quick-build lighting solutions (Valley Parkway & Ivy Street).
    - i.e. SEPCO Bus Stop Lighting Pole (product)

Community and Jurisdiction Support

Staff from the City of Escondido did not respond to requests to discuss potential improvements. However, on December 13, 2023, the City Council adopted Resolution 2023-172 "stating its objection to the removal or repurposing of any travel lanes for purposes of accommodating State or NCTD climate goals." This resolution indicates a lack of community/jurisdiction support for bus priority improvements. This adopted resolution indicates a lack of community/jurisdiction support for bus priority improvements, but could indicate that support could come from desire to improve mobility, accessibility, or other goals not related to climate.

Improved ridership and potentially more transit service could come as a result of continued high-density development near the Escondido Transit Center. This could create more support for bus priority on the corridor. Potential conflicts with bike lanes, wide car-centric roadways, and pedestrian amenities should be mitigated; however, as one of the only dedicated bike facilities in the city is located along this corridor.

Appendix 3A:
Quick-Build Profiles

Temporary Bus Bulbs/Platforms
Bus Stop and Shelter Enhancements

Overview

Made from modular plastic parts and sold in kits, these platforms allow buses to perform in-lane boarding, reducing time spent at stops. They may also help create space for passenger amenities such as shelters and seating by creating a clear pedestrian walkway.

Benefits as a Quick-Build

- Help to evaluate improvements to bus boarding times, as well as any negative impacts of bus-platforms on traffic
- Quick to configure and deploy (days to weeks), once design is completed
- Modular and are sold in multiple arrangements to accommodate bike lanes and other specific geometries.

When Should They Be Used?

- Along corridors that experience high-levels of ridership
- Along corridors that are facing speed or on-time performance issues
- As pilots for planned concrete or asphalt bus-bulbs later down the line

Costs and Example Products

Project	Per Unit Cost + Implementation (2025$)	Average Lifespan	Cost/Year (to maintain and replace at end of life)
Zicla - Vectorial Bus Bulb	$27,000 - $42,000	10-15 years	$3,350 to $7,615

Maintenance

- Five-year warranty on most products; useful life of 10+ years
- Requires inspection and cleaning at regular intervals; coordinate with street sweeping crews to identify process for maintenance

*Source: **The Daily Texan***

Common Challenges and Concerns

- Any improvements to a bus-stop must ensure the bus-stop is fully ADA compliant.
- Vehicle traffic in the travel lane is blocked while buses are stopped at a bus bulb which can increase motorist delay.
- Bus bulbs can conflict with planned or existing bikeways; some configurations can provide a protected bicycle lane behind a bus boarding area
- Ground must be relatively level, structurally intact, and free of holes.
- Not ideal for roadways with one through-lane because of possibility for creating traffic backups at intersections

Tips for Implementation

- Place bulbs far-side of intersections to minimize traffic delays and unsafe turns.
- Check drainage and utilities before installation to avoid flooding or conflicts.
- Use floating bus stop designs to maintain protected bikeways where needed.
- Length must be able to accommodate the typical number of buses expected at the stop at one time.

Successful Examples

LA Bus Boarding Platforms

The city implemented fast-tracked bus boarding platforms as part of its Tactical Transit Study, demonstrating how modular bus bulbs can quickly enhance transit service while allowing flexibility in street design.

Oakland Temporary Bus Bulbs

Temporary bus bulbs were deployed as a pilot project to assess their effectiveness in reducing bus dwell time and improving pedestrian safety before committing to permanent installations.

NYC DOT: Bus Platforms

Bus platforms were introduced to improve service reliability by reducing bus boarding delays and integrating pedestrian-friendly infrastructure, showcasing how bus bulbs can enhance both transit efficiency and urban streetscapes.

Alternative Bus Stop Seating
Bus Stop and Shelter Enhancements

Overview

Includes any seating products outside of the standard designs adopted by cities and transit agencies. Low-cost, ready-to-install products exist to help create seating amenities at stops which lack them.

Benefits as a Quick-Build

- Smaller modular products can be inserted at cramped and legacy stops without adequate space for a full bench or shelter; can retain sidewalk space for ADA accessibility.
- Provides seating, improving rider comfort and reducing stress of longer wait times
- Beneficial to areas or bus routes with high transit ridership by seniors and disabled persons

Costs and Example Products

Project Type	Per Unit Cost + Implementation (2025$)	Average Lifespan	Cost/Year (to maintain and replace at end of life)
Easy Recreation Bus Cubes	$1,300	10-20 years	$67 to $133
Simme Seats	$1,200	10-20 years	$60 to $120

Maintenance

- 10-20 year anticipated lifespan
- Inspections, regular cleaning, repairs
- No regular maintenance highlighted by manufacturers

Common Challenges and Concerns

- Community concerns over loitering at stops may have led to bus stop amenity removal
- Meeting ADA standards for sidewalk width
- Maintenance of temporary installations can vary based on complexity

*Source: **Simme Seat***

Tips for Implementation

- Collaborate with local residents, riders, and community groups to identify priority locations.
- Work closely with public works, planning, and ADA compliance teams to ensure proper placement, avoid utility conflicts, and maintain accessible pathways.
- Adding agency or partner logos and a brief explanation of the project can prevent vandalism and help the public understand the intent of the seating.

Successful Examples

City of Hayward: Simme Seat Pilot Program

City of Hayward, CA deployed 12 Simme Seats at existing stops to test their effectiveness and gather community feedback.

Reconnect Rochester: Bus Cubes

Non-profit Reconnect Rochester, NY worked with the community to deploy wooden bus cubes. These were reconfigured into carbon fiber cubes that are for sale and are used in several cities across the United States.

Bus Stop Adjustments
Bus Stop and Shelter Enhancements

Overview

Adjusting bus stops to improve bus operations. It can include moving stops relative to intersections (far-side stop placement), or consolidation of stops.

Benefits as a Quick-Build

- Can be cost effective, depending on existing and desired stop amenities
- Reduces operating costs by improving bus travel times
- May reduce congestion and traffic effects from other transit improvements

When Should They Be Used?

- Bus Stop Consolidation: when stops along a route or corridor are spaced too closely (less than 0.25 miles), leading to slow speeds.
- Bus Stop Adjustments: Most commonly to move bus stops from one side of an intersection to another (far-side). Allowing for buses to move through an intersection before stopping.

Costs and Example Products

Type	Cost
Community Outreach	Varies (staff and material costs)
GIS Mapping	Varies (staff)
Removal of Stop Amenities	Varies (staff and coordination with maintenance and street team)

Maintenance

- Requires follow-up after implementation to understand longer-term effects and gather feedback from riders

*Source: **San Diego Union Tribune***

Common Challenges and Concerns

- Adjusting stops on an individual basis requires understanding traffic dynamics; bus stop locations are context-dependent.
- Consolidation trades bus travel time for walking time to bus stop, which has the most negative impact on seniors, disabled persons, and riders carrying heavy loads.
- Outreach campaign must be conducted to gather feedback on impending changes; this may reduce speed of implementation

Tips for Implementation

- Conduct walking distance analyses before finalizing removals; aim to keep increases in walking distance below 1/4-mile where possible.
- Allow riders to submit comments and feedback; incorporate into final design.
- MTS has policy for changes to bus stops, such as what is allowable without board approval (MTS Policy)
- Should be implemented with bus priority lanes to reduce dwell time and increase effectiveness of bus priority treatments.

Successful Examples

San Diego MTS 30th Street Bus Stop Rebalancing

San Diego MTS is familiar with bus stop consolidation, and has implemented it in locations, such as along 30th Street in San Diego.

TransitCenter: Bus Stop Balancing

The document provides an overview of bus stop balancing as well as a campaign guide for staff pursuing bus stop balancing.

Best Practicies in Bus Stop Consolidation and Optimization (UCLA)

An overview of best practices for bus stop consolidation and optimization.

Bus Zone Lengthening
Curbside and Corridor Enhancements

Overview

Extending bus stop loading zones at the curb to allow smoother bus entry, faster boarding, and easier re-entry into traffic.

Benefits as a Quick-Build

- Noninvasive, may be implemented in a matter of hours or days
- May only require the restriping of curb, signage, or removal of a small number of curbside parking spaces
- Slight improvement to bus operator experience, with no new training necessary
- Can be flexibly implemented as a spot treatment or as part of a corridor- or region-wide effort

Costs and Example Products

Task	Cost/Unit (2025$)	Average Lifespan	Cost/Year (to maintain and replace at end of life)
Community Outreach	Varies	N/A	N/A
Painting Curb	$2.99/sq ft	3-5 years	$0.60 to $1.00/sq ft
Aluminum Signage	$245 to $880	5-10 years	$24 to $176

Maintenance

- Paint and signage maintenance
- Enforcement

Common Challenges and Concerns

- Requires adequate curb space to add to bus zone
- May need to remove curbside parking spots to allow for lengthening
- Temporary bus platforms can eliminate need for this solution with in-lane stops.
- Could be considered when in-lane stops are not desirable.
- If concrete bus pads are left unchanged, wear on roadway outside of pads may increase.

Source: SANDAG

Tips for Implementation

- Develop strategies to adjust street parking, ensuring sufficient space for bus movement and safety
- Prioritize Rapid planned routes and streamline transit operations to improve efficiency along the corridor
- Plan bus zone lengthening where bus pads already exist to avoid increased roadway wear outside concrete pads
- Integration with parking removal and bus stop consolidation

Successful Examples

University Avenue (San Diego)

As part of the University Avenue Complete Street Phase 1 project, the City of San Diego implemented red curb extensions and parking reallocation to lengthen bus stop areas, to enhance transit reliability and rider experience.

Geary Boulevard Improvement Project (San Francisco)

The Geary Boulevard Improvement Project in San Francisco aimed to improve bus transit efficiency along one of the city's busiest corridors, using curb extensions to lengthen bus zones, allowing multiple buses to load and unload at once without blocking lanes.

Parking Removal
Curbside and Corridor Enhancements

Overview

Parking removal may be required to increase access to curbs for implementation of other bus treatments. Parking removal can reduce conflicts between buses and automobiles and improve pedestrian access and sightlines.

Benefits as a Quick-Build

- Inexpensive materials (paint, signage)
- Improves viability of other quick build treatments

When Should They Be Used?

- When another treatment requires more curb space
- Integration with: Bus stop lengthening; queue jumps; bus priority lanes; and bus bulbs

Costs and Example Products

Task	Cost/Unit (2025$)	Average Lifespan	Cost/Year (to maintain and replace at end of life)
Community Outreach	Varies	N/A	N/A
Painting Curb	$2.99/sq ft	3-5 years	$0.60 to $1.00/sq ft
Aluminum Signage	$245 to $880	5-10 years	$24 to $176

Maintenance

- Requires follow-up after implementation to understand longer-term effects and gather feedback from the community

Common Challenges and Concerns

- Communities are often not supportive
- Outreach and studies required can often push this beyond the scope of being a quick-build
- Coastal Commission regulations limit removal of parking

Source: ABC 10News

Tips for Implementation

- Focus on small sections near major bus stops, intersections, or high-ridership corridors where parking removal has the most visible benefit to bus improvements
- Where coastal regulations or other parking minimums exist, coordinate early with permitting agencies.

Successful Examples

City of San Diego: Park Boulevard Bus Lane

Removal and reorganization of street parking on Park Boulevard corridor. Not a quick-build but is indicative of the role that street parking has on the use of roadway capacity for buses.

City of San Diego: Parking Reform

As of January 16, 2022, San Diego eliminated minimum parking requirements for commercial uses in Transit Priority Areas (TPAs) and many commercial neighborhoods.

Daylighting

New laws which limit parking near intersections can be leveraged to speed up implementation

Beautification
Curbside and Corridor Enhancements

Overview

Beautification integrates public art into the transit and pedestrian environment to enhance rider experience, increase visibility of bus stops, and promote pedestrian safety.

Benefits as a Quick-Build

- Can make bus stops brighter and more engaging
- Improves bus stop visibility, especially in areas with limited signage
- Enhances pedestrian safety (e.g., street murals that alert drivers to crossings)
- Supports community engagement and local identity through collaboration with local artists

Costs and Example Products

Expense	Cost/Unit (2025$)	Average Lifespan	Cost/Year (to maintain and replace at end of life)
Colored Road Paint	$2.48/sq ft	3-5 years	$0.5 to $0.83/sq ft
Plastic Delineators/Bollards	$95-$229	2-5 years	$19-$114

Maintenance

- Paint and signage maintenance
- Costs for community-focused projects like this are difficult to estimate, and include outreach, planning, and staff time

Common Challenges and Concerns

- Bright colors and detailed artwork, especially on or near roadways, may distract drivers, potentially impacting road safety.
- Street murals and bus stop art will fade or become damaged over time
- Potential maintenance and reinstallation costs over time

*Source: **Arts in the Right-of-Way, Washington D.C***

Tips for Implementation

- Implement at bus stops with known safety and accessibility concerns
- Organizations can create art funds or utilize existing public art funds (similar to City of San Diego), for commissioning artist work or awarding artists selected in an established art selection process.
- Limiting artists to a limited thermoplastic color palette on street paintings can ensure durability and visibility.

Successful Examples

City of San Diego Public Art Masterplan

This and other cities' public art programs demonstrate how public funds can contribute to public art installations. There is an opportunity for this money to also be combined with quick-build or near-term bus improvements

SODO Track

SODO Track is an example of an entire transit corridor turned into an art installation. The intent of the corridor is to encourage more community buy in for the transportation Corridor and to elevate the transit experience for riders.

Town of Chapel Hill Art+Transit Program: Art Shelters:

The Town of Chapel Hill has successfully adorned 30+ shelters within their bus system as part of their Art + Transit program.

Transit Signal Priority
Street and Intersection Enhancements

Overview

Transit Signal Priority (TSP) allows buses to communicate with traffic signals and signal controllers to give priority to buses in the form of early green lights or extension of green lights.

Benefits as a Quick-Build

- Requires minimal physical change to roadway, making it relatively lower cost than other intersection changes
- Can reduce travel times by 10% and reduce delay by up to 50% at target intersections.
- Buses that fall behind schedule gain ability to recover some lost time to ensure passengers arrive at their destinations on time.

Costs and Example Products

Intersections	**Signal Equipment** (Per Intersection) (2025$)	**Bus Equipment** (Per Bus)	**Yearly Bus Equipment Maint.** (Per Intersection)	**Yearly Bus Equipment Maint.** (Per Bus)
Minor/Minor	$27,300	$6,140	$4,100	$1,774
Minor/Major	$30,800	$6,140	$4,100	$1,774
Major/Major	$39,000	$6,140	$4,100	$1,774

Maintenance

- Repair and replacement of equipment
- Enforcement
- System Management (staff costs)

Source: SANDAG

Tips for Implementation

- Target signalized intersections on streets with lower cross-traffic volumes to maximize bus benefit with minimal impact to side streets.
- Prioritize intersections with long signal cycles (90 seconds or more) to maximize green extension effectiveness.
- Pair with bus-only lanes or queue jumps to enhance the overall impact.

Successful Examples

Improving Bus Operations and Traffic (IBOT) – SANDAG, 2017

Building on the successful regional implementation of Transit Signal Priority (TSP), IBOT study identified priority corridors for expanding TSP along existing local bus routes.

I-15 Rapid Corridor (Routes 235 &and237)

Implemented in 2014, the I-15 Rapid services utilized TSP along with dedicated lanes and direct access ramps.

Iris Rapid (Route 227)

The newest addition to the Rapid network, Iris Rapid, began service in 2023 and includes TSP features to optimize bus movement along its corridor.

Intersection Queue Jump/Bypass
Street and Intersection Enhancements

Overview

Short dedicated lane, potentially with a dedicated signal phase that allows buses and emergency vehicles, to bypass traffic congestion at intersections. May have a specialized traffic signal that gives buses a head start ahead of other vehicles.

Benefits as a Quick-Build

- Reduces signal delay for buses
- Can be implemented on a signal-by-signal basis, without need for corridor-wide integration
- Smaller footprint than full bus priority lanes

Costs and Example Products

Single Intersection Queue Jump Striping (Paint + Roadway Markings ONLY)	
Cost Per Intersection (2025$)	$11,000 to $15,000
Cost/Year (to maintain and replace at end of life)	$1,400 to $2,800

- Adds to costs for installation and maintenance of technological TSP features
- Some queue jumps may not require signal changes, depending on roadway configurations

Maintenance

- Some maintenance costs of roadway changes, including enforcement, repair, and cleaning of new striping

Source: *StreetsBlog NYC*

Common Challenges and Concerns

- Sufficient right-of-way availability is needed to add a dedicated bus lane without disrupting existing traffic or pedestrian pathways.
- High volumes of right-turning vehicles can obstruct bus movements in queue jump lanes, which can be addressed with separate right-turn lanes or protected signal phases.
- High pedestrian volumes may impact on the effectiveness of queue jump lanes, especially when pedestrians conflict with right-turning vehicles.
- Traffic signals may require retiming to prioritize buses without causing excessive delays to other traffic.

Tips for Implementation

- Ensure visible signs to guide drivers, cyclists, and pedestrians.
- Use distinct lane markings to designate the queue jump area.
- When right-turn volumes are low, existing right-turn lanes can be repurposed as queue jump lanes, reducing costs and avoiding the need to construct new lanes in constrained rights-of-way
- Coordination between traffic engineers and transit agencies is crucial to align queue jump lanes with bus routes and schedules.

Successful Examples

BREEZE Rapid - Escondido

A dedicated queue jump lane was installed at the intersection of Valley Parkway and Centre City Parkway in Escondido. This lane allows buses to bypass congested traffic at the intersection, reducing delays.

Broadway Queue Jump – San Diego

A queue jump at Third Avenue on Broadway allows buses to pull ahead of stopped traffic. This individual treatment was specifically put in place to allow buses to utlilize a temporary bus lane and dedicated curb area, and would not function similarly across the corridor. However, it is indicative of the place that queue jumps can have at specific intersections.

Transit Only/Keep Clear Markings
Street and Intersection Enhancements

Overview

Roadway markings to keep entrances and exits of bus stops, transit centers, and bus-only lanes clear of vehicle congestion. By visually designating bus access points, they protect transit operations from being delayed by queued or turning cars.

Benefits as a Quick-Build

- Improves bus access by keeping entry and exit points clear of traffic queues.
- Low-cost method for reducing bus and general traffic merging conflicts
- Uses existing low-cost materials

Costs and Example Products

Type	Cost/unit (2025$)	Average Lifespan	Cost/Year (to maintain and replace at end of life)
Thermoplastic Pavement Markings	$9.40/SQFT	3-5 years	$1.62 to $2.70/SQFT
Preformed Thermoplastic Pavement Markings	$15.07/SQFT	3-5 years	$3.17 to $5.29/SQFT
"BUS ONLY" Thermoplastic Stencil	$500	3-5 years	$100 to $167
"KEEP CLEAR" Thermoplastic Stencil	$1000	3-5 years	$200 to $333

Maintenance

- Paint and signage maintenance
- Enforcement

Common Challenges and Concerns

- Does not solve underlying traffic congestion; it only protects bus entry points.
- Requires maintenance and repainting over time, especially in high-traffic areas.
- Effectiveness depends on driver compliance; may require enforcement

*Source: **Google Earth***

Tips for Implementation

- Prioritize installation near transit facilities where bus driveways are often blocked by queued traffic.
- Use high-durability materials like thermoplastic for longer life in heavy traffic areas.
- Utilize previous examples, listed below, as templates for future quick-build implementation.
- Integration with queue jumps and bus only lanes.

Successful Examples

College Ave. at SDSU – San Diego

"KEEP CLEAR" markings were installed where buses exit SDSU Station. Previously, cars backed up far enough to prevent buses from leaving the driveway. This treatment was identified in 2020, and was put in place as a striping and maintenance effort.

8th Street Transit Center – National City

Exiting the 8th St. Transit Center, road markings keep traffic from backing up to block exiting bus traffic. Congestion exists as vehicles enter Naval Base San Diego and cross the at-grade trolley crossing. This treatment was identified in 2020, and was put in place as a striping and maintenance effort.

Crosswalk and Pedestrian Improvements
Street and Intersection Enhancements

Overview

Treatments that improve the visibility of pedestrians, reduce conflicts between modes, and protect pedestrians from automobiles can improve accessibility at transit facilities.

Benefits as a Quick-Build

- City maintenance crews may have experience with these treatments already
- Can require little to no significant roadway change.
- Visually striking and public facing

Costs and Example Products

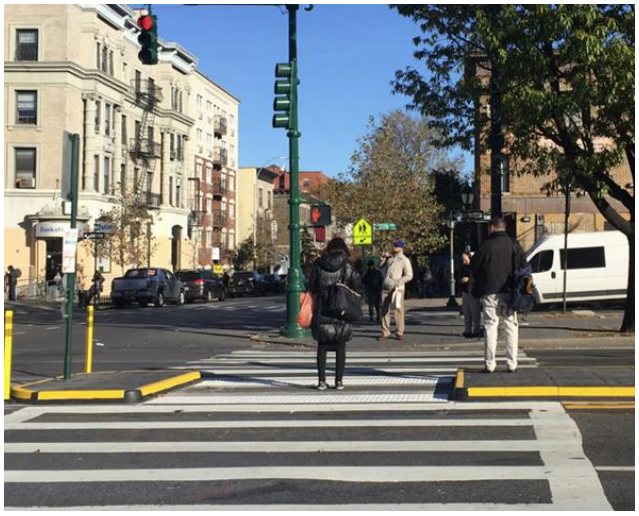
Type	Cost/unit (2025$)	Average Lifespan	Cost/Year (to maintain and replace at end of life)
Real-time Driver Speed Sign	$6,600	10-15 years	$440 to $660
Rapid-Rectangular Flashing Beacon (RRFB)	$25,000 to $37,400	15-25 years	$1,000 to $2,500
PPP RediPave Modular Median	$11,534	5-10 years	$1,153 to $2,306
Methacrylate Paint Crosswalk	$23.77/SQFT	5-10 years	$4.75 to $7.92/SQFT
US Reflector Modular Pedestrian Refuge Islands	$2,400 to $5,200	5-10 years	$240 to $1,040

Maintenance

- Paint and signage maintenance
- Enforcement

Common Challenges and Concerns

- Consider width and geometry of street (San Diego Street Design Manual, Section 6.4)
- Quick-build materials (like thermoplastic) can wear faster under heavy vehicle traffic, requiring scheduled maintenance to retain visibility.
- Changes in painting/marking must be aligned with incoming and outgoing lanes.



*Source: **PPP Modular Median***

Tips for Implementation

- Utilize existing safety resources, such as the SANDAG Vision Zero Traffic Safety Dashboard[1] to identify viable locations for implementation
- Integrate curb extensions using paint-and-posts or modular materials to reduce crossing distances and protect waiting pedestrians.
- Ensure reflective paint uses high-contrast colors (like white or yellow) to stand out against the road surface.
- Integration with shared bus/bike lanes, intersection queue jump/bypass, and curb extensions

Successful Examples

School Zone Crosswalk Enhancements- San Diego

Ahead of the 2024–2025 academic year, the City of San Diego upgraded crosswalks near 11 schools. Improvements included the installation or refreshing of high-visibility continental crosswalks using thermoplastic paint to enhance pedestrian safety for students and families.

High Crash Location Safety Improvements – San Diego (2024-25)

The City of San Diego identified seven high-crash locations for safety enhancements, including intersections and street segments. Quick-build measures at these sites included the installation of additional signs, flashing beacons, and crosswalks to improve pedestrian visibility and safety.

[1] https://opendata.sandag.org/stories/s/Traffic-Safety-Dashboard/5f7y-nefe/

Solar-Powered LED Lighting
Lighting, Signage, and Wayfinding

Overview

Pole-mounted solar panels to store energy in batteries, and power LED lights at night. These off-grid systems provide 8–12 hours of illumination, with backup storage for cloudy days.

Benefits as a Quick-Build

- Provides reliable nighttime illumination in public spaces, improving pedestrian, cyclist, and transit passenger safety.
- LEDs last 50,000–100,000 hours, and batteries typically last 5–10 years, reducing the need for frequent replacements.
- One of the most popular and requested stop amenities for safety and comfort of riders
- Can be attached to existing bus stop poles, reducing cost and preventing issues of access.

Costs and Example Products

Type	Cost/unit (2025$)	Average Lifespan	Cost/Year (to maintain and replace at end of life)
SolarIlluminations Lighting System	$1,276	5-15 years	$85 to $255
Sels Solar Transit Pole Solar Light	$2,400	5-15 years	$160 to $480
SEPCO Bus Stop Lighting Pole	$3,360	5-15 years	$224 to $672

Maintenance

- Battery replacement (5-10-year average lifespan).
- Routine panel cleaning, battery inspections, and system health checks are essential for maintaining peak efficiency.

Common Challenges and Concerns

- Installation costs may be high due to materials and labor, but they are often offset by lower long-term operational expenses.
- Solar systems are prone to theft or damage, especially in remote areas.

*Source: **Orange County Transit Authority***

Tips for Implementation

- Installation where there is minimal shading from trees or buildings enhances system performance.
- Explore available federal, state, and local incentives, rebates, and tax credits for renewable energy projects.
- Install physical barriers like locked enclosures, or tamper-proof hardware.
- Implemented with temporary bus bulbs/curb extensions, beautification, and bus zone lengthening.

Successful Examples

Orange County Transportation Authority:

In 2022, the Orange County Transportation Authority (OCTA) upgraded 26 bus stops along Route 553 in Santa Ana with solar-powered LED lighting and digital e-paper displays.

La Sombrita, LADOT

In 2023, LADOT piloted a proprietary shade/lighting station pole that was subject to public backlash for its seemingly poor design. Effective public outreach and off-the-shelf designs can prevent issues such as these.

High-Contrast Wayfinding and Signage
Lighting, Signage, and Wayfinding

Overview

Visually distinct signage systems designed to guide passengers through transit environments. These signs use contrasting colors, large typography, and clear symbols to ensure visibility in various lighting conditions and from different distances.

Benefits as a Quick-Build

- Low-cost, but somewhat low-impact on transit operations; improves rider experience
- Can be mounted to existing poles and structures at a low cost
- Immediate impact on built environment and apparent to community members

Costs and Example Products

Type	Cost/unit (2025$)	Average Lifespan	Cost/Year (to maintain and replace at end of life)
Paint Pavement Marking	$2.48/SQFT	3-5 years	$0.50 to $0.83/SQFT
Plastic Delineators/Bollards	$95 to $229	2-5 years	$19 to $114
Aluminum Signage	$245 to $880	5-10 years	$24 to $176

Maintenance

- Cleaning, repairs, mitigation of vandalism and theft
- Over time, high-contrast signs and markings can fade due to weather conditions, particularly in areas with extreme sun exposure, rain, or snow.
- Custom signage projects will have higher costs

Source: City of San Diego

Tips for Implementation

- Select materials designed to withstand harsh environmental conditions, such as UV-resistant paints, non-glare coatings, and weatherproof sign structures.
- Ensure all wayfinding signs comply with ADA standards and local guidelines for color contrast, legibility, tactile elements, and glare-free materials.

Successful Examples

Plaza de Panama Transformation

In Balboa Park, despite the failure of large-scale and controversial plans to redesign the central Plaza de Panama, some quick-build pedestrian improvements were implemented which improve comfort and guide visitors to attractions.

San Ysidro Wayfinding Signs Project

The San Ysidro Wayfinding Signs Project used robust outreach methods and community engagement to help in installing lightweight, high-contrast signage on in a busy pedestrian and transit area. $350,000 for the project – costly outreach and engagement can increase costs significantly. Quick-build implementation would require fewer custom designs and less outreach.

General Bus Priority Lanes
Bus Priority Lanes

Overview

Conversion of general traffic lanes, street parking, or other road space, into lanes which give priority to buses.

The four types highlighted in this document are:

- Dedicated Bus Lanes
- Peak-Period Bus Lanes
- Bus Priority/Right Turn Lanes
- Bus-Bike Lanes

The following profiles will highlight information for each, with cost estimates being derived from example high- and low-cost quick-build projects of that type.

Benefits as a Quick-Build

- May utilize existing road space to significantly speed up bus travel times
- Reduces conflicts between automobiles and buses, especially when stopping to board.
- If visible, generally high compliance, even with quick-build materials.

Common Challenges and Concerns

- ROW considerations – Caltrans ROW can pose issues to bus lane. El Cajon Boulevard, for example, interrupts bus lane when crossing freeways, then restarts on other side.
- High volumes of right-turning vehicles can obstruct bus lanes or create safety risks for buses.
- High cost of implementing and maintaining bus priority lanes, including infrastructure, signage, and ongoing upkeep.

Tips for Implementation

- Assess whether the current road layout allows for the conversion of general traffic lanes, street parking, or other road space into bus lanes.
- Ensure there are safe access points for passengers to board and alight, particularly in high-traffic areas.
- Existing or planned *Rapid* corridors would be ideal candidates for dedicated bus lanes
- Consider multimodal plans for corridors; bikes should also be considered

Dedicated Bus Lanes
Bus Priority Lanes

Overview

Lanes for exclusive bus use, usually converted from general purpose lanes or street parking. Can be implemented in various ways, including with cones, paint, or striping.

Benefits as a Quick-Build

- Faster, more predictable service, increasing bus competitiveness with automobiles.
- Reduces conflicts between right-turning vehicles and buses, especially when stopping to board, compared to other bus lane types.

When Should They Be Used?

- High bus volumes, such that buses should be unimpeded by right-turning cars, bikes, or any other user.

Costs from Case Studies

Organization/ Jurisdiction	**Project** (Low and High Cost) (2025$)	**Cost/Mile** (2024$)	**Yearly Maintenance Cost/Mile** (2024$)
Transportation Research Board	Dedicated Bus Lane (White Striped)(2010)	$155,000	$4,200 to $7,000
AC Transit	Bus Lane Pilot (Red Painted) (2018)	$625,450	$66,000 to $110,000

Maintenance

- Red thermoplastic has higher material and implementation costs, but may improve performance compared to white striping
- Maintenance will also include any “BUS ONLY” stencils, signage, and other treatments

Common Challenges and Concerns

- Bikeways can be impacted, as high bike volumes can increase conflict with bus lanes.
- Curbside and offset bus lanes are subject to encroachment due to double-parking, deliveries, or taxicabs.

*Source: **Bus-News***

Tips for Implementation

- Bus lanes may be separated with vertical treatments, such as bollards, or striping. Vertical separation typically yields higher automobile compliance.
- Ensure smooth transitions between bus lanes and general traffic lanes, especially at intersections.
- Integration with: bus bulbs, transit signal priority, temporary bus platforms, and bus stop consolidation

Successful Examples

Dedicated Transit Lanes Study – SCAG, 2023

The Regional Dedicated Transit Lanes Study explores the opportunities, needs, challenges, and best practices for developing a regional network of dedicated bus lanes and other transit priority treatments.

Best Practices in Implementing Tactical Transit Lanes – UCLA, 2019

This guide is intended for planners interested in implementing Tactical Transit Lanes, particularly first-time lanes. Its focus is on the implementation, i.e., the planning and outreach considerations of the project as opposed to design, for which other recent resources exist.

Peak-Period Bus Lanes
Bus Priority Lanes

Overview

Only available for buses during specific times of the day, usually during the morning and evening rush hours.

Benefits as a Quick-Build

- Allows buses and transit vehicles to bypass traffic during peak hours, improving travel times for riders.
- Can be adjusted or expanded over time to meet evolving demand.
- Reliable, fast transit services attract more passengers, boosting ridership.

Costs and Example Products

Organization/ Region	**Project** (Low and High Cost) (2025$)	**Cost/Mile** (2024$)	**Yearly Maintenance Cost/Mile** (2024$)
Metro Transit (Minneapolis)	Bus Lane Pilot (Cones) (3-day pilot)	$11,651	$4,000 to $7,000
City of Everett, MA	Bus Lane Pilot (White Striping)	$204,753	$4,000 to $7,000

Maintenance

- Enforcement costs are not accounted for in estimates.
- Peak-period lanes require more enforcement than other bus lane types
- Red paint is not advisable for peak-period lanes, due to cost and potential confusion for motorists at off-peak times.

Common Challenges and Concerns

- Ensuring that only buses and authorized vehicles use the peak-period bus lanes can be difficult, especially without adequate enforcement measures.
- Implementing peak-period bus lanes on already congested roads often require reallocating limited road space, which may impact other transportation modes.
- Creating temporary barriers (e.g., cones, signs) or marking lanes may require ongoing maintenance and regular updates.

Source: **LA StreetsBlog**

Tips for Implementation

- Repurpose existing lanes or road space to minimize the need for new construction.
- Implement clear, temporary signage that is easy to read and well-positioned to communicate when and where the bus lanes are active. Use changeable message signs if available.
- Use durable and low-maintenance materials for temporary barriers and markings to reduce the need for frequent updates and repairs.
- Implement with shared bus-bike lanes and crosswalk and pedestrian improvements.

Successful Examples

Flower Street – Los Angeles

In 2019, a temporary peak-hour bus lane was installed on Flower Street in downtown Los Angeles to address rail station closures. These temporary lanes improved bus travel times by 30%.

Hennepin Avenue – Minneapolis

This pilot project introduced peak-hour bus lanes on Hennepin Avenue, converting curbside parking to bus-only lanes during rush hours. The project reduced travel times by 15% and increased transit reliability by 27%.

Bus Priority/Right Turn Lanes
Bus Priority Lanes

Overview

Bus priority lane, with exception for right-turning vehicles. Automobiles are allowed to enter bus lane shortly before intersection.

Benefits as a Quick-Build

- Reduces traffic impacts compared to full separation of bus and GP lanes
- Can be implemented without significant roadway changes or thermoplastic paint
- Has been successfully implemented in San Diego

Costs and Example Products

Organization/ Region	**Project** (Low and High Cost) (2025$)	**Cost/Mile** (2024$)	**Yearly Maintenance Cost/Mile** (2024$)
City of San Diego	Bus Priority Lane (Solid White Lines)	$43,836	$4,000 to $7,000
Metropolitan Washington Council of Governments	Bus Priority Lane (Red Paint)	$404,379	$66,000 to $110,000

Maintenance

- Red thermoplastic has higher material and implementation costs, but may improve performance compared to white striping

Common Challenges and Concerns

- Painted lanes (especially red or solid white) can wear out quickly, reducing visibility and compliance.
- Bus lanes often conflict with curbside uses like delivery zones, taxi stands, or rideshare pickups.
- Buses may still conflict with turning vehicles if the lane is not well-designed or if turning vehicles don't yield.

Tips for Implementation

- Use thermoplastic materials or epoxy-based paints for durability.
- Integrate dedicated pick-up/drop-off zones at side streets instead of main corridors.
- Use clear, advance signage ("Bus Only, Right Turn OK") and separate signal phases to give buses a head start.
- Implement with transit signal priority and queue jumps.

Successful Examples

El Cajon Boulevard Busway – San Diego

A 2.9-mile stretch of bus priority lane, implemented to augment *Rapid* 215 bus service. This bus lane has been highly successful in improving bus travel times, while not significantly impacting automobile traffic.

Select Bus Service (SBS) - NYC 2014

New York City's Department of Transportation (NYC DOT) introduced SBS where curbside bus lanes were painted red and reserved primarily for buses traveling straight and vehicles making right turns.

Mount Auburn Street Bus Priority Pilot – Massachusetts

Red-painted lanes designated for buses and right-turning vehicles, allowing buses to bypass general traffic congestion.

Shared Bus-Bike Lanes
Bus Priority Lanes

Overview

A form of dedicated or peak-period bus lane with shared use by cyclists.

Benefits as a Quick-Build

- Shared lanes provide bicycle access on transit streets where no space is available for dedicated bike facilities.
- Provides increased space and visibility for active street users while improving transit service reliability.

Costs and Example Products

Organization/ Region	**Project** (Low and High Cost) (2025$)	**Cost/Mile** (2024$)	**Yearly Maintenance Cost/Mile** (2024$)
City of Bellingham	Shared Bus-Bike Lane	$43,300	$4,000 to $7,000
Portland Bureau of Transportation	Shared Bus-Bike Lane	$254,248	$66,000 to $110,000

Maintenance

- Red thermoplastic has higher material and implementation costs, but may improve performance compared to white striping

Common Challenges and Concerns

- Leapfrogging, when cyclists and buses repeatedly pass each other due to different travel characteristics and speeds, may occur.
- Due to different travel characteristics and speeds shared lanes may result in delays to transit service.

*Source: **LA StreetsBlog***

Tips for Implementation

- At high speeds, special care must be taken not to require bicycle and bus traffic mixing.
- At peak periods and high-volume bus routes, in particular, bus-bike lanes should not intend to be a substitute for dedicated bike facilities.
- Integration with intersection queue jump/bypass, transit signal priority, parking removal, and transit only/keep clear markings

Successful Examples

MOVE Culver City Project – Culver City

Culver City launched the MOVE Culver City project, introducing 1.3 miles of dedicated bus lanes, including shared bus-bike lanes, in its downtown corridor. This project improved transit efficiency and reliability, enhanced safety and accessibility for cyclists.

Appendix 3B:
Treatment Cost Calculator

Treatment Cost Calculators

The Treatment Cost Calculator is available at SANDAG.org/onthemove.