

El Camino Real Bus Speed and Reliability Study

December 2022



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ABOUT THIS STUDY

This study was funded by a Caltrans Sustainable Transportation Planning Grant. It commenced Spring 2021 with analysis of existing conditions and stakeholder interviews. Draft recommendations and public outreach efforts occurred in Spring 2022, with recommendations finalized in coordination with project stakeholders during Summer and Fall of 2022.

Project Timeline



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Executive Summary

PROJECT BACKGROUND & GOALS

The El Camino Real Bus Speed and Reliability Study seeks to increase bus speeds and improve reliability on El Camino Real. By identifying near-term and long-term improvements in the areas of bus operations, technology, infrastructure and policy, this study establishes a vision that will:



**Enhance the Experience
of Existing Riders**



Attract New Riders



Increase Operational Efficiency



**Improve the Driving Environment
for Bus Operators**

El Camino Real functions as the backbone for SamTrans bus service in San Mateo County: approximately two-thirds of SamTrans routes travel along El Camino Real for at least a portion of their route, and the primary bus route serving El Camino Real, Route ECR, generates about 25 percent of SamTrans ridership. Route ECR riders disproportionately consist of people from lower income households and people of color; consequently, improving bus speed and reliability on Route ECR represents one of the most effective strategies to advance more equitable transportation outcomes in San Mateo County.

Improving bus speed and reliability on Route ECR represents one of the most effective strategies to advance more equitable transportation outcomes in San Mateo County.

SamTrans riders and bus operators agree that travel times and reliability on Route ECR could be improved. When SamTrans asked riders how it could improve Route ECR in a 2018 survey, half of respondents identified reliability and travel time improvements as the top priority. In 2019, prior to travel pattern changes resulting from the COVID-19 pandemic, one-way end-to-end trips on Route ECR took up to 170 minutes per direction. Route ECR's on-time performance is often around 70 percent, and passenger wait times regularly vary between 10 and 50 minutes. This variability in bus speeds can make it difficult to reliably plan and operate Route ECR schedules.

The current design of El Camino Real tends to deprioritize buses, resulting in bus speeds that are substantially slower than auto speeds. Several street design factors contribute to slow bus speeds, including bus stop spacing, location, and design; traffic obstructions and conflicts; and traffic signals. However, many of these deficiencies can be addressed through operational and infrastructure improvements.

RECOMMENDED IMPROVEMENTS

SamTrans identified a package of operational and capital improvements based on feedback from bus riders, bus operators, and community stakeholders. By implementing these improvement measures, SamTrans aims to increase bus speeds by 30 percent along the El Camino Real corridor while achieving a bus rapid transit-like experience for riders and bus operators. Full recommendations are detailed in Chapter 4 of this report.

In the near term, SamTrans should prioritize several low-cost adjustments to Route ECR that can move forward without requiring capital improvements. The following near-term operational enhancements are recommended:

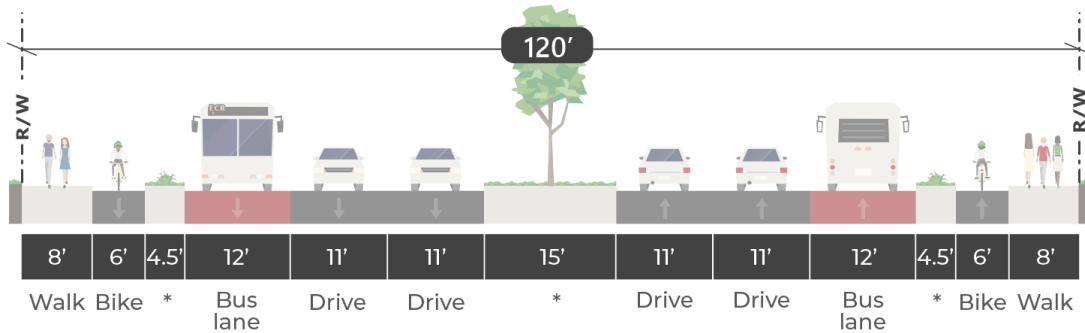
- SamTrans should maintain the Daly City route alignment changes implemented in August 2022 (eliminating the diversion north of John Daly Boulevard into San Francisco).
- SamTrans should expand transit signal priority (TSP) technology on its fleet and partner with Caltrans to maximize travel time savings associated with the TSP system on El Camino Real.
- SamTrans should reduce the overall number of bus stops on Route ECR by 20 percent through bus stop balancing.
- SamTrans should accelerate customer adoption of cashless fare collection methods, including Clipper Cards and mobile payments, to speed up the boarding process and reduce delays.

In parallel with advancing near-term operational enhancements, SamTrans and its partners should commence planning, design, and permitting for a range of capital improvements to address bus delays and access barriers. SamTrans has prepared a Capital Improvement Plan to address bus speed and reliability needs that may accompany other multimodal improvements on El Camino Real. The following capital improvements are recommended:

- SamTrans should partner with cities and Caltrans to install bus bulbs and queue jumps. Most pullout bus stops should be replaced with in-lane stops at bus bulbs along the El Camino Real corridor.
- SamTrans should work with cities and Caltrans to address gaps in pedestrian infrastructure that impede bus stop access and deter bus riders.
- SamTrans should seek to improve the efficiency of Route ECR circulation at transit centers.
- SamTrans should pursue bus lanes along high priority segments on El Camino Real (identified in South San Francisco, San Bruno, Millbrae, and northern Burlingame; San Mateo; and San Carlos).

Example Cross-Section of Bus Lanes

South San Francisco, San Bruno, Millbrae, and northern Burlingame (6.1 miles)



By implementing the recommended near-term operational enhancements and the full Capital Improvement Plan, SamTrans could reduce one-way bus travel times on Route ECR by approximately 40 to 45 minutes relative to 2019 peak period conditions. Faster service would allow SamTrans to maintain the same level of service frequency using fewer buses while enhancing the quality of service, attracting new riders, and providing a less stressful experience for bus operators.

The total cost to implement the transit-focused recommendations in the Capital Improvement Plan on El Camino Real is estimated to be \$80 to \$100 million, while a full multimodal redesign of the 25-mile corridor would cost approximately \$500 to \$750 million (addressing other streetscape changes such as widened sidewalks, protected bike lanes, and landscaped medians).

Bus Boarding Island With a Protected Bikeway
(Source: City of Redwood City)



IMPLEMENTATION APPROACH

Implementing capital improvements on El Camino Real requires a unique project development process due to the corridor's position as a Caltrans-owned facility. There are two possible approaches to implementing the Transit Improvement Capital Vision on El Camino Real:

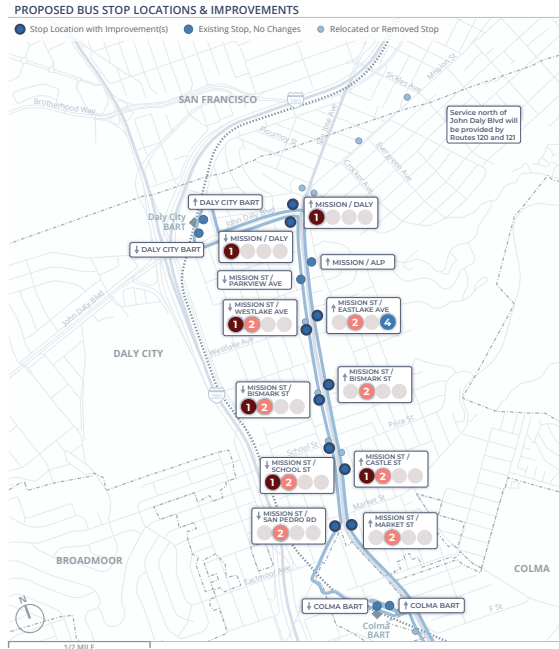
Caltrans-Led Projects: SamTrans and cities can incorporate improvements into Caltrans-led projects. Caltrans periodically implements projects on El Camino Real to address repair, safety, and operational needs. Incorporating transit and complete streets improvements into planned Caltrans projects presents an opportunity to streamline implementation efforts and avoid redundant efforts across multiple agencies. SamTrans and cities may incorporate additional improvement measures via Caltrans projects through early project coordination and providing supplemental funding.

SamTrans and City-Led Projects: SamTrans and cities can develop their own projects via the Caltrans project development process. The project development process varies by project type and is applicable to both larger-scale citywide or multi-city streetscape projects as well as smaller scale projects associated with individual land use developments or intersection improvements. Depending on the scale and type of project, either SamTrans or individual cities may lead the project development process: cities may prefer to lead projects that fully occur within their city limits or are smaller in scale, while SamTrans should consider leading capital improvement projects on El Camino Real that span multiple cities or focus on transit-specific improvements.

Each approach has tradeoffs depending on the scope, scale, and focus of individual projects, as detailed in Chapter 5. Moreover, cities are at different stages of identifying needs, determining preferred corridor designs, and initiating the Caltrans project development process; consequently, the implementation path may vary by city and is likely to include multiple projects including certain segments of the 25-mile corridor. While developing projects, SamTrans, cities and Caltrans should use the Capital Improvement Plan presented as an appendix to this report. The Capital Improvement

Excerpt from Capital Improvement Plan Booklets

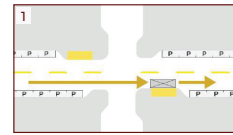
Proposed Route ECR Improvements



The following infrastructure improvements are recommended to support faster and more reliable bus operations on El Camino Real in Daly City.

1 Bus Stop Balancing & Placement

Far-side, in-lane bus stops with balanced spacing helps buses travel faster and more reliably. ECR stops should be spaced every 1/4 to 1/3 mile, with shorter spacing occurring in areas with high ridership and/or serving transit connections, public facilities, and equity priority areas. Stops should be located on the far side of intersections in the lane of travel to maximize the effectiveness of the corridor's transit signal priority system and avoid delays and conflicts associated with near-side and pullout stops.



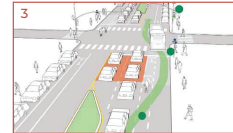
2 Bus Bulbs

Bus bulbs are curb extensions that allow buses to stop in the lane of traffic. Bus bulbs improve speed and reliability by reducing the amount of time lost when merging in and out of traffic, while also reducing pedestrian crossing distances. Where space permits, near-level boarding and separated bikeway bypasses are suggested features for bus bulbs.



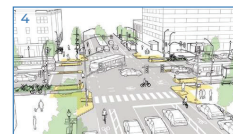
3 Queue Jumps

In cases where near-side pullout stops are most suitable, queue jumps reduce delay for buses merging back into traffic. Queue jumps allow buses to enter traffic flow from a dedicated bus lane or right-turn only lane via transit signal priority (a leading bus interval or active signal priority). Alternatively, allowing buses to proceed straight in a right-turn only lane can function as an informal queue jump.



4 Pedestrian Improvements

Improving pedestrian connections to bus stops helps reduce overall passenger travel times and access barriers. Pedestrian access improvements may include striping unmarked crosswalks, adding traffic signals or pedestrian hybrid beacons at unsignalized crossings, adding or widening sidewalks, and adding or modernizing curb ramps.



Plan provides a summary of Route ECR operations by City and outlines the recommended improvement measures such as stop locations, bus bulbs, queue jumps, pedestrian gap closures, and bus lanes.

The following near-term actions are recommended to align policy objectives and project development processes for El Camino Real.

- SamTrans should collaborate with partners to establish a countywide Transit-First Policy for El Camino Real.
- SamTrans should establish an El Camino Real Program Manager to facilitate coordination and advance transit and multimodal projects.
- SamTrans should establish a Transit Capital Improvement Fund for El Camino Real to incorporate transit improvements into Caltrans-led projects and advance projects led by SamTrans and cities.
- SamTrans, Caltrans, cities, and other stakeholders should commit to an ongoing partnership to modernize El Camino Real as a multimodal complete street.

Modernizing El Camino Real will require a range of implementation approaches, from small-scale projects that improve individual bus stops to multi-city projects that revamp several miles of streetscape. While El Camino Real presents complex challenges, it also provides ample opportunities to realize a transit-oriented, pedestrian- and bicycle-friendly grand boulevard for San Mateo County.

Framework for Inter-Agency Partnership

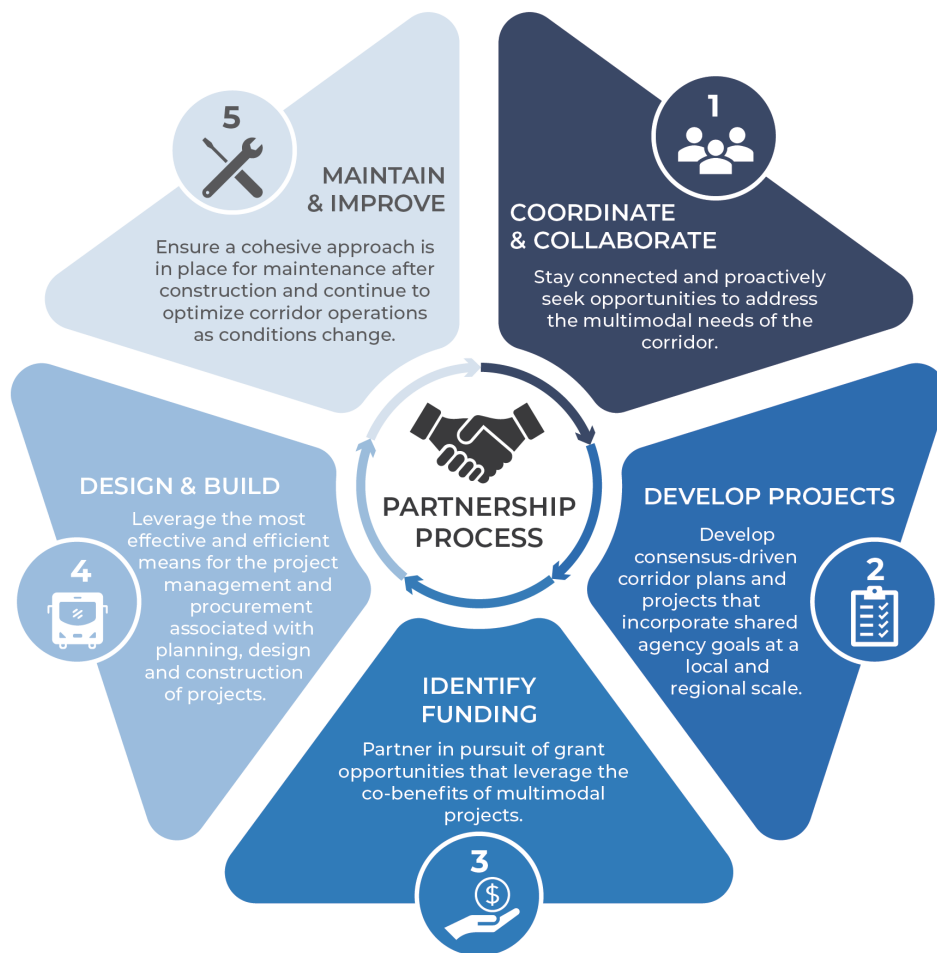


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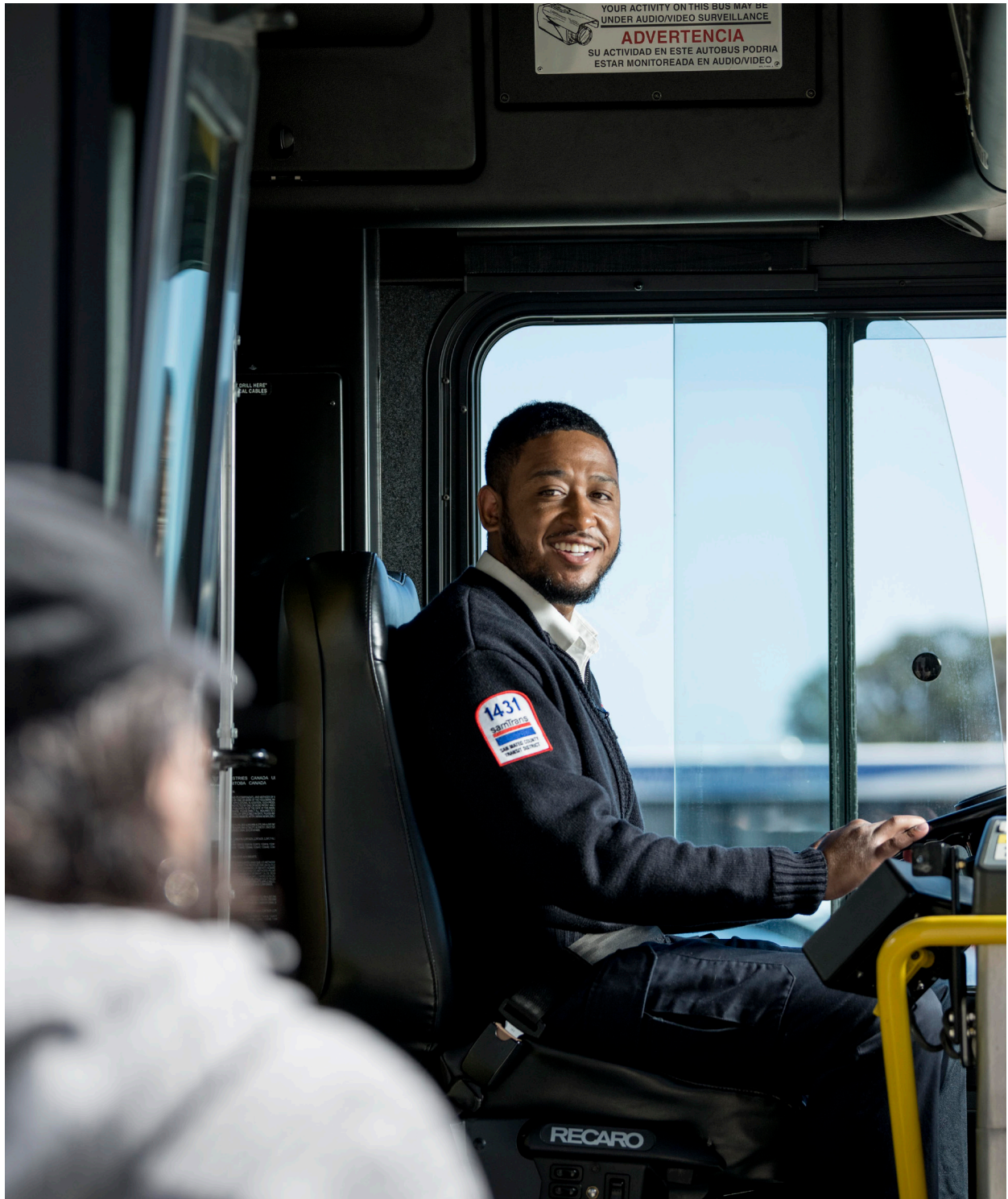
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- South San Francisco
- San Bruno
- Millbrae
- San Mateo
- Belmont
- San Carlos
- Redwood City
- Atherton/North
Fair Oaks
- Menlo Park/
Palo Alto



01

Introduction

1.1 EL CAMINO REAL'S IMPORTANCE TO SAMTRANS

Bus service on El Camino Real (also known as State Route 82 and Mission Street in Daly City) functions as the backbone of SamTrans service in San Mateo County. Passing through 13 cities across over 28 miles, El Camino Real ties together nearly the entire SamTrans network. Approximately two-thirds of SamTrans routes travel along El Camino Real for at least a portion of their route. The primary bus route serving El Camino Real, Route ECR, generates about 25 percent of SamTrans ridership and requires about 20 percent of the total bus operations budget to deliver the route. Riders use bus service on El Camino Real for a variety of trip purposes, such as going to work, school, shopping, medical appointments, community facilities, and connecting to BART, Caltrain, and other SamTrans routes.

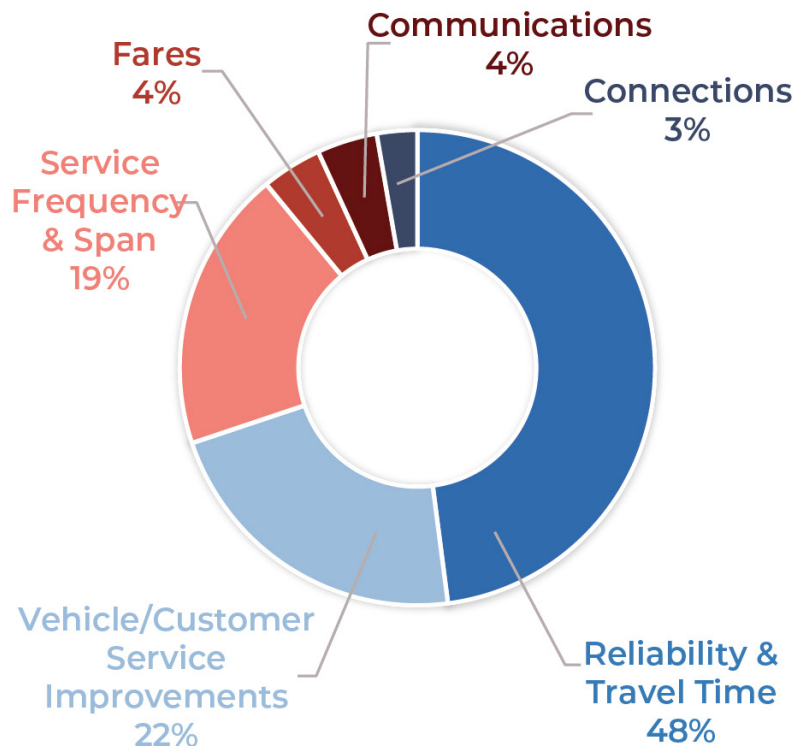
Route ECR generates about 25 percent of SamTrans ridership while requiring 20 percent of the total bus operations budget.

1.2 WHAT WE'VE HEARD – RIDER AND DRIVER FEEDBACK

Despite the importance of El Camino Real for bus service, both riders and drivers agree that travel times and reliability on Route ECR could be improved. When SamTrans asked riders how it could improve Route ECR in a 2018 survey (**Figure 1**), half of respondents identified reliability and travel time improvements as the top priority. Feedback from drivers further underscores how the route's length can be difficult and exhausting to drive: In 2019, Route ECR experienced travel times exceeding 2.5 hours one-way, which is about twice as long as driving a car.

Route ECR's reliability also exhibits room for improvement; on-time performance is 70 percent overall, which is below the agency's goal of 85 percent. Riders often encounter inconsistent arrival times that can make Route ECR difficult to use.

Figure 1: How can SamTrans Improve Route ECR?

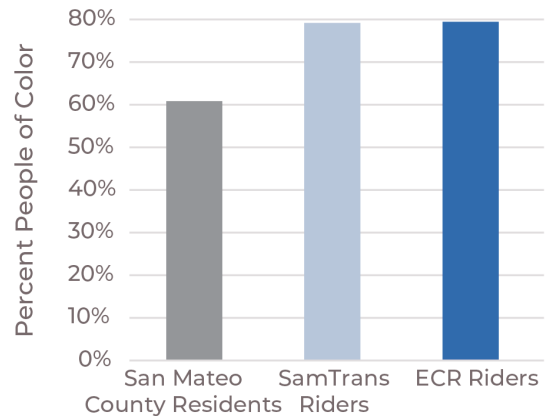
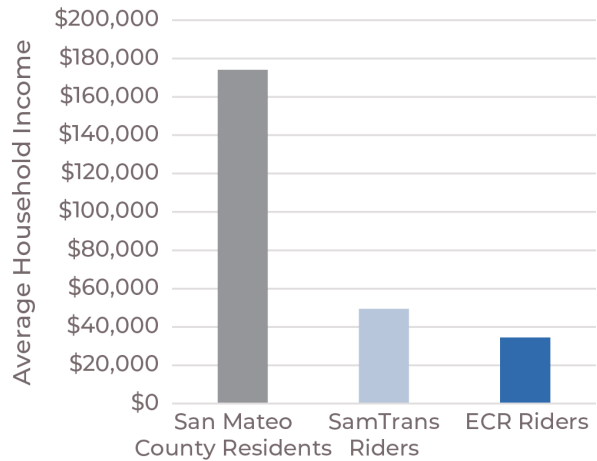


1.3 TRANSPORTATION EQUITY ON EL CAMINO REAL

Route ECR riders are disproportionately lower income compared to San Mateo County residents and SamTrans riders overall. As illustrated in **Figure 2**, the average household income of ECR riders is about 80 percent lower than the county average and 30 percent lower than the average SamTrans rider. Approximately 80 percent of ECR riders are people of color, which is consistent with SamTrans ridership overall but greater than the countywide share of 60 percent.

El Camino Real and Route ECR operate through multiple SamTrans Equity Priority Areas as established in the SamTrans Service Policy Framework. Adopted by the SamTrans Board of Directors in

Figure 2: ECR Rider Demographics



The average household income of ECR riders is about 80 percent lower than the county average and 30 percent lower than the average SamTrans rider.

March 2022, the SamTrans Service Policy Framework calls for improved quality of service to Equity Priority Areas as part of the document's guiding principles. Improving bus speed and reliability on Route ECR represents one of the most effective strategies to advance more equitable transportation outcomes in San Mateo County.

1.4 STUDY GOALS AND OUTCOMES

This study is focused on two specific goals: to increase bus speeds and improve bus reliability on El Camino Real. By identifying near-term and long-term improvements in the areas of bus operations, technology, infrastructure and policy, this study establishes a vision that will enhance the experience of existing riders, attract new riders, increase operational efficiency, and improve the driving environment for SamTrans bus operators responsible for delivering service on El Camino Real. Through the recommendations outlined in this report, SamTrans hopes to increase bus speeds on El Camino Real by 30 percent and substantially reduce the variability of wait times and delays experienced by bus riders.

Figure 3: ECR Rider Demographics

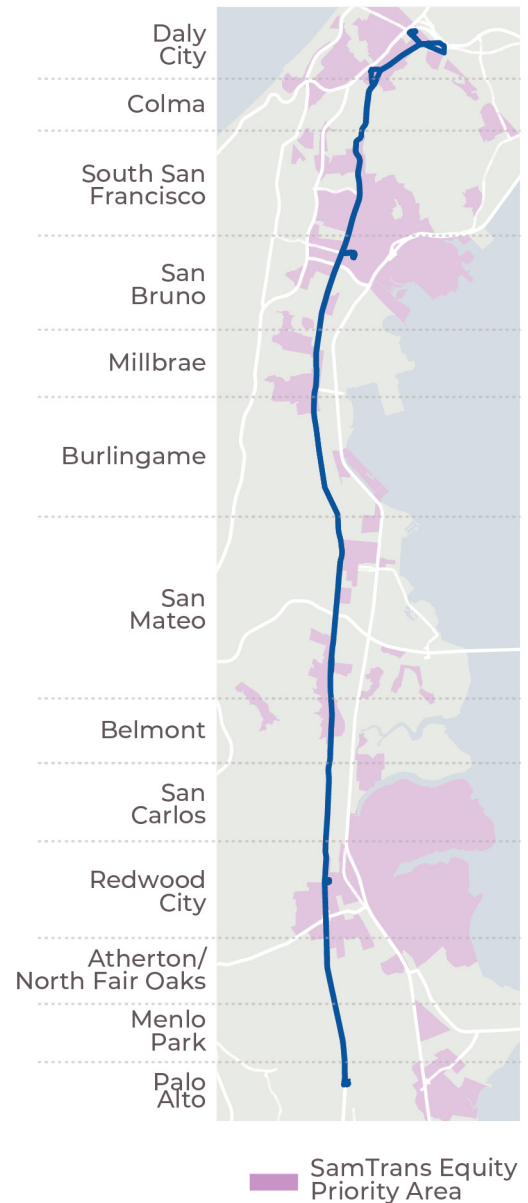


Figure 4: Study Goals & Outcomes

Study Goals



Increase Bus Speeds



Improve Reliability

Study Outcomes



Enhance the Experience of Existing Riders



Attract New Riders



Increase Operational Efficiency



Improve the Driving Environment for Bus Operators



02

The Roles of El Camino Real

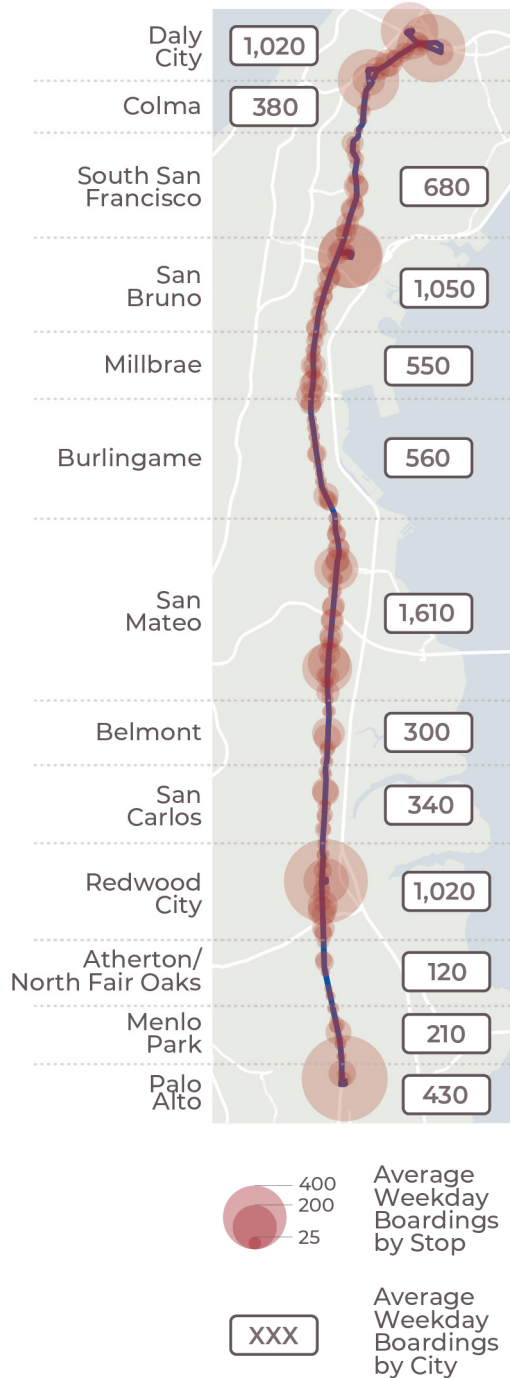
El Camino Real plays several roles in San Mateo County: it is the Peninsula's "Grand Boulevard," a backbone transit corridor, an auto thoroughfare, and an active transportation corridor. This chapter explores these roles in relation to SamTrans' service.

2.1 THE PENINSULA'S "GRAND BOULEVARD"

El Camino Real is the main street of San Mateo County, connecting numerous downtowns, businesses, schools, and other community destinations. For the last two decades, the communities along El Camino Real have participated in the Grand Boulevard Initiative (GBI), which sets guiding principles to revitalize El Camino Real into a vibrant, people-friendly street. The GBI includes representatives from the 31 agencies responsible for parts of the corridor's function and appearance, including Caltrans, SamTrans, nineteen Peninsula cities, Santa Clara Valley Transportation Authority (VTA), City/County Association of Governments of San Mateo County (C/CAG), Metropolitan Transportation Commission (MTC), and other organizations. The GBI has developed guiding design principles that include developing a balanced multimodal corridor, creating a pedestrian-oriented environment, strengthening pedestrian and bicycle connections, and encouraging compact mixed-use development.

El Camino Real is expected to experience substantial land-use changes in the coming years. As San Mateo County continues to add more housing and jobs, El Camino Real is increasingly a focal point for transit-oriented development. Regionally, MTC has designated nearly all of the El Camino Real corridor as a Priority Development Area, which is defined as a transit rich corridor that enables people to live a car-free or car-light lifestyle and serve as a focal point for sustainable and equitable growth.

Figure 5: Route ECR 2019 Average Weekday Boardings by City



2.2 EL CAMINO REAL AS A BACKBONE TRANSIT CORRIDOR

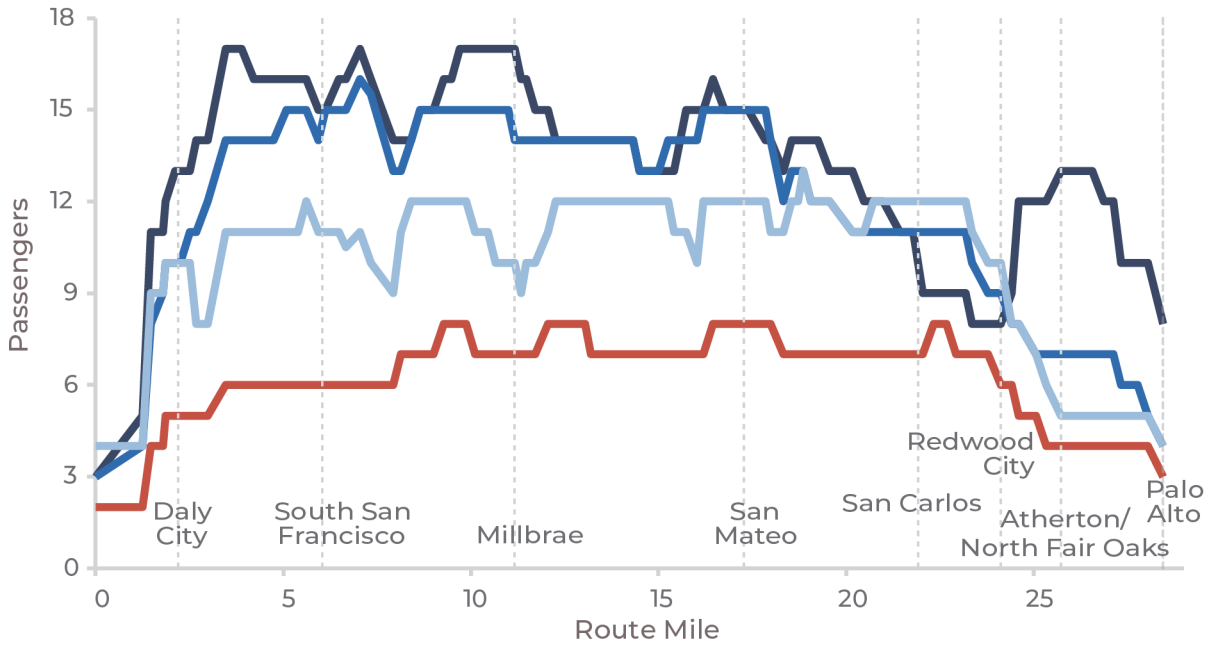
Route ECR is the backbone of SamTrans service in San Mateo County serving ‘everywhere to everywhere’ travel patterns without a single hub. On a typical weekday, Route ECR served approximately 8,300 daily riders in 2019 and 7,000 daily riders in 2022. As shown in **Figure 5**, Route ECR ridership is distributed across the entire corridor, with the highest concentrations in the San Mateo, San Bruno, Daly City, and Redwood City.

Route ECR attracts ridership throughout the day. On average, nearly 200 riders board the Route ECR on each individual trip made by the route during the morning, midday, and evening periods before declining in the late evenings. As depicted in **Figure 6**, passenger loads at individual segments typically range from 12 to 18 riders, with the peak load points occurring across northern San Mateo County, San Mateo, and Redwood City. While ridership is bidirectional and fairly-balanced, passenger loads vary slightly by time of day and direction – southbound trips experience higher loads during the AM peak and midday periods, while northbound trips experience higher loads during the midday and PM peak periods.

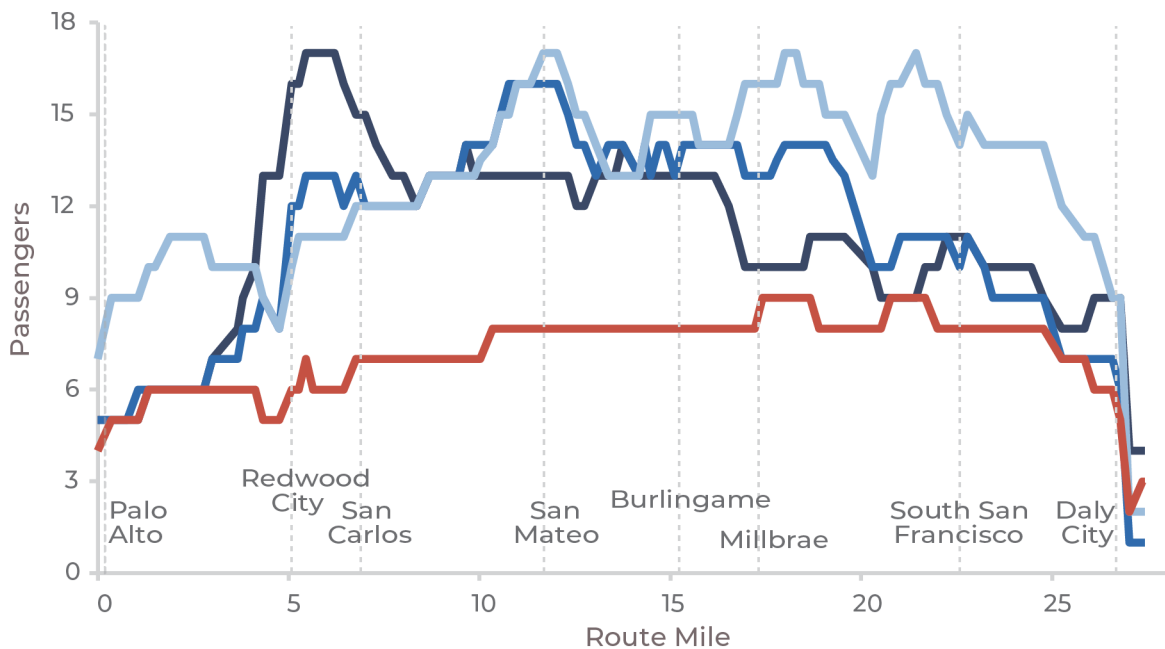
Figure 6: Route ECR Passenger Load by Time of Day

— AM Peak (6AM - 10AM)
 — Midday (10AM - 3PM)
 — PM Peak (3PM - 7PM)
 — Late Night/Early Morning (7PM - 2AM, 4AM - 6AM)

SOUTHBOUND



NORTHBOUND



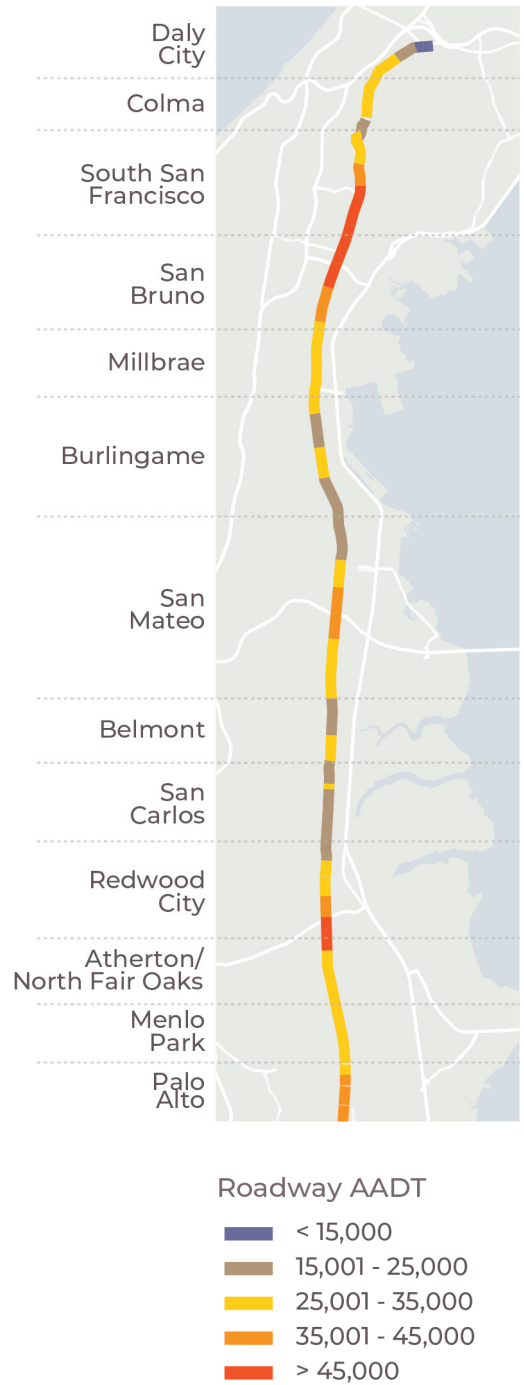
Trips on Route ECR do not tend to traverse multiple sub-regions of the Peninsula, nor are they end-to-end trips. About 20 percent of Route ECR riders are traveling within the same city, 30 percent are traveling between two adjacent cities, and half traveling are across more than two cities.

2.3 EL CAMINO REAL AS AN AUTO THOROUGHFARE

El Camino Real (SR-82) is one of three north-south thoroughfares that spans the entire urbanized area of San Mateo County (alongside US-101 and I-280). In 2019, annual average daily traffic (AADT) on El Camino Real varied widely by segment, with some areas serving fewer than 15,000 AADT to other segments serving over 50,000 AADT. As shown in **Figure 7**, traffic volumes are highest through South San Francisco, San Bruno, San Mateo, and Redwood City, and lowest in Daly City, Burlingame, Belmont, and San Carlos.

As a corridor that frequently experiences congested traffic conditions, it has been identified as a part of San Mateo County’s Congestion Management Program (CMP) network by C/CAG.

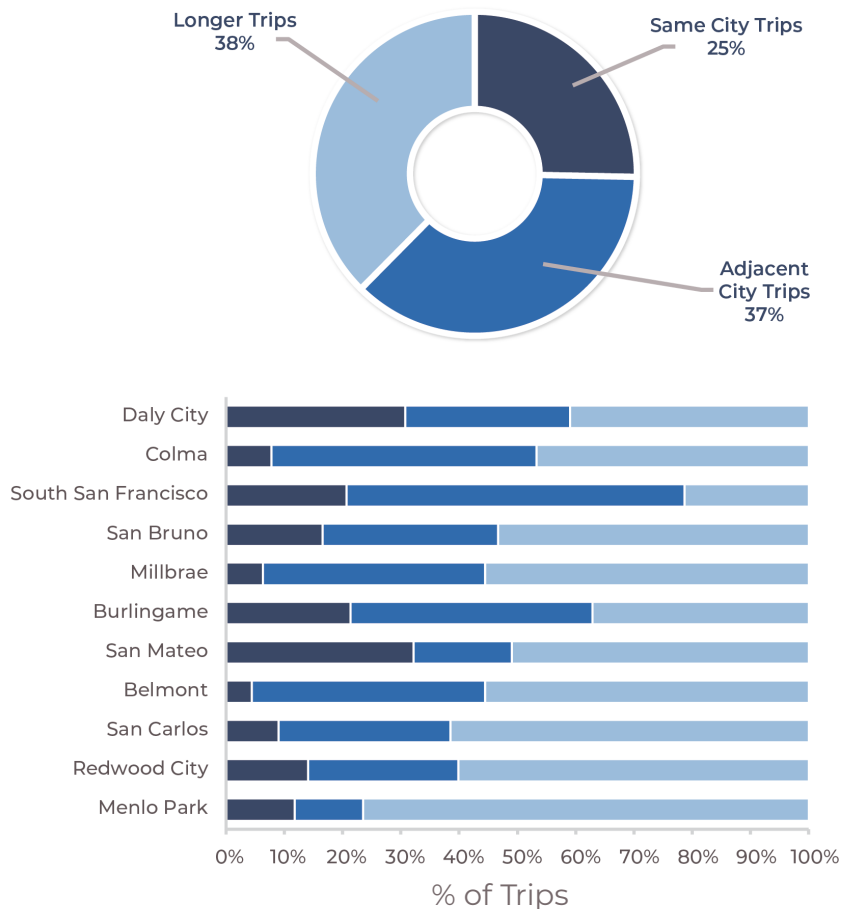
Figure 7: El Camino Real 2019 Annual Average Daily Traffic (AADT)



While El Camino Real was originally designed to accommodate regional travel prior to completion of the US-101 and I-280 freeways, it primarily serves shorter, more local trips today. Based on an analysis of Streetlight data (anonymized cell phone location data), most vehicle trips on El Camino Real are local trips. Approximately 25 percent occur within the same city and about 37 percent of trips occur between two adjacent cities. Only 38 percent of all trips occur across longer distances (i.e., across three or more cities), as most trips that are more regional in nature tend to use US-101 or I-280. Most cities exhibit a similar mix of shorter and longer trip lengths, as shown in **Figure 8**.

Overall, auto travel patterns on El Camino Real are similar to transit travel patterns, which suggests improvements to bus service may be able to capture some mode shift.

Figure 8: Destinations of El Camino Real Auto Trips



2.4 EL CAMINO REAL AS AN ACTIVE TRANSPORTATION CORRIDOR

Numerous city and county plans highlight the importance of walking and bicycling on El Camino Real. The Grand Boulevard Initiative, a collaboration of 19 cities, counties, local and regional agencies, identifies several guiding principles related to creating a pedestrian-oriented environment, developing a balanced multimodal corridor, and strengthening bicycle and pedestrian connections on El Camino Real. The City/County Association of Governments of San Mateo County's Countywide Bicycle & Pedestrian Plan (2021) synthesizes the latest bicycle and pedestrian plans on the corridor to highlight the importance of El Camino Real as the county's primary north-south backbone bicycle route and as a key gap in the county's pedestrian network (**Figure 9**). Most cities in San Mateo County have identified El Camino Real as a focal point for pedestrian and bicycle safety improvements via Active Transportation Plans and Local Road Safety Plans.

However, cities are at different stages in determining what kind of bicycle facility may be suitable for El Camino Real and how it would affect the overall corridor design. Some cities have already implemented bike lanes (Class II), others have prepared corridor plans for protected bikeways (Class IV), and some have yet to identify whether bike lanes should be included at all. Limited right-of-way represents a key barrier for bicycle and pedestrian improvements on El Camino Real; adding bike facilities or widening sidewalks can require the removal of on-street parking or travel lanes in some constrained locations, as well as special considerations of bus-bike interface at bus stops. Overall, El Camino Real is incrementally evolving into a more walkable and bikeable corridor, but substantial work remains to create a complete street that's comfortable for people of all ages and abilities.

Figure 9: Countywide Backbone Bicycle Facilities and Pedestrian Focus Areas (C/CAG Countywide Bicycle & Pedestrian Plan, 2021)





03

Bus Speed and Reliability Challenges

The current design of El Camino Real deprioritizes buses, resulting in slow speeds and unreliable service. This chapter explores bus speed and reliability challenges on El Camino Real and its relationship to bus stop conditions and street design.

3.1 BUS AND VEHICLE SPEEDS PRIOR TO THE COVID-19 PANDEMIC

Bus speeds vary widely across the El Camino Real corridor depending on location and time of day. **Figure 10** shows average speeds by city while 2019 average speeds by segment and time of day are depicted in **Figure 11**. Slow segments occur throughout the corridor but tend to be more heavily concentrated in Daly City, San Bruno, San Mateo, Redwood City, and Menlo Park – cities that tend to experience more traffic congestion and often have a greater density of traffic signals, bus stops, and ridership activity. Bus speeds are fastest in Atherton, Colma, Belmont, and Burlingame, but still present opportunities for improvement relative to auto speeds.

Figure 10: Average ECR Route Speeds by City

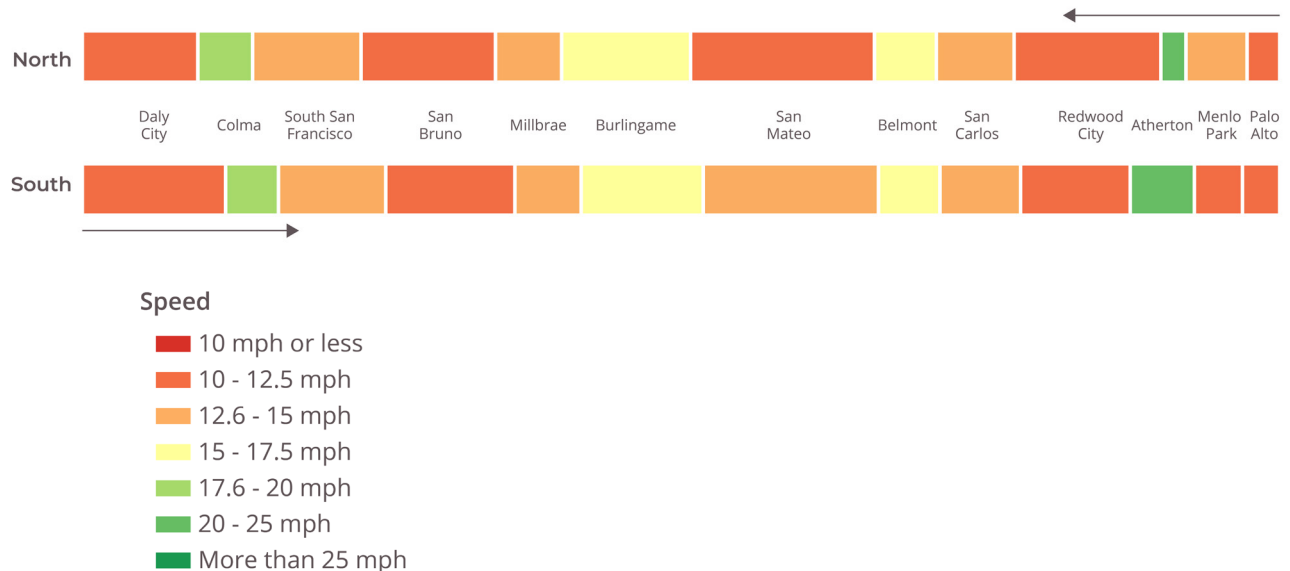
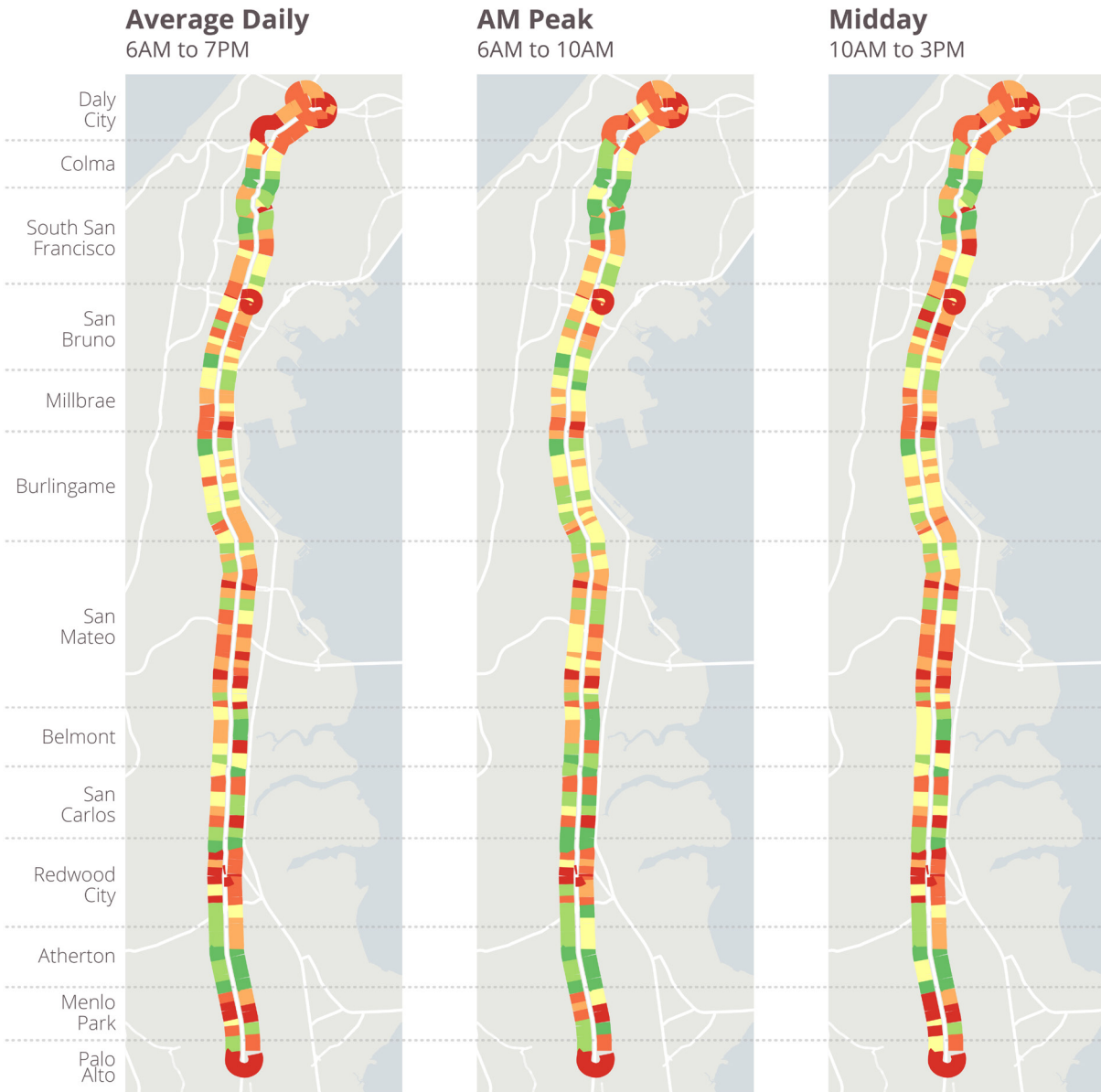
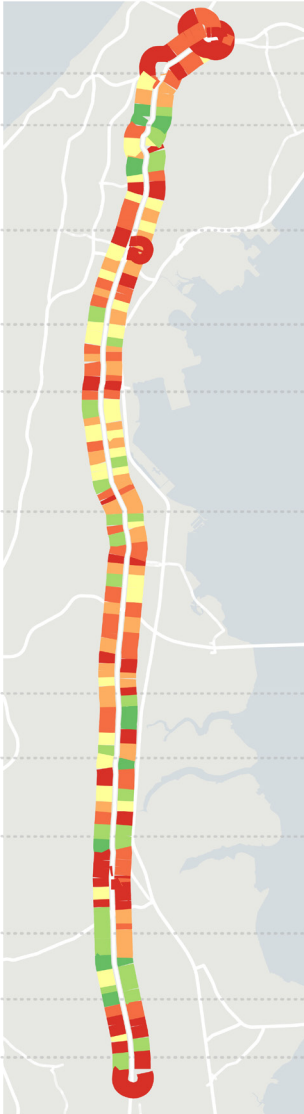


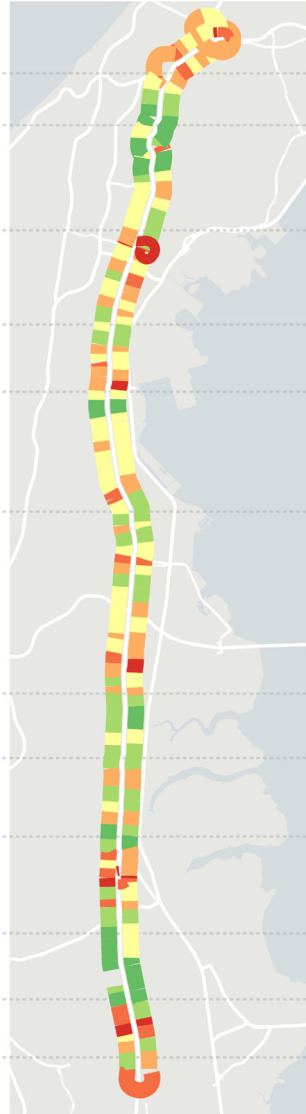
Figure 11: Route ECR Speeds by Time of Day (2019)



PM Peak
3PM to 7PM



Evening/Early AM
7PM to 6AM

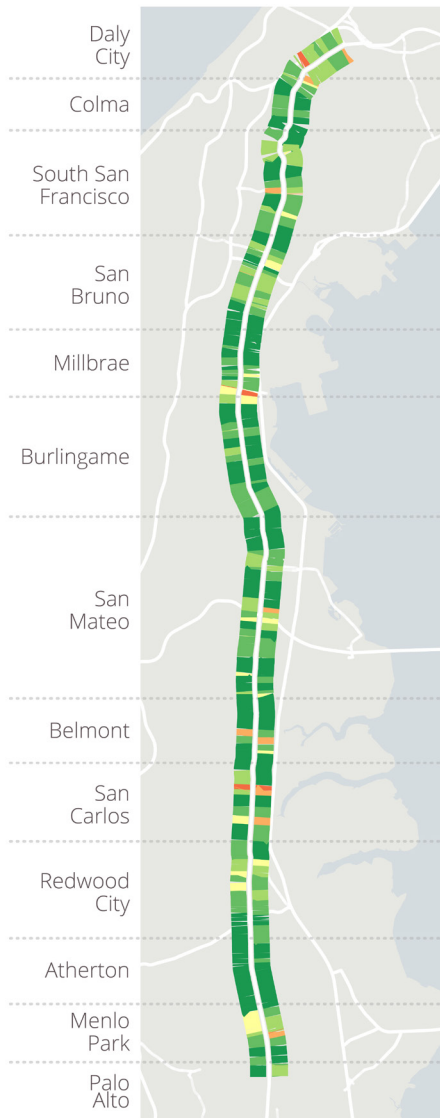


Speed

- 10 mph or less
- 10 - 12.5 mph
- 12.6 - 15 mph
- 15 - 17.5 mph
- 17.6 - 20 mph
- 20 - 25 mph
- More than 25 mph

Buses travel at an average speed of 11 miles per hour compared to 23 miles per hour for automobiles.

Figure 12: Average Daily Vehicle Speeds on El Camino Real (2019)



In comparison to autos, buses tend to travel considerably slower along El Camino Real.

Figure 12 illustrates average daily auto speeds on El Camino Real. Autos travel almost twice as fast as buses; buses travel at an average speed of 11 miles per hour (13 miles per hour excluding dwell time) compared to 23 miles per hour for autos. Several factors contribute to this difference in bus speeds and auto speeds:

- **Bus stops:** Buses experience delays associated with dwell time when passengers are boarding, alighting, and paying their fares. Bus stops also present delays merging into traffic at pullout stops, and add acceleration time for buses to regain their operating speed.
- **Obstructions and conflicts:** Buses are more likely to experience delays associated with operating in the curbside lane, such as right-turning vehicles, vehicles pulling into or out of parking spaces, double-parked vehicles, or bicyclists. Buses are generally less able to navigate around such disruptions compared to autos.
- **Traffic signals:** Traffic signals on El Camino Real tend coordinated green lights that are calibrated to auto speeds. Since buses already travel slower than autos, they face compounding delays at traffic signals and often cannot take advantage of coordinated green lights.

This combination of delays due to bus stops, obstructions and conflicts, and traffic signals exacerbates the corridor's already congested operating conditions, making riding the bus considerably slower than driving.

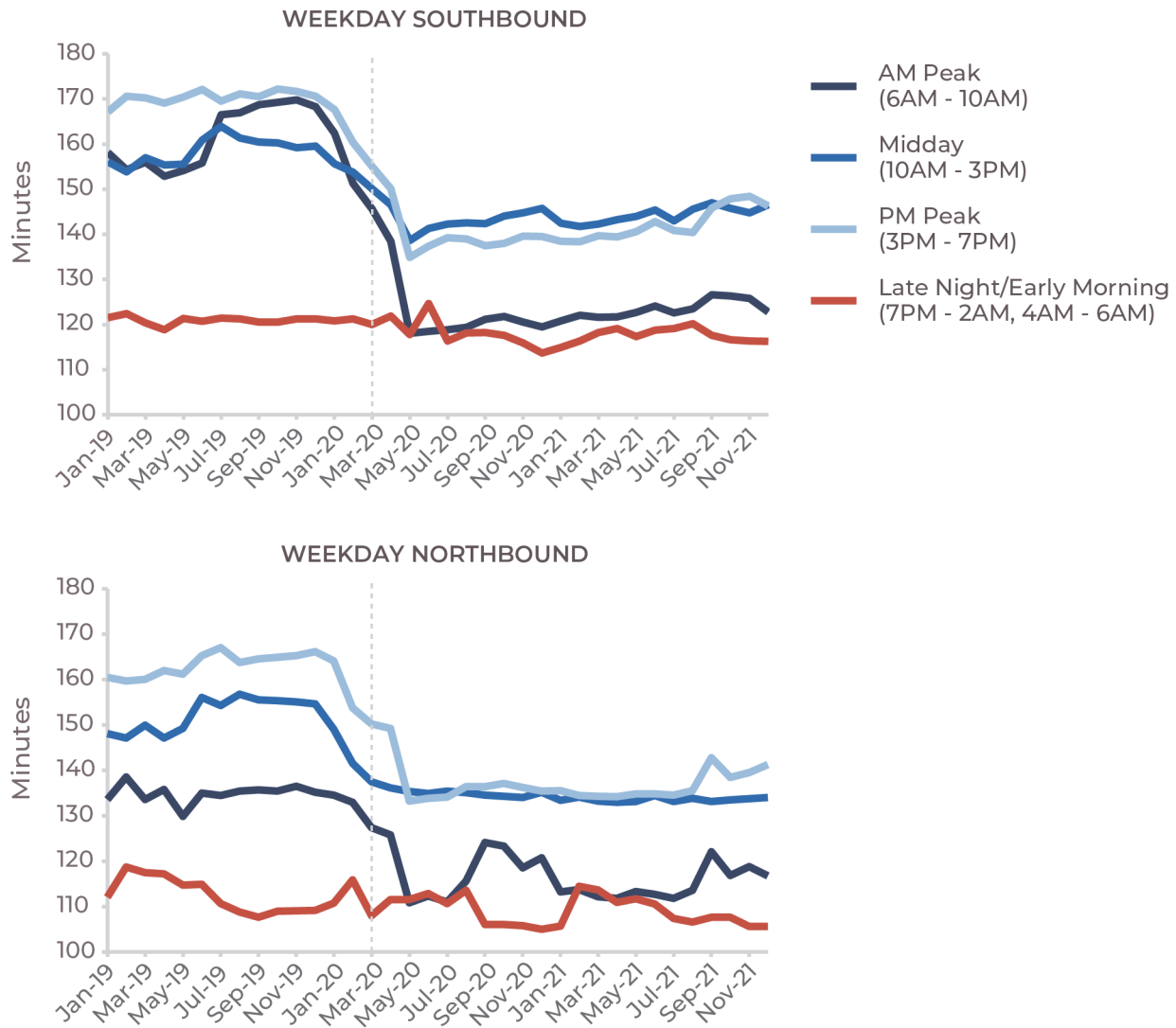
3.2 TRAVEL TIMES BEFORE & AFTER THE COVID-19 PANDEMIC

Route ECR is one of the longest high-frequency bus routes in the country. In 2019, one-way end-to-end trips on Route ECR took 150 to 170 minutes in the southbound direction and 130 to 170 minutes in the northbound direction, with the longest travel times typically occurring during the PM peak period between 3:00 and 7:00 PM. On a typical trip, dwell time accounted for approximately 10 to 15 percent of travel time (defined as when bus doors were open), while the remainder occurred when buses were moving (when bus doors are closed). Travel times were typically 20 to 30 percent faster during late evenings when ridership and traffic congestion was lower, with a one-way travel time of 110 to 120 minutes each direction.

The onset of shelter in-place orders in Spring 2020 due to the COVID-19 pandemic demonstrated the potential for faster travel times on Route ECR. As depicted in **Figure 13** and **Figure 14**, during the COVID-19 shelter-in-place order in Spring 2020, one-way travel times decreased by 20 percent due to less traffic congestion and fewer stops. As travel activity rebounded over the course of the pandemic, Route ECR travel times deteriorated back toward pre-pandemic levels. Nonetheless, the pandemic illustrated that it is possible to achieve faster bus service along El Camino Real.

Travel time savings during the COVID-19 shelter-in-place orders were not evenly distributed throughout the corridor. As demonstrated in **Figure 15**, Route ECR experienced travel time savings of 20 to 30 percent in cities that experienced the greatest reduction in traffic congestion, such as San Mateo, Redwood City, and Menlo Park. Most other cities saw travel time savings of 10 to 20 percent.

Figure 13: Total Travel Time per Trip (Travel Time Plus Dwell Time)



During the COVID-19 shelter-in-place order in Spring 2020, one-way travel times decreased by 20 percent due to less traffic congestion and fewer stops.

Figure 14: Percent Change in Total Travel Time per Trip (Travel Time Plus Dwell Time)

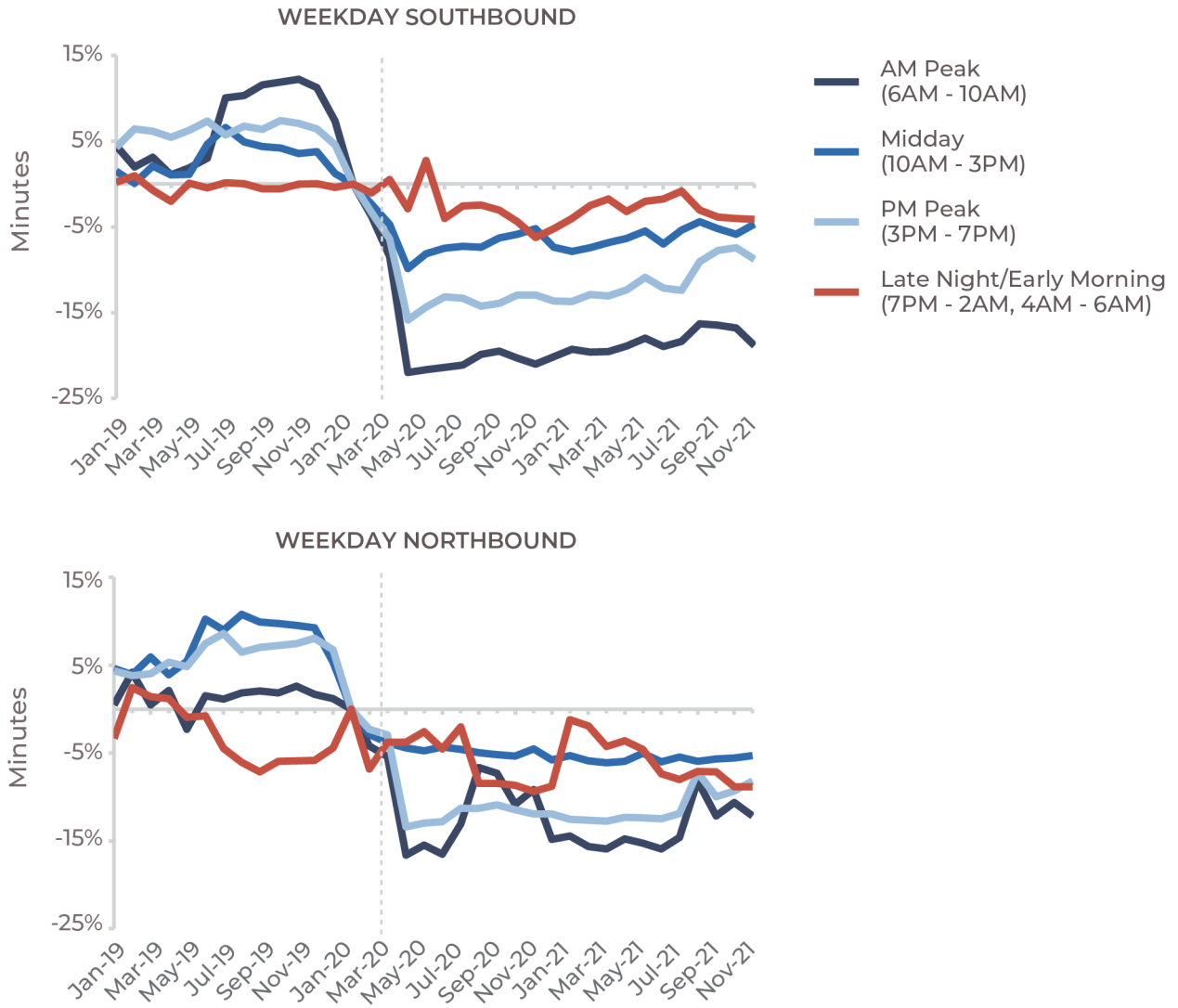
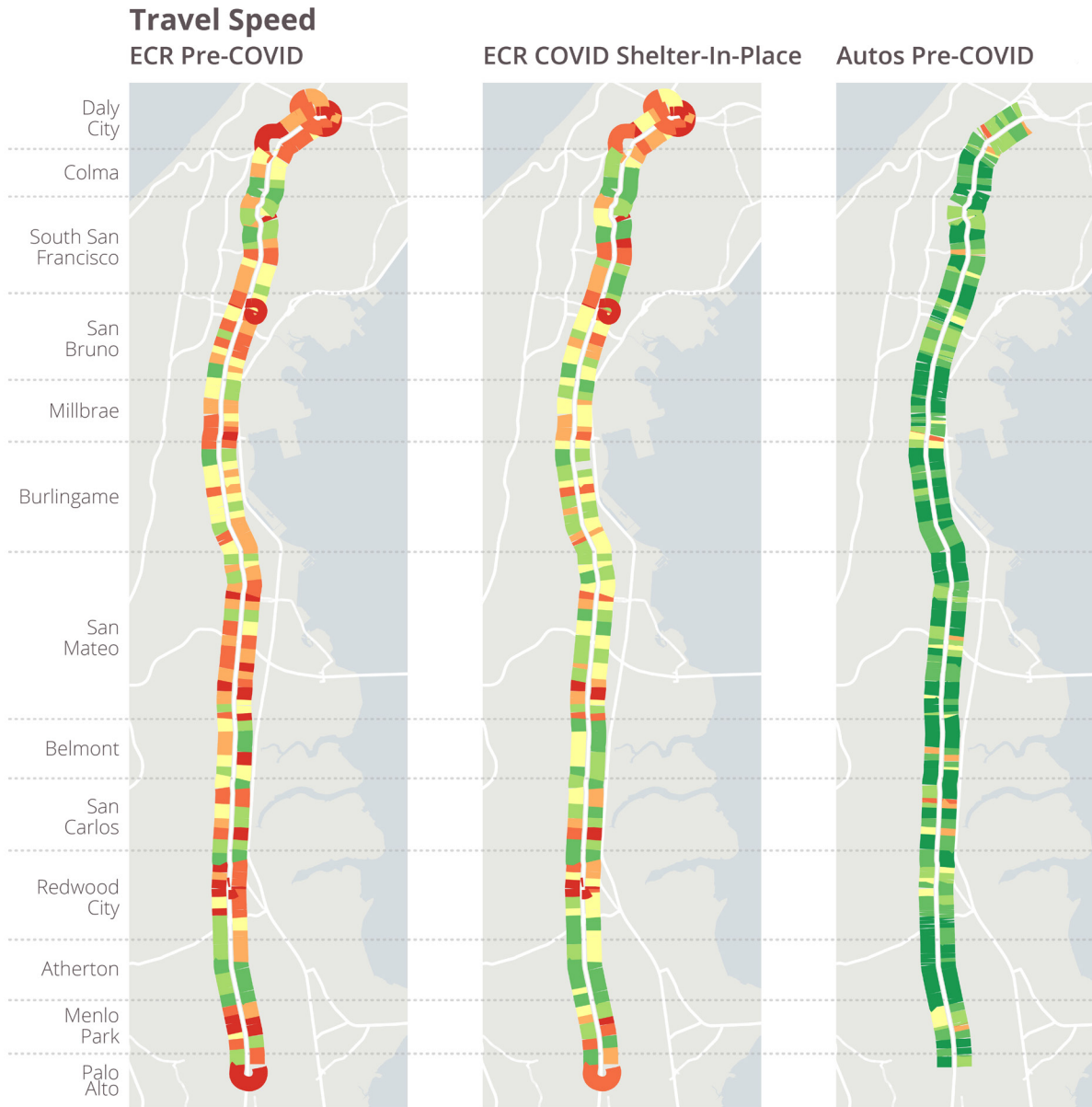
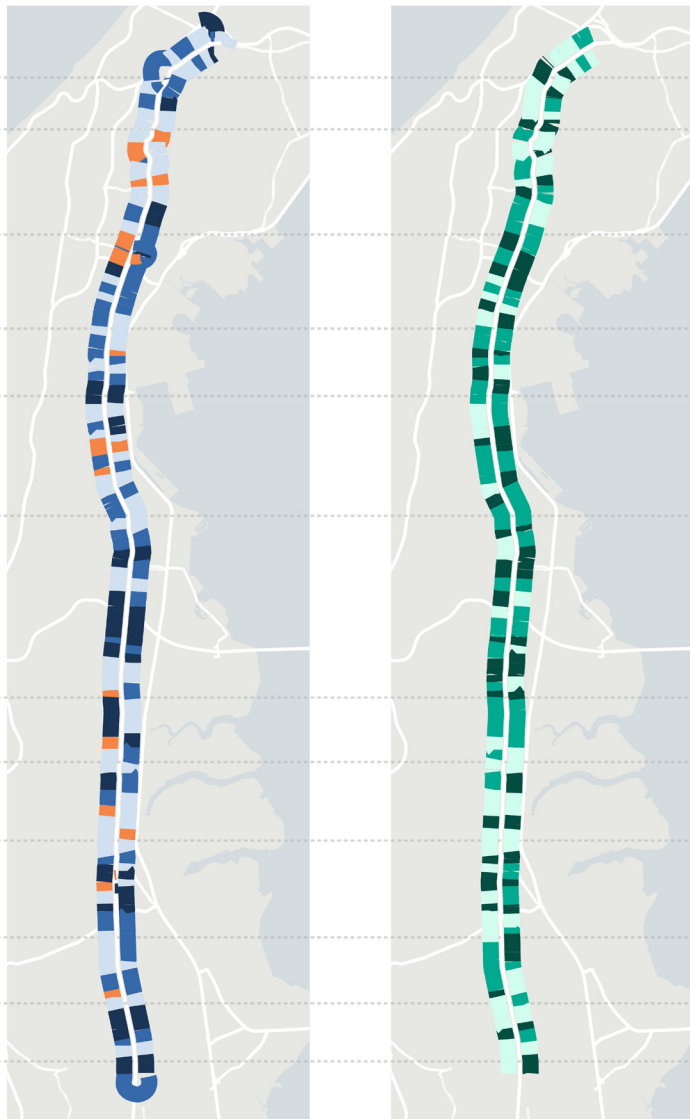


Figure 15: Change in ECR Speed



Percent Difference from ECR Pre-COVID

ECR COVID Shelter-In-Place Autos Pre-COVID



Speed

- 10 mph or less
- 10 - 12.5 mph
- 12.6 - 15 mph
- 15 - 17.5 mph
- 17.6 - 20 mph
- 20 - 25 mph
- More than 25 mph

Percent Difference from COVID

- Slower
- 0 - 9% faster
- 10 - 19% faster
- More than 20% faster

Percent Difference from Autos

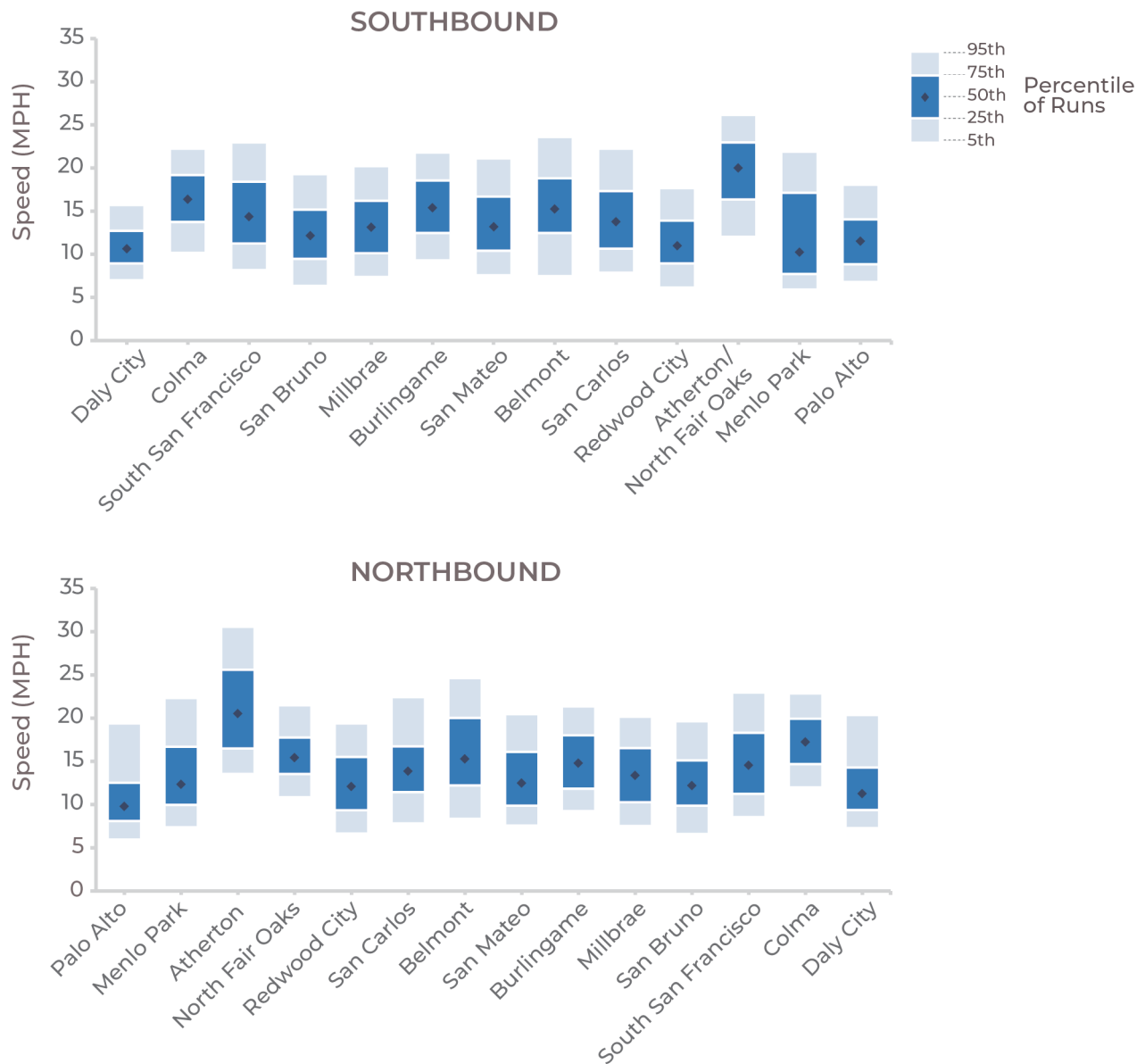
- Less than 50% faster
- 50 - 75% faster
- More than 75% faster

Pre-COVID AVERAGE 2019
 COVID Shelter-In-Place MAY 2020

3.3 ROUTE ECR RELIABILITY

Bus speeds on El Camino Real tend to be unreliable across the corridor. As depicted in **Figure 16**, buses typically travel between 11 and 17 miles per hour during the morning, midday, and evening periods. However, in some cities, speeds can regularly vary by up to 15 miles per hour depending on traffic congestion and other delays.

Figure 16: Speed Variability by City



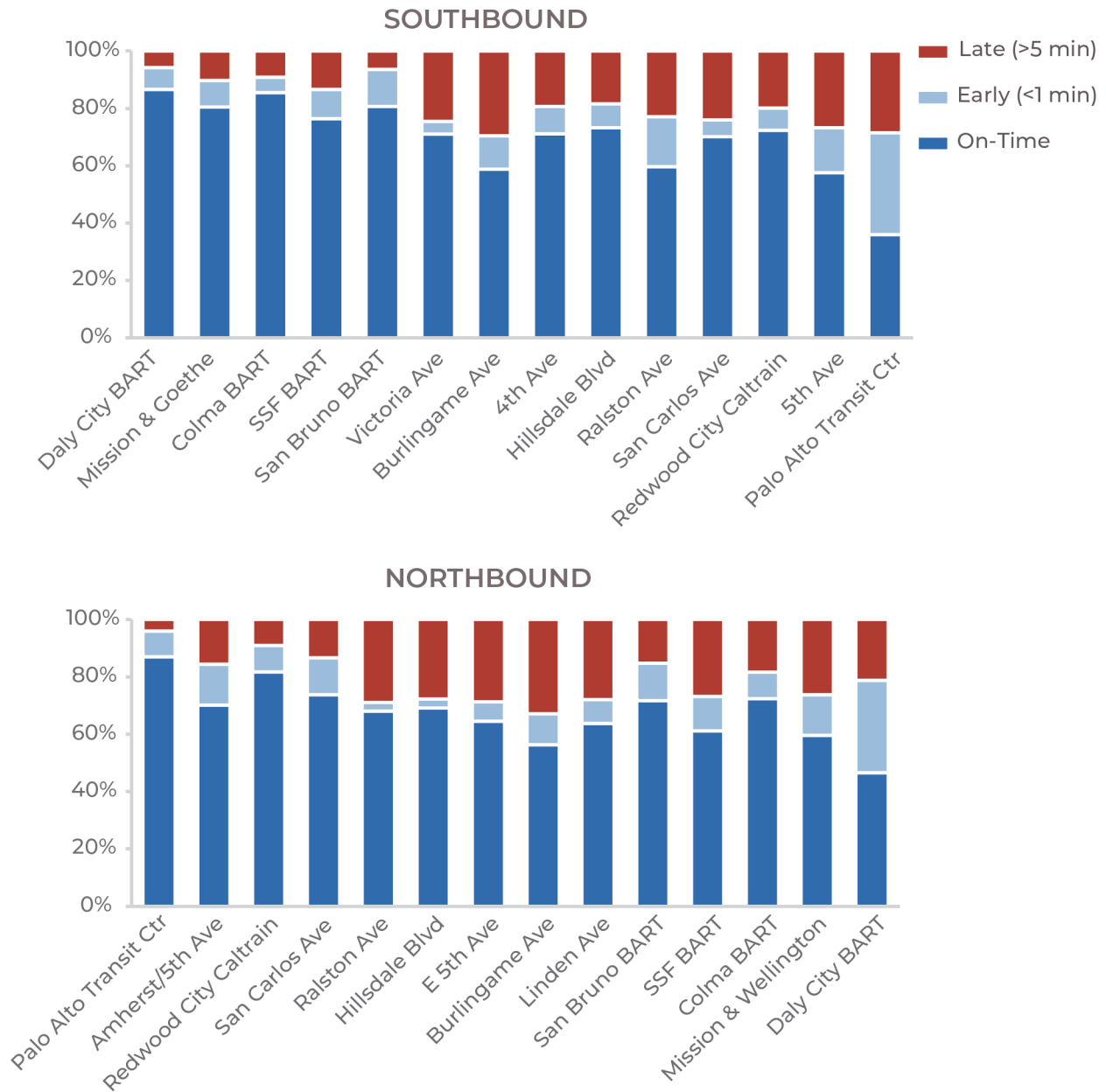
This variability in bus speeds can make it difficult to reliably plan and operate Route ECR schedules, especially as variability compounds across the length of the corridor. SamTrans defines on-time performance as arriving less than one minute early or up to five minutes late relative to scheduled arrival times and has established an 85 percent goal systemwide. As depicted in **Figure 17**, buses typically start their trips on-time, but on-time performance deteriorates to 50 to 70 percent as buses traverse most of the corridor.

From a rider's perspective, variability in bus speeds and on-time performance leads to inconsistent wait times and difficulty in planning trips. While ECR was scheduled to run every 20 minutes in 2019, bus delays and bunching caused wait times to regularly vary between 10 and 50 minutes, and approximately one out of every 10 trips had unusually short or long wait times beyond this range. The range in wait times experienced by riders was longer at the ends of the corridor, as service becomes more inconsistent as Route ECR travels through its route. Scheduled headways and headways experienced by riders are compared in **Figure 18**.

Route ECR's speed and reliability challenges have significant equity implications. Hourly-wage and shift-based workers tend to have less flexibility in their work schedules than higher-income office workers. Without flexibility to arrive late or adjust work schedules to avoid congestion, these workers are more vulnerable to reliability issues and travel delays on Route ECR. Unreliable service can impact a rider's take-home pay or job security, discouraging transit use and impacting livelihoods.

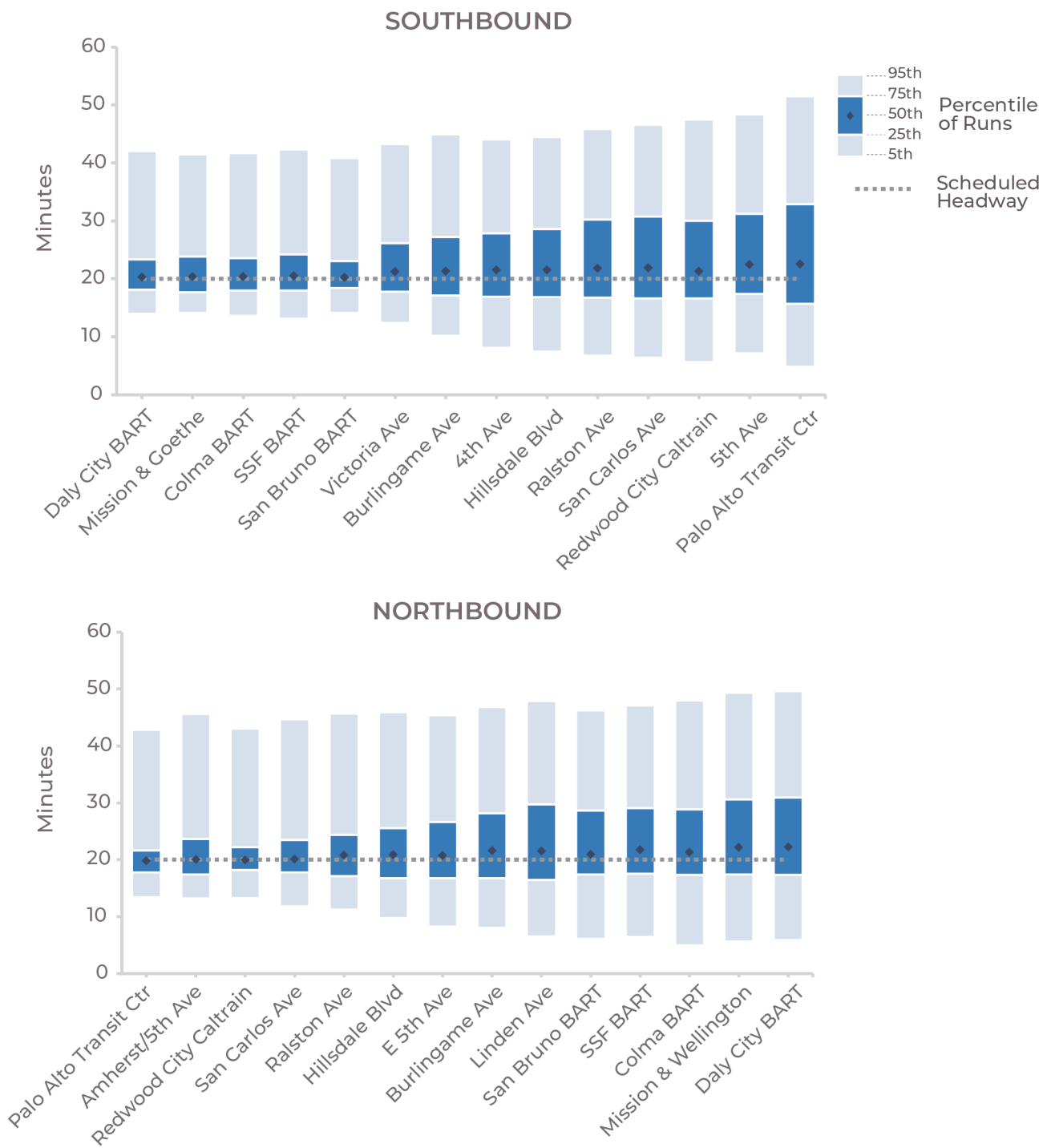
Unreliable service can impact a rider's take-home pay or job security, discouraging transit use and impacting livelihoods.

Figure 17: On-Time Performance by Stop (2019)



In 2019, bus delays and bunching caused wait time to regularly vary between 10 to 50 minutes.

Figure 18: Route ECR Headways (2019)



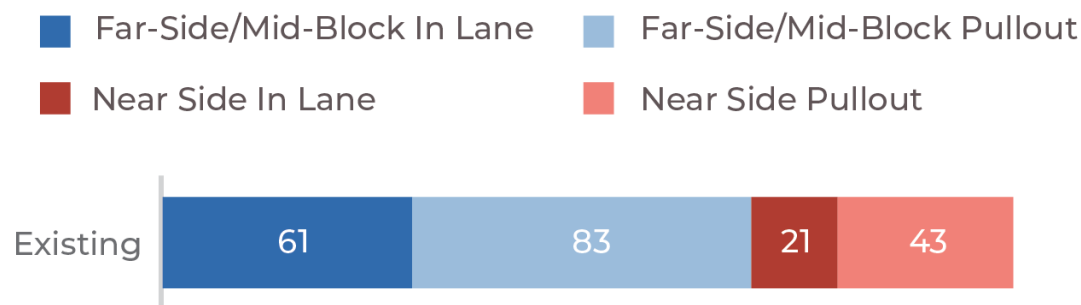
3.5 BUS STOP CONDITIONS & STREET DESIGN

The built environment on El Camino Real plays a key factor in the speed and reliability of Route ECR service. Route ECR has 208 total bus stops (103 northbound and 105 southbound). Many of these stops are spaced relatively closely together: 89 stops (43 percent) are less than a five-minute walk apart (1/4 mile, a typical walking distance for riders accessing a bus stop). The SamTrans Service Policy Framework calls for stop spacing of up to a half-mile on higher-frequency routes such as Route ECR, reflecting the willingness of riders to walk a bit further for faster bus service.

A majority of stops (126 total, or 61 percent) are pullout stops, which expose buses to delays merging back into traffic after pulling out of the travel lane to pick up or drop off passengers. About one third of stops (64 total) are near-side stops, where buses stop before crossing an intersection. Near-side stops are more likely to encounter conflicts with right-turning vehicles and experience delays from traffic signals. Transit signal priority (TSP) strategies discussed in Section 4.3 are also less effective with near-side stops.

Many stops are undersized or overlap with driveways, loading zones, or even on-street parking, which can also contribute to delays. A number of stops also include barriers to pedestrian access such as missing/narrow sidewalks, unmarked/unsignalized crosswalks, and other barriers which can further delay or deter bus riders. According

Figure 19: Summary of Existing Bus Stop Location Characteristics



to SamTrans' 2018 Triennial Survey, 95 percent of bus riders access stops via walking; consequently, safe and efficient pedestrian access is critical for retaining existing bus riders and attracting new riders.

The prevalence of relatively closely-spaced stops, pullout stops, near-side stops, and pedestrian access barriers substantially contributes to bus speed and reliability challenges for Route ECR. However, many of these deficiencies can be addressed through operational and infrastructure changes presented in Chapter 4.





04

Recommendations

This chapter presents recommendations for faster and more reliable bus service on El Camino Real based on input from riders, bus operators, and communities on the corridor. Recommendations are grouped into three categories: near-term operational enhancements, a capital improvement plan, and bus lanes. Through implementation of these recommendations, SamTrans seeks to address bus delays associated with traffic congestion, bus stops, obstructions and conflicts, and traffic signals identified in Chapter 3, while contributing toward and maintaining compatibility with the region's Grand Boulevard vision for a safe, multimodal, complete street.

By implementing these improvement measures, SamTrans aims to increase bus speeds by 30 percent along the El Camino Real corridor while achieving a bus rapid transit-like experience for riders and bus operators.

4.1 IDENTIFYING RECOMMENDATIONS

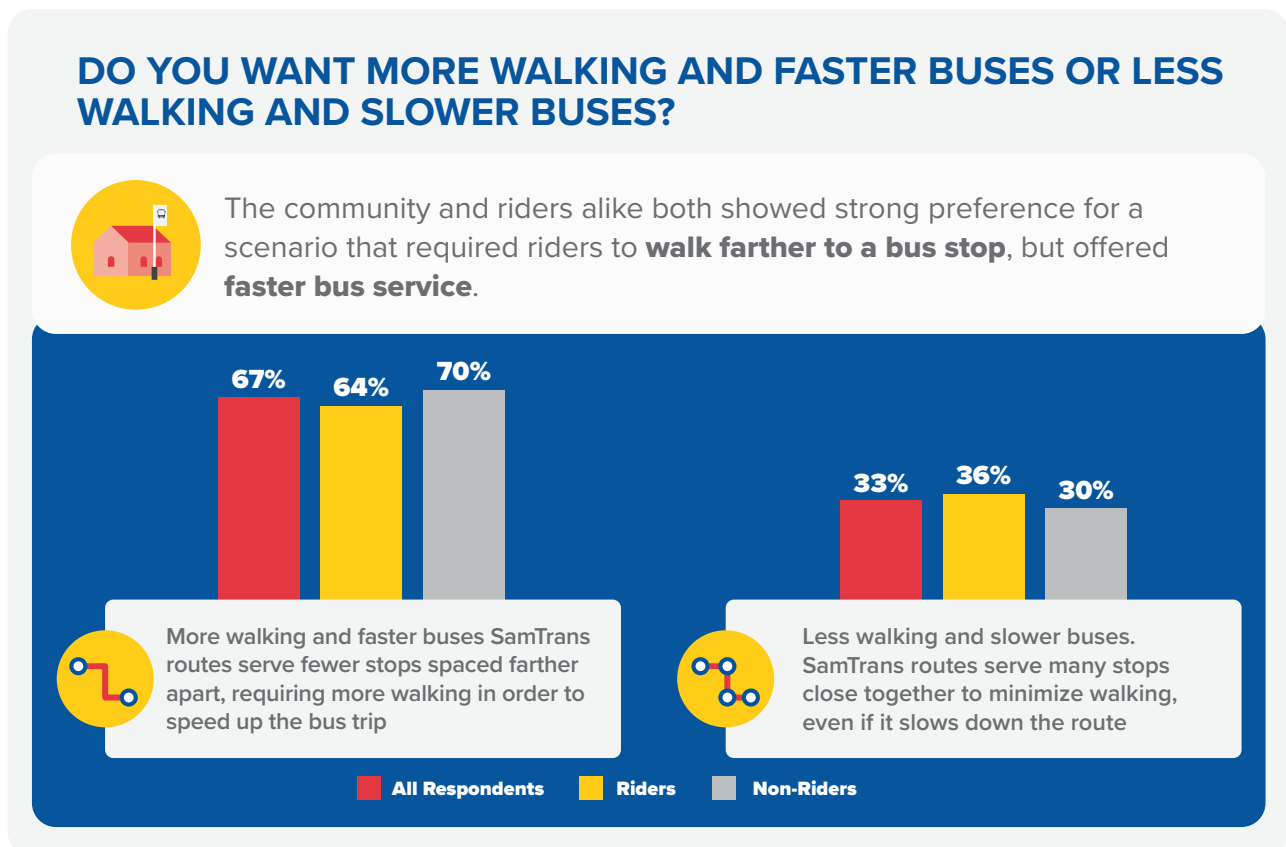
After understanding existing conditions on the corridor and the bus speed and reliability challenges experienced by Route ECR, the study identified a package of recommended improvements that emphasized and considered:

- Benefits and impacts to riders, considering ridership, on-board passenger loads, and average bus speed in each segment to identify the areas where improvements are most needed and would benefit the most passengers
- Feasibility, including coordination required by multiple entities and the right of way constraints at various points on the corridor
- Expected travel time savings and reliability improvements, based on Route ECR conditions, peer review and research, and industry best practices
- Relative costs, seeking the most cost-effective recommendations or those that could be bundled with other projects or objectives to realize co-benefits

4.2 OUTREACH AND PRIORITIZATION PROCESS

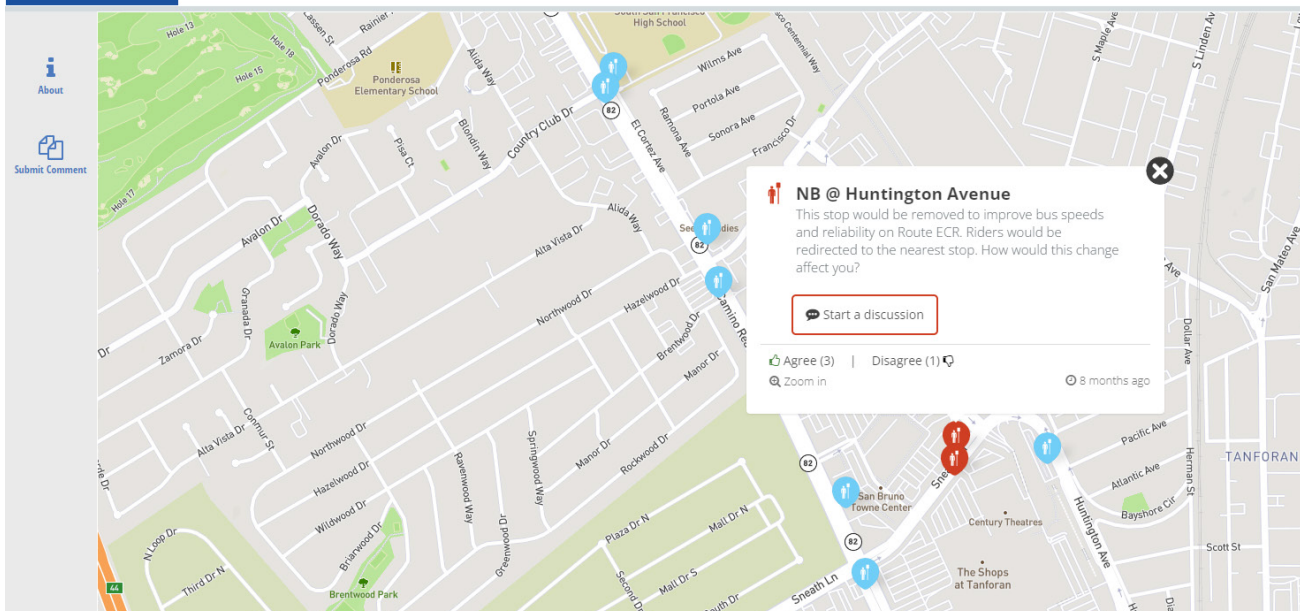
SamTrans commenced outreach to riders and non-riders in San Mateo County regarding service priorities for Route ECR during the *Reimagine SamTrans* project in 2020-2021. *Reimagine SamTrans* included nearly 200 stakeholder presentations, pop-up events, and public meetings while engaging over 8,000 survey respondents to help craft a vision for SamTrans service systemwide. During this outreach process, two-thirds of all respondents stated a preference for walking farther to a bus stop if it would result in faster service, and the preferred bus network option included a reduction in up to 30 percent of bus stops on Route ECR (**Figure 20**). Rider and public input received during *Reimagine SamTrans* served as the basis for developing bus improvement concepts for Route ECR in this study.

Figure 20: Reimagine SamTrans Rider Priorities



Reimagine SamTrans Interactive Feedback Map

samTrans



In Spring 2022, SamTrans conducted another round of outreach to riders to hear their priorities for specific bus improvements along Route ECR. Outreach materials focused on a project website, interactive map, pop-up events, and a virtual public hearing. The website was advertised by social media and temporary signs at 60 bus stops. The website provided multilingual information on the project including factsheets and a list of potential capital improvements. A public comment form was available on the website and in a printed format that was distributed at the in-person pop-up events. Individuals also had the option to call the SamTrans Customer Call Center to give their input in more than 200 available languages, or to provide their comments via email. The interactive map augmented the project website to enable location-specific feedback for riders to provide feedback on near-term changes. A total of 16 pop-up events were also hosted at bus stops.

These outreach efforts resulted in 105 email comments on the project and about 50 comments on proposed changes to individual bus stops. SamTrans supplemented outreach to bus riders through coordination with cities, community organizations, advocacy groups, and bus operators. SamTrans held two rounds of meetings with city staff representatives of the 13 jurisdictions served by Route ECR and ten meetings with other stakeholders. Four open house events were held with SamTrans bus operators.

Across all ECR outreach activities, respondents agreed that improvements to Route ECR are needed to enhance bus speeds and reliability. Riders shared concerns about reliability issues, including inconsistent service frequencies and buses showing up late or not at all. Bus operators and other stakeholders echoed the speed and reliability challenges of the route. Riders expressed strong support for bus lanes, reducing the number of stops, and improving bus stops. Cities and other stakeholders emphasized the value of coordinating bus bulbs and pedestrian access improvements with broader complete streets modernization efforts. While transit improvements can generally be coordinated with pedestrian and bicycle improvements, stakeholders noted that tradeoffs may occasionally occur. Given the scale of Route ECR, there was consensus that SamTrans should act on near-term improvements that can materially improve the experience for riders and bus operators, while also partnering with cities and Caltrans to implement capital improvements aligned with other local and countywide complete streets objectives.

Based on these outreach efforts, SamTrans identified a set of near-term priorities that the agency could accomplish to deliver some speed and reliability improvements without a major capital investment. SamTrans paired these near-term changes with a capital improvement plan to clarify how the agency can work with cities and Caltrans to incorporate improvements to individual bus stops on the corridor. Lastly, SamTrans reviewed the viability of bus lanes on El Camino Real and identified priority segments for further study.

4.3 RECOMMENDED OPERATIONAL ENHANCEMENTS

In the near term, SamTrans should prioritize several operational adjustments to Route ECR that can move forward without requiring capital improvements. The measures identified in this section will provide more rapid-like service through an improved route structure, an optimized transit signal priority (TSP) system, bus stop balancing, more efficient stop placement, and a faster fare payment process. Combined, this near-term package of measures aims to achieve 15 to 20 minutes in travel time savings in each direction on Route ECR.

4.3.1 Route Adjustments

Recommendation 1: SamTrans should maintain the Daly City route alignment changes implemented in August 2022.

The northern alignment of Route ECR was adjusted through the *Reimagine SamTrans* project to eliminate the loop to Sickles Avenue at the border of Daly City and San Francisco. These changes saved approximately three minutes of northbound travel time and six minutes of southbound travel time, enabling faster and more reliable trips between the Daly City BART station and elsewhere along the El Camino Real/Mission Street corridor.

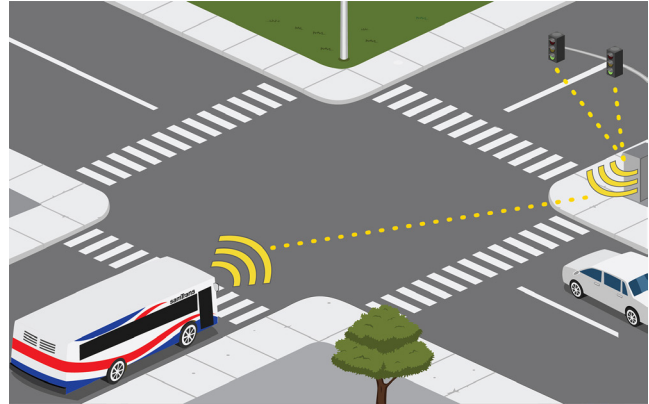
4.3.2 TSP Optimization

Recommendation 2: SamTrans should expand TSP technology on its fleet and partner with Caltrans to maximize travel time savings associated with the TSP system on El Camino Real.

In 2021, SamTrans implemented a TSP system on El Camino Real that extends green lights by up to ten seconds for buses approaching an intersection. The initial launch of the TSP system has produced modest changes to bus speeds thus far, but presents opportunities for further optimization. In particular, TSP hardware has not yet been

installed on all buses, while SamTrans may consider further improvements to signal progressions, truncating red light times, and incorporating TSP for Route ECR's diversions turning on and off of El Camino Real and circulating on side streets (such as the Daly City, Colma, and San Bruno BART stations, and the Redwood City and Palo Alto Caltrain stations). Other prioritization measures discussed in this section would support more effective utilization of TSP, including relocating near-side stops and providing bus bulbs and bus lanes.

SamTrans recently installed a TSP system on El Camino Real that extends green lights by up to 10 seconds for buses.



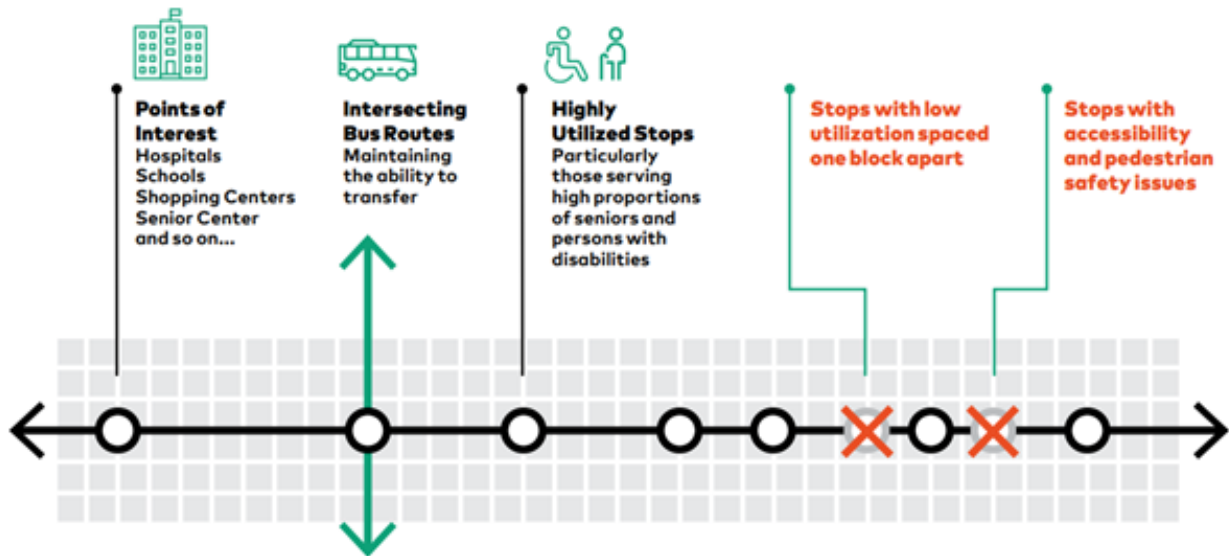
4.3.3 Bus Stop Balancing & Near-Side Stop Relocation

Recommendation 3: SamTrans should reduce the overall number of bus stops on Route ECR by 20 percent through bus stop balancing.

Bus stop balancing presents an opportunity to achieve more consistent stop spacing, improving bus speed and reliability by decreasing the amount that buses stop. Given the length of Route ECR, bus stops should generally be placed every 1/4 to 1/2 mile (consistent with the agency's Service Policy Framework); however, nearly half of stops do not meet this threshold today. Based on a review of the corridor's land use and ridership patterns as well as outreach to riders and corridor stakeholders, SamTrans has identified 20 percent of stops on Route ECR for removal and consolidation. Closer stop spacing would be maintained at stops that exhibit high ridership and provide key connections to community facilities and other transit routes, as illustrated in **Figure 21**.

Figure 21: The Basics of Bus Stop Balancing (Source: TransitCenter)

The Basics of Bus Stop Balancing



Bus stop balancing would be paired with near-side stop relocations, generally moving bus stops to the far side of an intersection. Far-side stops reduce conflicts between buses and right-turning vehicles at intersections. Far-side stops also make transit signal priority more effective by allowing buses to clear a signalized intersection before stopping. In the near-term, SamTrans would relocate about 25 near-side stops on Route ECR, prioritizing stops that can be easily moved without more significant capital improvements. Eventually, most stops on Route ECR would be relocated to the far-side, accompanying the construction of bus bulbs discussed in Section 4.4.1.

With this bus stop balancing and relocation approach, 82 percent of riders would maintain access to their existing stop (or a stop in a very similar location), 97 percent of riders would maintain access within a five-minute walk ($\frac{1}{4}$ mile), and 99 percent of riders would maintain access within a 10-minute walk ($\frac{1}{2}$ mile). **Figure 22** illustrates the near-term changes to bus stop access, which will continue to evolve over time as capital improvements are implemented.

Figure 22: Near-Term Bus Stop Balancing - Changes to Walk Access within 10 Minutes (Half-Mile) of Route ECR



4.3.4 Cashless Payments

Recommendation 4: SamTrans should accelerate customer adoption of cashless fare collection methods, including Clipper Cards and mobile payments, to speed up the boarding process and reduce delays.

Cash payments contribute to greater dwell time delays when compared to cashless methods. While maintaining some form of cash payment is important from an equity standpoint, transitioning riders from cash to cashless payment methods is an effective way to speed up the boarding process.

Today, SamTrans riders use a variety of fare collection methods, including cash payments, Clipper, paper tickets, and the SamTrans Mobile App. SamTrans's fare structure offers an incentive for riders to use a Clipper card, with riders receiving a discount of 20 cents on local bus routes when using Clipper instead of paying with cash or using the SamTrans Mobile App. Additionally, riders using Clipper or the SamTrans Mobile App receive free transfers to other SamTrans bus routes for a two-hour period, while riders paying with cash must pay the full fare when boarding each bus.

Increasing use of Clipper cards and other contactless payment products can help reduce bus dwell times



Approximately 32 percent of Route ECR riders pay their fare with cash, compared to 18 to 26 percent on comparable operators.

Even with these incentives, approximately 32 percent of Route ECR riders pay their fare with cash, compared to 18 to 26 percent on comparable operators. As MTC prepares to roll out the “Clipper 2.0” system, SamTrans should increase its efforts to transition riders to streamlined payment options by using direct outreach to increase rider awareness of the benefits of Clipper and the SamTrans Mobile App, providing free Clipper cards, and working with MTC to increase the network of Clipper vendors in San Mateo County, among other marketing efforts. Clipper’s support of mobile payment platforms like Apple Pay and Google Pay can further these efforts, giving passengers more flexibility when making fare payments.

4.4 RECOMMENDED TRANSIT CAPITAL IMPROVEMENT PLAN

In parallel with advancing near-term operational enhancements, SamTrans and its partners should commence planning, design, and permitting for a range of capital improvements to address bus delays and access barriers. The recommended Transit Capital Improvement Plan includes:

- Bus bulbs and queue jumps
- Pedestrian gap closures
- Transit center bus circulation improvements
- Bus lanes

These improvement measures may be pursued on a project-by-project basis or incorporated into a broader complete streets modernization of the corridor as described in Section 5.1. **Table 1** summarizes recommendations by city; specific recommendations for individual roadway segments, bus stops, and intersections are summarized in the accompanying Capital Improvement Plan booklets.

Table 1: Summary of Recommended Capital Improvements and Bus Lanes by City

City	Total Number of Bus Stops	Estimated Number of Bus Bulbs	Estimated Number of Queue Jumps	Estimated Number of Stops with Pedestrian Gap Closures	Transit Center Bus Circulation Improvements	Bus Lanes
Daly City	14	10	-	1		-
Colma	8	7	-	4	✓	-
South San Francisco	17	7	-	6	-	2.1 miles (NB) 2.1 miles (SB)
San Bruno	13	7	-	4	✓	2.0 miles (NB) 2.0 miles (SB)
Millbrae	10	4	-	2	-	1.7 miles (NB) 1.7 miles (SB)
Burlingame	17	2	3	5	-	0.3 miles (NB) 0.3 miles (SB)
San Mateo	32	10	1	19	-	2.6 miles (NB) 3.1 miles (SB)
Belmont	8	6	1	6	-	-
San Carlos	11	6	-	10	-	1.3 miles (SB)
Redwood City	15	9	1	9	✓	0.2 miles (SB)
Atherton/ North Fair Oaks	6	1	-	6	-	-
Menlo Park/ Palo Alto	7	2	-	1	✓	-
Total	158	71	6	75	4	8.7 miles (NB) 10.7 miles (SB)

4.4.1 Bus Bulbs & Queue Jumps

Recommendation 5: SamTrans should partner with cities and Caltrans to install bus bulbs and queue jumps. Most pullout bus stops should be eliminated along the El Camino Real corridor.

As discussed in Chapter 3, pullout stops cause delays and conflicts for buses merging back into traffic, which can be quite substantial on a high-volume corridor like El Camino Real. Eliminating pullout stops is addressed via constructing bus bulbs, while queue jumps may be incorporated in locations where pullout stops are still needed (such as schedule timepoints).

Bus Bulbs

Bus bulbs represent the preferred approach to replacing pullout stops. Bus bulbs use curb extensions to allow buses to stop in lane, eliminating the need to merge in and out of traffic. Bus bulbs can save 20 to 30 seconds per stop while reducing variability and delays. Replacing pullout stops with bus bulbs will also enable SamTrans to right-size bus stop sizing, provide bus shelters, and expand sidewalk space. Bus bulbs also reduce crossing distances for pedestrians and typically take up less curb space than a pullout stop. The installation of new bus bulbs is recommended for 71 stops on the corridor.

Where feasible, bus bulbs should incorporate near level boarding to raise the height of the platform to allow for faster bus boarding and alighting and more convenient access for mobility-impaired passengers. Near-level platforms may not be viable at all stop locations since they require additional sidewalk space surrounding the bus stop to accommodate an accessible ramp between the higher platform and the lower sidewalk.

Example: Bus Bulb (Source: NACTO)

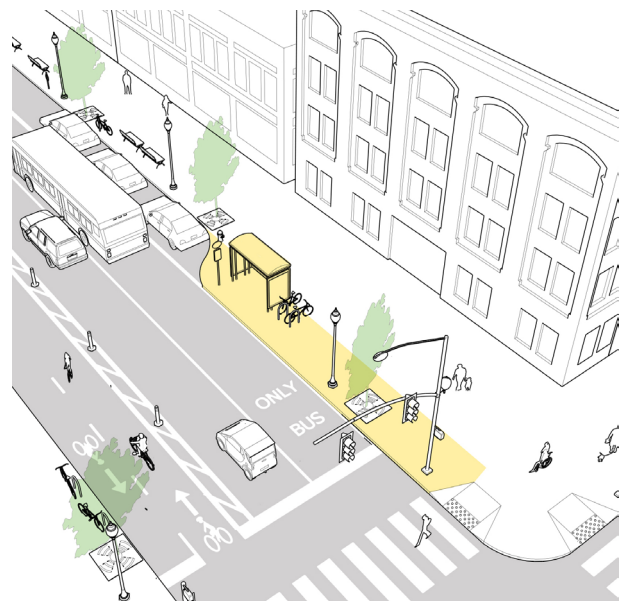
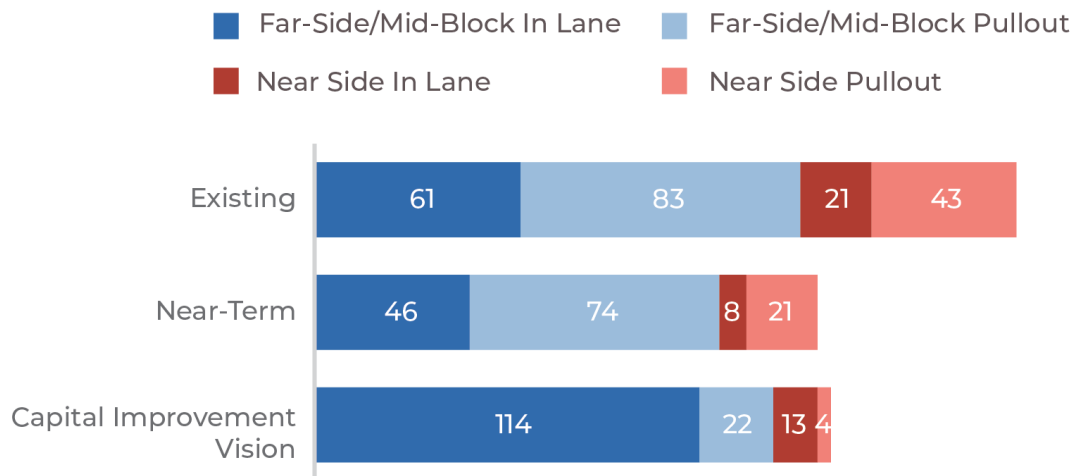


Figure 23: Summary of Recommended Changes to Bus Stops



When bus bulbs overlap with bicycle facilities, bus boarding islands are recommended to incorporate a channelized bikeway bypass between the boarding island and the sidewalk. Bus boarding islands help reduce conflicts between buses and bicyclists. Bus boarding islands typically require more street right-of-way than bus bulbs, and are sometimes incompatible with near-level boarding unless ample space exists.

By combining bus bulbs, bus stop balancing, and near-side stop relocation, the vast majority of bus stops would become far-side in-lane stops under the Capital Improvement Plan, as shown in **Figure 23**. Only a few stops would remain as pullouts where necessary for timepoints or compatibility with queue jumps.

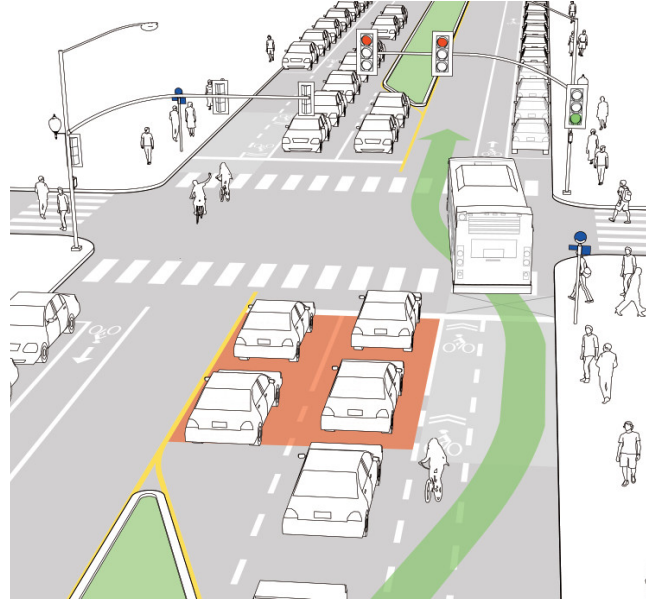
Queue Jumps

SamTrans should pursue queue jumps where near-side pullout stops are necessary. Queue jump signals give buses a head start over other traffic at signalized intersections; buses complete their queue jump via a custom signal phase from a right turn only lane that exempts transit vehicles.

Queue jumps are typically paired with near-side pullout stops and can offer 10 to 15 seconds of travel time savings, although these savings can be lower if a high volume of right turn traffic is present.

Queue jumps present an alternative to bus bulbs for locations where far-side in-lane bus bulbs are not viable. While less preferable to bus bulbs due to their lower travel time savings, conflicts with right turning vehicles, and lack of benefits to pedestrians and bicyclists, queue jumps can work well when a far-side stop is not viable, particularly for locations that are schedule timepoints and when transitioning from bus lanes to mixed traffic operations. Six queue jump locations have been identified for the El Camino Real corridor, and they may be considered in lieu of bus bulbs elsewhere.

Example: Queue Jump (Source: NACTO)



4.4.2 Pedestrian Gap Closures & Complete Streets Improvements

Recommendation 6: SamTrans should work with cities and Caltrans to address gaps in pedestrian infrastructure that impede bus stop access and deter bus riders.

As noted in Section 3.5, 95 percent of SamTrans bus riders access bus stops via walking; consequently, pedestrian access is critical for retaining existing bus riders and attracting new riders. Approximately 72 bus stops exhibit barriers to pedestrian access, including missing or narrow sidewalks, unmarked or unsignalized crosswalks, and obstructions overlapping bus stops like parking, commercial loading zones, and driveways.

Addressing these gaps would require a range of solutions on a stop-by-stop basis, such as striping unmarked crosswalks at signalized intersections, adding new traffic signals or pedestrian hybrid beacons at unsignalized pedestrian crossings, relocating bus stops, painting red curbs, and adding or upgrading sidewalks, curb ramps, and stop platforms.

Pedestrian gap closures may be pursued as a part of broader complete streets improvements to create a more comfortable multimodal streetscape on El Camino Real. In particular, several cities are in the initial stages of planning bicycle improvements along El Camino Real. Bicycle facilities are most compatible with bus facilities when repurposing parking instead of removing travel lanes.

Example: A pedestrian friendly boulevard
(Source: NACTO)



When implementing bike lanes with bus facilities, protected bike lanes (also known as Class IV facilities) are typically preferred since they offer physical separation to help reduce conflicts between buses and bicyclists, particularly when incorporating bus boarding islands as noted above. Shared lanes (Class III) and striped or buffered bike lanes (Class II and Class IIb) without bus boarding islands tend to pose more conflicts with buses. Bikeway projects that seek to remove a travel lane should consider the effects on bus operations and seek to identify possible improvement measures to address potential effects on bus speeds.

4.4.3 Transit Bus Center Circulation Improvements

Recommendation 7: SamTrans should seek to improve the efficiency of Route ECR circulation at transit centers.

Route ECR directly serves five transit centers at the Daly City BART Station, Colma BART Station, San Bruno BART Station, Redwood City Caltrain Station, and Palo Alto Caltrain Station. Buses encounter particularly slow speeds during these diversions associated with traffic signals, side streets, and driveways. SamTrans should seek to incorporate improvement measures such as transit signal priority at all transit centers, and evaluate other measures to improve bus speeds as these transit centers change over time. In

particular, the redesign of the Redwood City Transit Center presents an opportunity to shorten route diversions, while a plan to reconfigure access to the Palo Alto Transit Center via Quarry Road would avoid delays associated with the University Avenue interchange.

4.4.4 Bus Lanes

Recommendation 8: SamTrans should pursue bus lanes along high priority segments on El Camino Real.

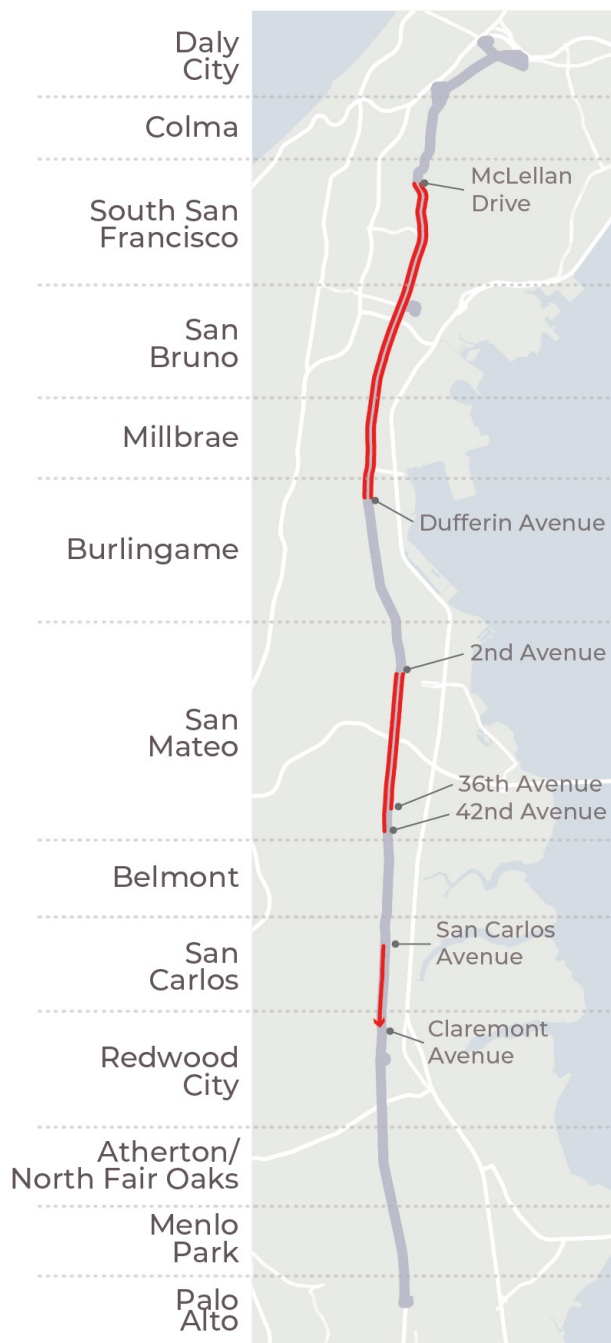
Bus lanes are among the most transformative and cost-effective transit prioritization strategies, but also present the greatest tradeoffs in constrained street environments like El Camino Real. SamTrans has previously analyzed a corridor-wide approach to bus lanes in the El Camino Real Bus Rapid Transit Phasing Study (2014). This study provides recommendations on the most suitable bus lane treatments for the corridor and the segments to prioritize.

Curbside bus lanes represent the most compatible and cost-effective approach to bus lanes on El Camino Real. Curbside bus lanes dedicate the rightmost lane to buses while accommodating right-turning vehicles and vehicles accessing on-street parking (if present). They can be implemented through incremental changes to lane striping without requiring a more costly and disruptive streetscape redesign, and are compatible with other capital improvement measures such as bus bulbs and protected bikeways. Bus lanes would be enforced throughout the day while continuing to allow access for vehicles making right turns or accessing on-street parking, and may also be used by other SamTrans routes, public shuttle routes, and emergency vehicles.

Example: Bus lane (Source: Los Angeles Metro)



Figure 24: Proposed Curbside Bus Lanes



While a corridor-wide approach to bus lanes is optimal from a transit operations perspective, the length, varying local context, and available right-of-way on the El Camino Real corridor necessitates a more targeted approach to prioritize key segments.

SamTrans prioritized bus lane segments that would provide the greatest benefits to riders while maintaining compatibility with the varying contexts and constraints of the corridor. Several factors were considered. First, segments with low bus speeds and high ridership were identified. Second, roadway segments were screened to prioritize those with at least three lanes per direction, such that the addition of bus lanes could still maintain two general purpose lanes (to preserve a base level of throughput capacity for the corridor). Lastly, the remaining segments were reviewed to ensure compatibility with local plans and policies and overall viability.

The following bus lane segments are recommended for further analysis:

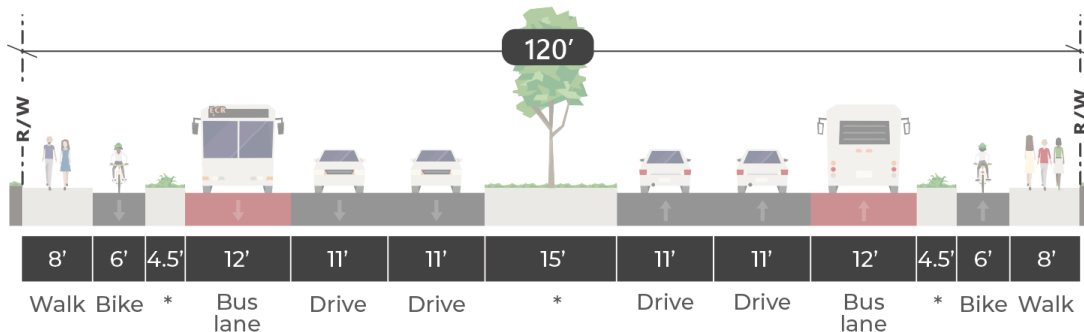
South San Francisco, San Bruno, Millbrae, and northern Burlingame (6.1 miles): The proposed bus lane would span McLellan Drive in South San Francisco to Dufferin Avenue in Burlingame, passing through San Bruno and Millbrae. The curbside (outer) travel lane would be converted to a bus lane in both directions, while four general purpose lanes would be maintained for through traffic. Turn lanes and the median would generally not be affected, and there would be flexibility to maintain parking, add protected bike lanes, or expand sidewalks. Bus lanes would help bypass congestion around the Tanforan Mall, downtown San Bruno, and downtown Millbrae, and are expected to save approximately six minutes of travel time per direction while enhancing reliability.

San Mateo (2.6 miles northbound, 3.1 miles southbound): The proposed northbound bus lane would begin at 36th Avenue and end at 2nd Avenue, while the proposed southbound bus lane would begin at 2nd Avenue and end at 42nd Avenue. The curbside (outer) travel lane would be converted to a bus lane in both directions, while four general purpose lanes would be maintained for through traffic. The median would generally not be affected, and there would be flexibility to maintain parking, add protected bike lanes, or expand sidewalks. These bus lanes would help bypass congestion around downtown San Mateo and the Hillsdale Mall, and are expected to save approximately three minutes of travel time per direction while enhancing reliability.

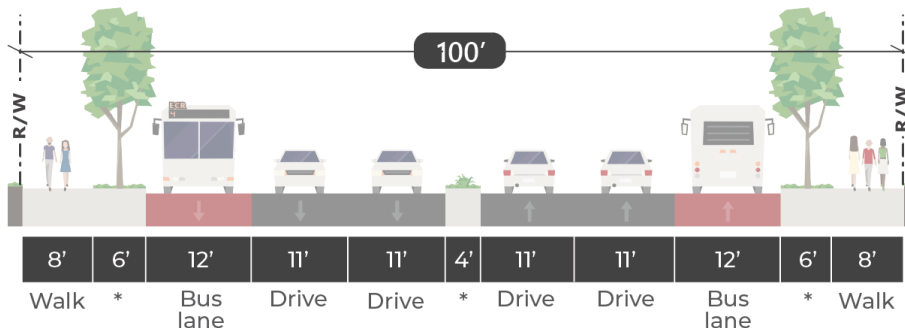
San Carlos/Redwood City (1.5 miles, southbound only): The proposed southbound bus lane would begin at San Carlos Avenue and end at Claremont Avenue. The curbside (outer) travel lane would be converted to a bus lane in the southbound direction only, while four general purpose lanes would be maintained for through traffic. Turn lanes and the median would generally not be affected, and there would be flexibility to maintain parking, add protected bike lanes, or expand sidewalks. This bus lane would help bypass congestion around downtown San Carlos and is expected to save approximately two minutes of travel time, which would better align southbound and northbound travel times through San Carlos.

Figure 25: Example Bus Lane Cross-Sections

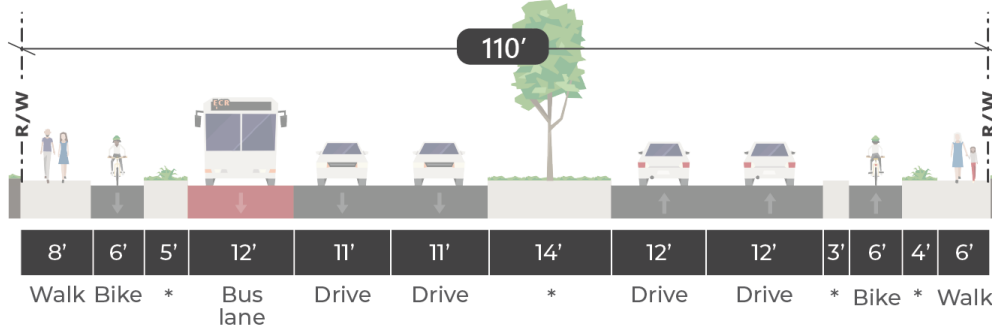
South San Francisco, San Bruno, Millbrae, and northern Burlingame (6.1 miles)



San Mateo (2.6 miles NB, 3.1 miles SB)



San Carlos, Redwood City (1.5 miles, SB only)



Other approaches to deploying bus lanes were considered but not recommended to move forward:

- **Median bus lanes** place bus lanes and stops in the roadway median, usually with physical separation from other vehicles. While median bus lanes generally experience fewer delays than curbside bus lanes, they take up more roadway space and require major streetscape changes to implement. For these reasons, curbside bus lanes were determined to be a better fit for the complexity and variability of the corridor.
- **Peak period-only bus lanes** repurpose general purpose lanes or on-street parking as bus lanes during peak travel periods (typically morning and evening commute periods). Peak period-only bus lanes are most suited to corridors that primarily experience slow bus speeds during peak periods, which is inconsistent with the all-day traffic congestion that buses experience on El Camino Real.
- **Curbside high-occupancy vehicle (HOV) lanes** restrict access to single-occupancy vehicles except for those making right turns or parking. Caltrans is currently engaged in a curbside HOV lane pilot program in San Francisco along Lombard Street (US-101) and Park Presidio (SR-1). Vehicles traveling in these lanes must have two or more passengers unless they're turning, parking, or meet state exemptions, which results in a higher volume of auto traffic using the lanes compared to bus lanes. Curbside HOV lanes may be considered as an alternative to bus lanes, but preliminary studies results suggest they are less effective.

4.5 BENEFITS OF PROPOSED RECOMMENDATIONS

By implementing the recommended near-term operational enhancements and the Transit Capital Improvement Plan, SamTrans could reduce one-way bus travel times on Route ECR by approximately 40 to 45 minutes relative to 2019 peak period conditions. This reduction would represent a travel time savings of roughly 25 to 30 percent while enabling more reliable operations with a lower risk of delay and variability.

Faster service would allow SamTrans to maintain the same level of service frequency using fewer buses. Reducing one-way travel times by 25 to 30 percent would free up approximately three operators and 60 hours of daily service to redeploy around the bus system. SamTrans could increase frequency on Route ECR or enhance service elsewhere in the network, consistent with the *Reimagine SamTrans* service plan.

The benefits of faster and more reliable service extends beyond reduced travel times for current riders. Faster and more reliable service broadens the appeal of Route ECR, expanding its usefulness for new riders and helping to recapture riders who found the service too slow. Importantly, faster and more reliable service would also result in a less stressful experience for bus operators, especially after addressing many of the corridor's key deficiencies and conflict points.

Reducing one-way travel times by 25 to 30 percent would free up approximately three operators and 60 hours of daily service to redeploy around the bus system.

Of the recommended treatments, implementation of bus bulbs and bus lanes would result in the greatest share of travel time savings and reliability benefits. However, near-term operational enhancements such as route adjustments in Daly City (recently completed), bus stop balancing and near-side stop removal, TSP optimization, and cashless payments can still offer a combined 15 to 20 minutes of savings in each direction along with more reliable operations. **Figure 26** and **Table 2** summarize estimated peak period travel time savings per direction by improvement measure.

This analysis illustrates that combining a variety of improvement measures can achieve a substantial benefit to bus speeds while enabling more reliable operations.

Figure 26: Estimated Peak Period Travel Time Savings (in minutes) per Direction by Improvement Measure

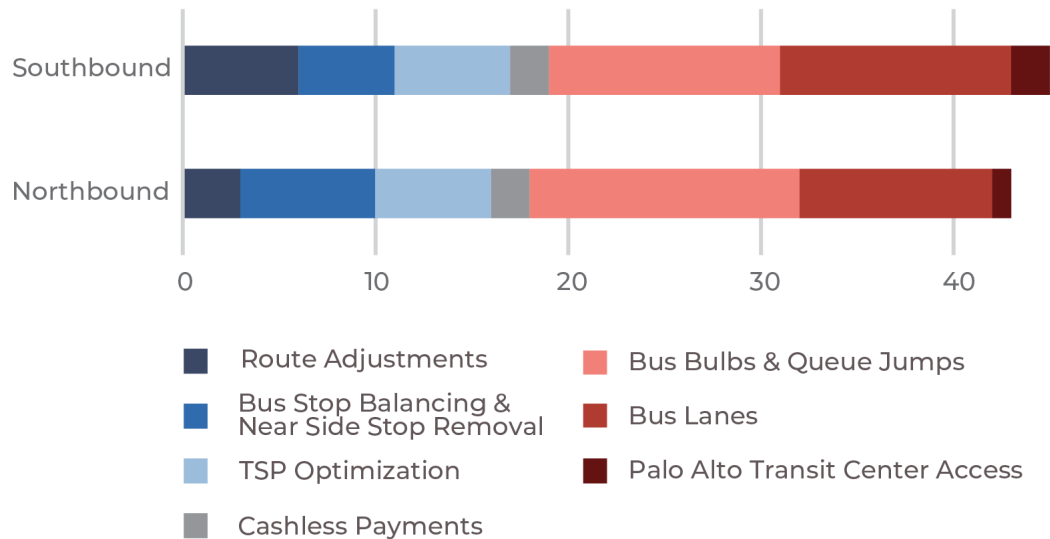


Table 2: Estimated Peak Period Travel Time Savings per Direction by Improvement Measure

Improvement	Northbound (minutes)	Southbound (minutes)
Route Adjustments	3	6
Bus Stop Balancing & Near Side Stop Removal	7	5
TSP Optimization	6	6
Cashless Payments	2	2
Bus Bulbs & Queue Jumps	14	12
Bus Lanes	10	12
Transit Center Access Improvements (Palo Alto)	1	2
Total Estimated Savings per Direction	43	45



4.6 COST ESTIMATES

The total cost to implement the Transit Capital Improvement Plan on 25 miles of El Camino Real is estimated to be \$80 to \$100 million. **Table 3** provides a breakdown of rough order-of-magnitude costs by capital improvement category. Approximately two-thirds of costs are associated with constructing bus bulbs, while pedestrian gap closures and traffic signal modifications account for most of the remainder. Bus lanes are the lowest cost treatment in the Transit Capital Improvement Plan since they can be accomplished via striping changes only. For all capital improvements, soft costs (such as design, permitting, construction management) and contingency are estimated to match or exceed the construction cost given the complexity of the Caltrans approval process.

Table 3: Cost Estimates for Transit Capital Improvement Plan

Capital Improvement Category	Description	Approximate Cost
Bus Bulbs	Incorporating shelters, near-level boarding, and/or bus boarding islands with bikeway bypasses	\$26 Million
Pedestrian Gap Closures	Crosswalk and sidewalk gap closures adjacent to bus stops	\$9 Million
Traffic Signal Modifications	New pedestrian hybrid beacons, traffic signals, queue jumps, or other signal modifications supporting bus operations and bus stop access	\$4 Million
Bus Lanes	Three priority bus lane segments spanning South San Francisco-northern Burlingame, San Mateo, and San Carlos	\$1 Million
Total Construction Cost		\$40 Million
<i>Soft Costs (Design, Permitting, Construction Management, etc.) & Contingency</i>		<i>\$40-60 Million</i>
Total Cost		\$80-100 Million

Costs to implement the near-term operational enhancements are assumed to be largely covered by existing staff time and resources in coordinating and executing the changes. Some use of the agency’s facilities and information technology budgets, or supplementary funds, may be needed for these measures.

There are some opportunities and tradeoffs that would affect these costs. For example, bus lanes are typically more effective when including red painted lanes, but this treatment costs approximately 10 times more per mile than typical lane striping and may not be cost-effective for all proposed segments. Similarly, bus bulbs may cost about ten percent less without near-level boarding or bus boarding islands but would be less effective at reducing dwell times.

Many transit capital improvements are likely to be implemented by cities or Caltrans as a part of broader complete streets modernization efforts (as discussed in Section 5.1). As shown in **Table 4**, preliminary cost estimates for projects in the cities of Colma, Burlingame, and Redwood City suggest that a comprehensive complete streets modernization of El Camino Real would cost about \$20 to \$30 million per mile, assuming some combination of pedestrian improvements, medians, protected bikeways, traffic signal modifications, landscaping and stormwater retention, and

Table 4: Cost Estimates for Complete Streets Modernization

Segment	Length	Total Cost	Cost per Mile
Colma	1.1 Miles	\$30 Million	\$27 Million per Mile
Burlingame	3.7 Miles	\$100 Million	\$27 Million per Mile
Redwood City	0.6 Miles	\$11 Million	\$19 Million per Mile
Corridor-Wide, Low Estimate	25 Miles	\$500 Million	\$20 Million per Mile
Corridor-Wide, High Estimate	25 Miles	\$750 Million	\$30 Million per Mile

Sources: City of Colma, 2021; Caltrans, 2022; City of Redwood City, 2019

other changes outside of the transit-focused scope of this study. If other San Mateo County jurisdictions pursued modernization efforts that are comparable in scope across the 25-mile corridor, the total cost would be approximately \$500 to \$750 million. Transit improvements would therefore account for roughly one-sixth of overall corridor modernization costs.

4.6 OTHER OPERATIONAL CHANGES FOR FURTHER CONSIDERATION

The following operational changes were considered as part of the universe of potential travel and reliability solutions. Though these are not recommended at this time, they may warrant further consideration in the future.

All-Door Boarding

An all-door boarding/proof of payment system was considered to reduce dwell times associated with fare collection. All-door boarding typically offers substantial dwell time savings for routes with very high ridership. Fare collection during boarding can add significant delay to transit routes, especially at stops with high passenger volumes, and all-door boarding can reduce dwell time by 1-2 seconds per passenger boarding. All-door boarding can involve off-board fare payment, where passengers purchase and validate fares at the stop before boarding the bus, and on-board fare payment, where passengers use on-board fare readers placed at each door.

However, the moderate existing ridership levels on Route ECR suggest that dwell time savings from all-door boarding would be minimal. In the near-term, SamTrans should focus on cashless payments and continue to monitor dwell time and ridership patterns.

Headway Management System

A headway management approach was considered to improve reliability by keeping vehicles evenly spaced with set headways instead of a set schedule. Headway management is most effective when added to a corridor with a more limited variance

in travel times and established transit prioritization measures like bus lanes and TSP. Additionally, headway management systems are resource-intensive, requiring active monitoring and service adjustments in real time. The length and variability of Route ECR suggest that a headway management approach is not yet viable but may be reconsidered as the capital improvement plan is implemented.

Splitting Route ECR

Splitting Route ECR was considered via the *Reimagine SamTrans* process to achieve two shorter routes that would have less variability in travel times and be easier to deliver for bus operators. However, due to its consistent passenger loads, there is no easy location to split Route ECR without requiring a number of passengers to transfer and coordinating transfers between the new routes would be challenging. Though SamTrans bus operators were receptive to the idea of splitting the route in order to improve the operational experience, many expressed concern for passengers who would be subject to a transfer and, in some cases, the need to pay an additional fare. Various locations midway on the route were explored but identifying enough physical space to layover a substantial number of vehicles and facilitate easy passenger transfers proved difficult with current land uses.

SamTrans may continue to evaluate splitting Route ECR as operating conditions evolve. SamTrans will participate in the upcoming US-101 Mobility Hub project led by the San Mateo County Transportation Authority, which will explore the potential for a new mobility hub facility near US-101 and CA-92 in San Mateo to serve as a future transfer location.



05

Implementing Projects on El Camino Real

Implementing capital improvements on El Camino Real requires a unique project development process due to the corridor's role as a Caltrans-owned facility serving both local and cross-county travel. Substantial coordination is necessary between cities, SamTrans, Caltrans, and other stakeholders: each project must complete an initial phase of planning and design, work with Caltrans to obtain necessary approvals, line up funding for construction, and deliver the improvements. Recent streetscape projects on El Camino Real have taken up to 10 years from planning through construction due to the complexity of this process. Moreover, a single corridor-wide project is unlikely to occur since cities are at different stages in determining their local visions for El Camino Real; some have already completed some planning and design work, while others are starting from scratch.

This chapter explores how cities, SamTrans, Caltrans, and other stakeholders may work together to deliver capital improvements on El Camino Real that address local and countywide needs. It also identifies near-term foundational actions that SamTrans and partner agencies should take to advance transit improvements and broader multimodal transportation goals on El Camino Real.

5.1 APPROACHES TO PROJECT DEVELOPMENT

There are two possible approaches to implementing the Transit Capital Improvement Plan on El Camino Real:

1. SamTrans and cities incorporate improvements into Caltrans-led projects
2. SamTrans and cities can develop their own projects via the Caltrans project development process

Each approach has tradeoffs depending on the scope, scale, and focus of individual projects. A Caltrans-led approach can provide a more straightforward implementation process but can also reduce the amount of influence that SamTrans and cities have over the scope of work, planning and design process, and construction timeline. Cities have the most control over the design process by leading projects themselves, but sometimes encounter challenges in the level of resources needed to navigate the Caltrans process. A SamTrans-led approach can augment city resources and ensure consistency in prioritizing bus speed and reliability improvements across the corridor but would still require cities to cede some control over the planning, design, and construction processes. Each of these approaches are summarized in **Table 5**.

Table 5: Summary of Proposed Roles & Responsibilities

Agency	Leads	Supports
Caltrans	<ul style="list-style-type: none"> • Operations, safety, and repair projects associated with state programs (SHOPP, etc) 	<ul style="list-style-type: none"> • Project development process led by SamTrans or cities
SamTrans	<ul style="list-style-type: none"> • Multi-city complete streets projects • Transit-specific projects 	<ul style="list-style-type: none"> • Caltrans-led and city-led projects affecting street design and transit facilities
Cities (& County of San Mateo in North Fair Oaks)	<ul style="list-style-type: none"> • City-specific complete streets projects • Individual improvements to intersections, traffic signals, pedestrian/ bicycle facilities, or bus stops • Development-related improvements 	<ul style="list-style-type: none"> • SamTrans-led and Caltrans-led projects affecting each city

5.1.1 Caltrans-Led Approach

Caltrans periodically implements projects on El Camino Real to address repair, safety, and operational needs primarily through the State Highway Operation and Protection Program (known as SHOPP). Presently, SHOPP projects are planned to occur in Burlingame and San Mateo in Fiscal Years 2023-2024 and Daly City, Colma, and South San Francisco in Fiscal Years 2025-2026. Caltrans also implements multimodal projects outside of SHOPP, such as a bikeway project currently planned in Redwood City, Atherton, and North Fair Oaks.

Incorporating transit and complete streets improvements into planned Caltrans projects presents an opportunity to streamline implementation efforts and avoid redundant efforts across multiple agencies. SHOPP and other Caltrans projects usually address smaller-scale improvement measures like pedestrian gap closures. However, these projects typically have limited capital improvement budgets and usually do not implement major streetscape changes or transit-specific improvements. SamTrans and cities may incorporate additional improvement measures via the SHOPP process through early project coordination and providing supplemental funding.

Leveraging Caltrans-led projects to advance SamTrans and City goals may not work in every local context: it requires clarity in the recommended scope of work as well as securing sufficient funding to advance those recommendations. Nonetheless, SamTrans should work with Caltrans and cities to maximize opportunities for collaboration.

5.1.2 SamTrans and City-Led Approach

SamTrans and cities may lead capital improvement projects on El Camino Real through the Caltrans project development process. The project development process varies by project type and is applicable to both larger-scale citywide or multi-city streetscape projects as well as smaller scale projects associated with individual land use developments or intersection improvements.

Larger scale projects like a citywide streetscape redesign require a Project Study Report-Project Report (PSR-PR) if locally funded with a single well-defined project alternative, or a Project Study Report-Project Development Support (PSR-PDS) process if the project is using state or federal funds and covers multiple project alternatives. Both processes are multi-step efforts that involve reviewing existing available data, defining a project's purpose and need, identifying corridor deficiencies, developing project alternatives, preparing engineering analysis and technical studies, and developing cost estimates. Projects pursuing a PSR-PDS would also complete the Project Approval and Environmental Documentation (PA&ED) stage. Lastly, the project would prepare Plan Specifications & Engineering (PS&E) to finalize the scope of the selected alternative, receive project approval, and obtain an encroachment permit.

Smaller projects like bus bulbs, pedestrian gap closures, or traffic signal modifications can typically pursue the more streamlined Design Engineering Evaluation Report (DEER) process. Projects are eligible for the DEER process if they meet certain criteria such as having a single build alternative, having an approved environmental document or exemption, requiring no right-of-way conveyances, and conducting an appropriate level of technical studies and public outreach.

Depending on the scale and type of project, either SamTrans or individual cities may lead the project development process:

- Cities may prefer to lead projects that fully occur within their city limits or are smaller in scale without a transit focus. Examples of city-led projects may include a citywide streetscape redesign, a new traffic signal, pedestrian and bicycle safety improvements, intersection modifications, or roadway changes

associated with a new development project. For such projects, SamTrans would provide input on transit elements and may help facilitate coordination efforts with Caltrans and other projects.

- SamTrans should consider leading capital improvement projects on El Camino Real that span multiple cities or focus on transit-specific improvements. For a multi-city complete streets project, SamTrans would be well positioned to lead and ensure a consistent approach across city boundaries. For a transit-focused capital improvement project, SamTrans would target individual improvements like bus bulbs or bus lanes in locations where such projects would be consistent with a city's vision and would not preclude future plans. SamTrans would also be responsible for leading near-term operational enhancements such as bus stop balancing and near-side stop relocation.

A SamTrans-led project development process presents the opportunity to achieve a more consistent multimodal approach across the corridor while helping to address city needs around augmenting staff capacity and institutional knowledge for the Caltrans process. While cities would retain the option to pursue their own projects, SamTrans should be involved as a partner on all projects affecting El Camino Real.

The implementation approach for bus lanes exhibits some similarities and differences compared to other capital improvements on the El Camino Real corridor. From a constructability standpoint, bus lanes are relatively straightforward, and generally only require changes to signage and striping. The primary challenge associated with bus lanes is evaluating the effects on roadway operations and assessing tradeoffs during the encroachment permit process. Consequently, bus lanes may be implemented as a part of a single- or multi-city complete streets project, or may be pursued by SamTrans as a distinct project independent of other complete streets improvements. Given the longer timeframe associated with larger complete streets projects, SamTrans may consider advancing bus lane segments in coordination with cities and Caltrans as a near-term demonstration project.

5.1.3 Potential Approaches to Implementation by City

Cities are at different stages of identifying needs, determining preferred corridor designs, and initiating the Caltrans project development process. For these reasons, some cities may be better suited to leading their own projects, while others may consider partnering with SamTrans. **Table 6** illustrates this study's inventory of local planning efforts as of December 2022, and outlines proposed or planned next steps for each city based on the status of local planning efforts or planned projects.

Table 6: Status of Current Projects on El Camino Real

City	Recent Planning Efforts	Next Steps
Daly City	<ul style="list-style-type: none"> Identified corridor needs and preferred design via Bicycle & Pedestrian Master Plan Partially covered under GBI PSR-PDS 	<ul style="list-style-type: none"> City and SamTrans to coordinate with Caltrans SHOPP project to incorporate measures identified in Capital Improvement Plan
Colma	<ul style="list-style-type: none"> Determined preferred design via El Camino Real Pedestrian and Bicycle Improvement Plan in 2021 	<ul style="list-style-type: none"> City to initiate Caltrans process City & SamTrans to coordinate with Caltrans via SHOPP project to incorporate measures identified in Capital Improvement Plan
South San Francisco	<ul style="list-style-type: none"> Identified corridor needs via General Plan and Active South City Bicycle & Pedestrian Master Plan Partially covered under GBI PSR-PDS 	<ul style="list-style-type: none"> Determine preferred corridor design & initiate Caltrans process Consider SamTrans as potential project lead City & SamTrans to coordinate with Caltrans via SHOPP project to incorporate measures identified in Capital Improvement Plan
San Bruno	<ul style="list-style-type: none"> Identify corridor improvement needs via Walk 'n Bike Plan Partially covered under GBI PSR-PDS 	<ul style="list-style-type: none"> Determine preferred corridor design & initiate Caltrans process. Advance bikeway project in coordination with C/CAG Consider SamTrans as potential project lead
Millbrae	<ul style="list-style-type: none"> Identified preferred corridor design in El Camino Real Specific Plan 	<ul style="list-style-type: none"> Initiate Caltrans process. Advance bikeway project in coordination with C/CAG Consider SamTrans as potential project lead

City	Recent Planning Efforts	Next Steps
Burlingame	<ul style="list-style-type: none"> Completed environmental review for El Camino Real Renewal Project with Caltrans 	<ul style="list-style-type: none"> Caltrans to advance to design & construction SamTrans to coordinate with Caltrans and City to incorporate measures consistent with Capital Improvement Plan
San Mateo	<ul style="list-style-type: none"> Identified corridor needs via Bicycle Master Plan, TOD Pedestrian Plan, and General Plan. North of Santa Inez Avenue is covered under El Camino Real Renewal Project with Caltrans. 	<p>North of Santa Inez Avenue:</p> <ul style="list-style-type: none"> Caltrans to advance northern segment to design & construction SamTrans to coordinate with Caltrans and City to incorporate measures into ECR Renewal Project consistent with Capital Improvement Plan <p>South of Santa Inez Avenue:</p> <ul style="list-style-type: none"> Determine preferred corridor design & initiate Caltrans process for central and southern segments Consider SamTrans as potential project lead
Belmont	<ul style="list-style-type: none"> Identified corridor needs via Belmont Village Specific Plan and Comprehensive Bicycle & Pedestrian Plan 	<ul style="list-style-type: none"> Determine preferred corridor design & initiate Caltrans process Consider SamTrans as project lead
San Carlos	<ul style="list-style-type: none"> Identified corridor needs via Bicycle & Pedestrian Master Plan 	<ul style="list-style-type: none"> Determine preferred corridor design & initiate Caltrans process Consider SamTrans as project lead
Redwood City	<ul style="list-style-type: none"> Identified corridor needs via Citywide Transportation Plan and Bicycle & Pedestrian Master Plan Determined preferred design for southern portion of corridor via El Camino Real Corridor Plan 	<ul style="list-style-type: none"> Determine preferred corridor design & initiate Caltrans process for northern portion of corridor SamTrans and City to coordinate with Caltrans via bikeway safety project on southern portion of corridor to incorporate measures identified in Capital Improvement Plan
Atherton/ North Fair Oaks	<ul style="list-style-type: none"> Identified corridor needs via Atherton's Bicycle & Pedestrian Master Plan and County's Comprehensive Bicycle & Pedestrian Plan 	<ul style="list-style-type: none"> Determine preferred corridor design & initiate Caltrans process. City & SamTrans to coordinate with Caltrans via bikeway safety project SamTrans and City to coordinate with Caltrans via bikeway safety project on northern portion of corridor to incorporate measures identified in Capital Improvement Plan

How to Use the Capital Improvement Plan

While developing projects, cities and Caltrans should use the Capital Improvement Vision Booklets presented as an appendix to this report. The Booklets provide a summary of Route ECR operations by City and identify recommended improvement measures, including specific recommendations for stop locations, bus bulbs, queue jumps, pedestrian gap closures, and bus lanes. SamTrans can provide location-specific design guidance upon request.



ECR Bus Speed & Reliability Study

DALY CITY VISION

The El Camino Real Bus Speed and Reliability Study provides a corridor-wide vision to reduce travel times by 30 percent and achieve a more dependable service. As the backbone of the SamTrans network, Route ECR serves 13 cities across 25 miles. Route ECR accounts for one quarter of average weekday bus ridership on SamTrans – with the majority of riders being lower income people of color. This study envisions faster and more reliable Route ECR service primarily through bus stop balancing, bus bulbs, and queue jumps, while also investigating the suitability of bus-only lanes on congested roadway segments.

SamTrans encourages Daly City to consult this vision and the specific bus priority treatments when conducting capital improvement and development review processes to achieve more equitable and sustainable mobility outcomes on El Camino Real.

FALL 2022
RECOMMENDATIONS



Route ECR in Daly City (2019)

This page summarizes Route ECR's performance in Daly City, including its ridership patterns, travel time, and reliability.

Who Rides Route ECR?

WEEKDAY RIDERS IN DALY CITY



WEEKDAY TRIPS THROUGH DALY CITY



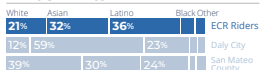
WHERE RIDERS GO



AVERAGE HOUSEHOLD INCOME



DEMOGRAPHICS



Route ECR Operations

AVERAGE SPEED (MPH) IN DALY CITY



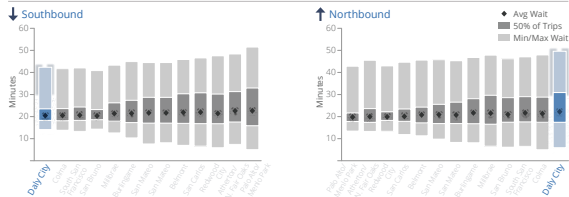
ON-TIME PERFORMANCE (% OF TRIPS)



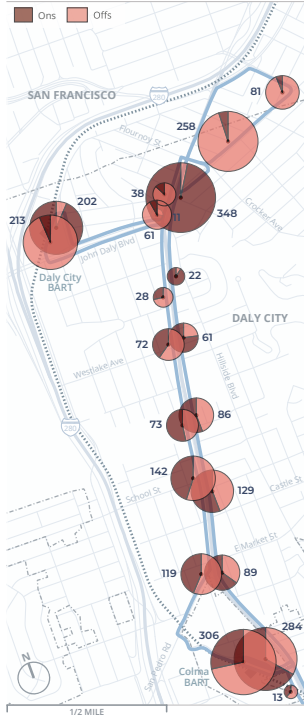
TRAVEL TIME (MIN) IN DALY CITY



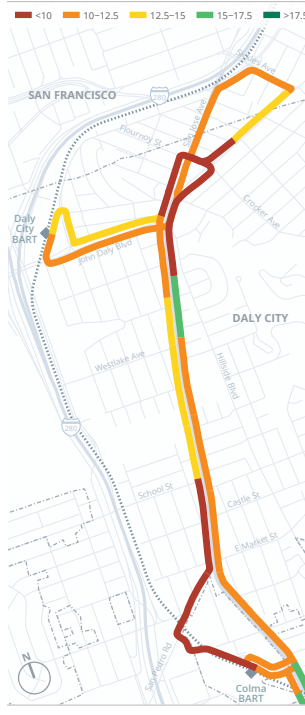
PASSENGER WAIT TIME PER CITY



DAILY RIDERSHIP BY STOP



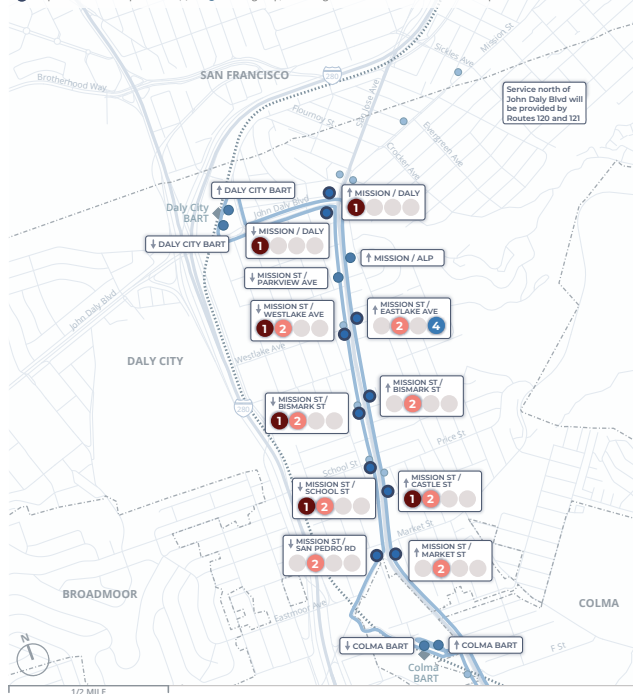
AVERAGE BUS SPEED (MPH)



Proposed Route ECR Improvements

PROPOSED BUS STOP LOCATIONS & IMPROVEMENTS

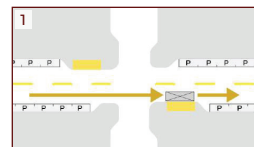
● Stop Location with Improvement(s) ● Existing Stop, No Changes ● Relocated or Removed Stop



The following infrastructure improvements are recommended to support faster and more reliable bus operations on El Camino Real in Daly City.

1 Bus Stop Balancing & Placement

Far-side, in-lane bus stops with balanced spacing helps buses travel faster and more reliably. ECR stops should be spaced every 1/4 to 1/3 mile, with shorter spacing occurring in areas with high ridership and/or serving transit connections, public facilities, and equity priority areas. Stops should be located on the far side of intersections in the lane of travel to maximize the effectiveness of the corridor's transit signal priority system and avoid delays and conflicts associated with near-side and pullout stops.



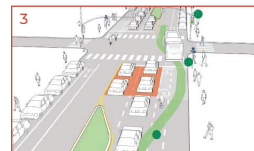
2 Bus Bulbs

Bus bulbs are curb extensions that allow buses to stop in the lane of traffic. Bus bulbs improve speed and reliability by reducing the amount of time lost when merging in and out of traffic, while also reducing pedestrian crossing distances. Where space permits, near-level boarding and separated bikeway bypasses are suggested features for bus bulbs.



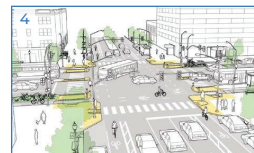
3 Queue Jumps

In cases where near-side pullout stops are most suitable, queue jumps reduce delay for buses merging back into traffic. Queue jumps allow buses to enter traffic flow from a dedicated bus lane or right-turn only lane via transit signal priority (a leading bus interval or active signal priority). Alternatively, allowing buses to proceed straight in a right-turn only lane can function as an informal queue jump.



4 Pedestrian Improvements

Improving pedestrian connections to bus stops helps reduce overall passenger travel times and access barriers. Pedestrian access improvements may include striping unmarked crosswalks, adding traffic signals or pedestrian hybrid beacons at unsignalized crossings, adding or widening sidewalks, and adding or modernizing curb ramps.



5.2 FOUNDATIONAL ACTIONS

The following near-term actions are recommended to align policy objectives and project development processes for El Camino Real.

5.2.1 Establish a Transit-First Policy for El Camino Real

Recommendation 9: SamTrans should collaborate with its partners to establish a countywide Transit-First Policy for El Camino Real.

Currently, there is no countywide policy guidance on modal priorities along El Camino Real, which can result in inconsistent approaches to balancing transit and multimodal improvements. This study recommends that SamTrans and its agency partners establish an El Camino Real Transit-First Policy including the following components:

El Camino Real/Mission Street (State Route 82) Transit First Policy: El Camino Real/Mission Street (State Route 82) shall function as a Transit-First corridor that prioritizes bus speed and reliability in all planning, design, and policy decisions.

- SamTrans shall collaborate with Caltrans, cities, and other local agencies to ensure that changes to El Camino Real/Mission Street further countywide goals of improving bus speed and reliability.
- Sponsors of transportation and land use projects along El Camino Real/Mission Street shall analyze their effects on transit operations and incorporate transit improvement or impact mitigation measures consistent with SamTrans guidance.
- SamTrans shall support Caltrans, cities, and other local agencies in advancing complete streets projects that improve the operations and safety of El Camino Real/Mission Street for all modes.

The Transit First Policy would clarify the countywide importance of transit on El Camino Real and establish a coordinated approach to improving transit operations and

infrastructure. The Transit First Policy would also affirm SamTrans' support for complete streets projects that incorporate transit improvements.

5.2.2 Establish an El Camino Real Program Manager at SamTrans

Recommendation 10: SamTrans should establish an El Camino Real Program Manager to facilitate coordination and advance transit and multimodal projects.

Although SamTrans has historically led coordination efforts related to the Grand Boulevard Initiative, it does not have any staff dedicated toward developing and supporting projects on El Camino Real. Establishing an El Camino Real Program Manager would help address inter-jurisdictional coordination needs between cities, SamTrans, and Caltrans while facilitating the implementation of projects of countywide significance. The El Camino Real Program Manager should focus on the following roles:

- Coordinating with Caltrans and cities to incorporate transit and complete streets improvements into Caltrans-led projects
- Supporting cities in city-led projects to ensure corridor-wide consistency with transit and complete streets improvements
- Leading multi-city complete streets projects and transit-focused projects through the Caltrans permitting process
- Sharing best practices and facilitating collaboration opportunities
- Reviewing transportation impact analyses of development projects to ensure consistency with the corridor's transit-first policy

5.2.3 Establish a Transit Capital Improvement Budget for El Camino Real

Recommendation 11: SamTrans should establish a Transit Capital Improvement Fund for El Camino Real to incorporate transit improvements into Caltrans-led projects and advance projects led by SamTrans and cities.

Currently, there is no dedicated source of SamTrans funding to incorporate transit improvements into Caltrans-led projects (such as adding bus bulbs to a SHOPP project) or advance transit improvements through the design and permitting process. The Transit Capital Improvement Fund would provide an established funding mechanism to leverage existing projects, provide matching funds for grants, and address location-specific transit improvements consistent with the Capital Improvement Plan identified in Section 4.4.

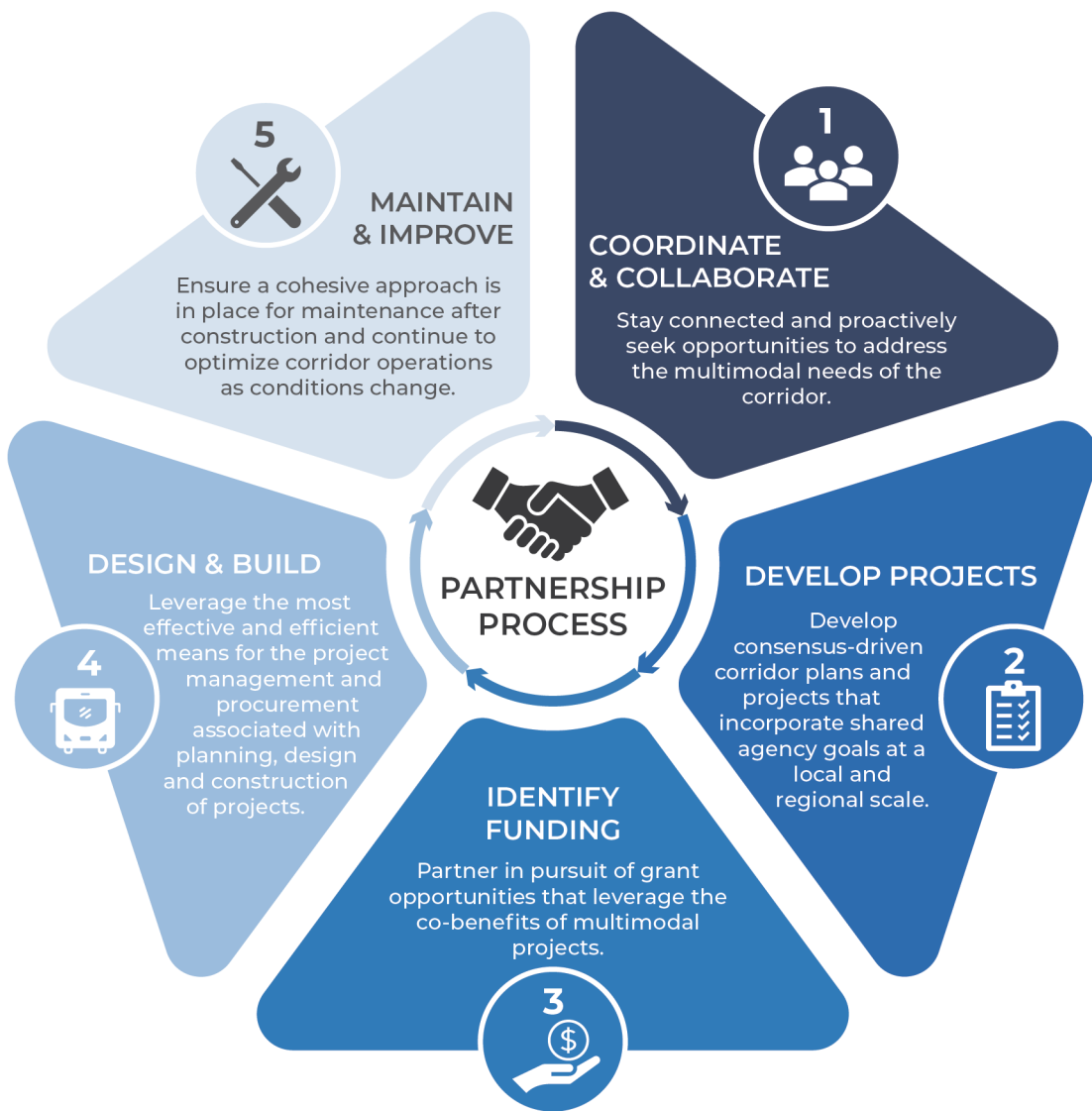
5.2.4 Commit to Ongoing Partnership & Develop Projects

Recommendation 12: SamTrans, Caltrans, cities, and other stakeholders should commit to an ongoing partnership to modernize El Camino Real as a multimodal complete street.

Through this study process, SamTrans has already initiated a more extensive coordination and collaboration process with Caltrans and city partners, and intends to continue these efforts. As a next step, SamTrans and its partners should commit to developing projects consistent with local and countywide goals to create a more transit-, pedestrian-, and bicycle-friendly corridor. In order to efficiently engage with Caltrans and seek funding for grant programs, all cities should seek to identify a preferred corridor design and determine the most effective project development approach in consultation with SamTrans and Caltrans. SamTrans should help facilitate this process and consider leading corridor design efforts for cities looking for assistance. Ideally, these efforts may be pursued in tandem with initiating the project development process with Caltrans.

Developing projects on El Camino Real will require a continuous multi-step process that involves coordinating and collaborating, developing projects, identifying funding, planning, designing, and building projects, and maintaining and improving the corridor, as summarized in **Figure 27**.

Figure 27: Framework for Inter-Agency Partnership



5.3 FUNDING OPPORTUNITIES

Funding capital improvements on El Camino Real will require a mix of city, county, regional, state, and federal sources. This section outlines potential funding opportunities.

5.3.1 County Funding Opportunities

In addition to the proposed Transit Capital Improvement Budget identified in Section 5.2.3, SMCTA and C/CAG administer several Call for Projects grant programs that may fund transit and complete streets improvements as summarized below.

SMCTA Highway Call for Projects Grants

The Highway Program Call for Projects is guided by a Short Range Highway Plan (SRHP) that includes a corresponding Capital Improvement Program (CIP). Eligible projects must be included in the 2021-2030 SRHP/CIP (adopted June 2021), identified in the Short Range Highway Plan gap analysis, or specifically listed in one of the expenditure plans to compete for funding in the Highway Program. Cities, San Mateo County, Caltrans, and other potential project sponsors are able to apply for and contend for funding for one project development phase at a time. Project applications are scored by an evaluation committee using the adopted criteria in the Strategic Plan 2020-2024. Funding recommendations are then presented to the Transportation Authority Board of Directors who approve and program the project awards. Projects that are primarily related to Complete Streets elements such as pedestrian, bicycle, and/or transit improvements, such as those along El Camino Real, are eligible specifically for Measure W funding.

Pedestrian and Bicycle Call for Projects Grants

The Pedestrian & Bicycle Program Call for Projects allows cities, San Mateo County, and other transportation agencies including SamTrans an opportunity to apply for funding for capital improvements and planning efforts. Project applications are scored

by an evaluation committee using the adopted criteria in the Strategic Plan 2020-2024. Funding recommendations are then presented to the Transportation Authority Board of Directors who approve and program the project awards. Projects on El Camino Real that may be eligible include pedestrian gap closures and bikeway projects, both of which may also incorporate transit improvements.

Alternative Congestion Relief & Transportation Demand Management Call for Projects Grants

The Alternative Congestion Relief (ACR) and Transportation Demand Management (TDM) Program is guided by the ACR/TDM Plan which was adopted by SMCTA in January 2022. The ACR/TDM Program includes three competitive categories: (1) Intelligent Transportation Systems Planning and Design Funds; (2) ACR/TDM Planning; and (3) ACR/TDM Project & Program Funds. Cities, San Mateo County, Commute.org, C/CAG, and other potentially eligible sponsors are able to apply for and contend for funding for up to three projects during each Call for Projects cycle. Project eligibility is confirmed during required pre-application submittal meetings with SMCTA staff and applications are scored by an evaluation committee using the adopted criteria in the ACR/TDM Plan. Funding recommendations are then presented to the Transportation Authority Board of Directors who approve and program the project awards. Projects on El Camino Real that may be eligible include pedestrian gap closures, bus stop improvements, and transit signal priority expansion.

Regional Transit Connections Call for Projects Grants

A Regional Transit Connections Plan is under development by the SMCTA. Measure W provides funding for the program category for projects that improve transit connectivity between adjacent counties and the rest of the region. The Regional Transit Connections Plan will develop goals, project eligibility, and evaluation criteria to be used in future Call for Projects. Depending on this effort's outcomes, Route ECR may be eligible for the Regional Transit Connections Call for Projects.

Transportation Development Act (TDA) Article 3 Bicycle and Pedestrian Program Call for Projects Grants

C/CAG's TDA Article 3 Bicycle and Pedestrian Program grants fund smaller scale projects that improve bicycle and pedestrian conditions projects that improve regional connections, enhance safety, and address local mobility needs. A Call for Projects is administered every two years by C/CAG. TDA Grants are best suited to location-specific bicycle and pedestrian improvements along El Camino Real, and may also be used for planning studies.

5.3.2 Regional, State, and Federal Funding Sources

The Metropolitan Transportation Commission (MTC) distributes capital improvement grants via various programs that pull from state and federal funding sources. Recent examples include One Bay Area Grants, which fund complete streets projects; Transit Performance Initiative Program, which funds low-cost capital improvements and planning studies that improve transit operations on major corridors; and the Quick Strike Grant Program, which funds smaller-scale quick-build complete streets projects.

The State of California administers several grant programs that may fund capital improvements on El Camino Real. The Transit and Intercity Rail Capital Program (TIRCP) funds capital improvements that reduce greenhouse gas emissions and increase transit ridership and is best suited to transformative project such as bus lanes and transit center access improvements. The Active Transportation Program (ATP) provides grants for bicycle- and pedestrian-focused projects and may be considered to fund streetscape projects. The Highway Safety Improvement Program (HSIP) funds individual safety-focused projects identified in Local Road Safety Plans and may be considered for pedestrian gap closures. The Affordable Housing and Sustainable Communities (AHSC) Program may also fund transit improvements alongside affordable housing developments. Other grant programs periodically arise as well.

Several new federal grant programs are emerging from the Infrastructure Investment and Jobs Act. Recent examples include the Rebuilding American Infrastructure with Sustainability and Equity (RAISE) Grants, which may target locally- and regionally-significant infrastructure projects, and the Safe Streets and Roads for All program, which provide grants focused on safety improvements.

5.3.3 City Opportunities - Development Fees, Mitigations, and Community Benefits

Cities may require development impact fees, environmental impact mitigations, or community benefit contributions associated with new development projects. Transit and complete streets projects on El Camino Real would be an applicable use of such funds. Projects on El Camino Real affecting bus stops or bus stop access should strive to incorporate capital improvements identified in this plan along their project's frontage. Additionally, large projects that may add significant delay to SamTrans services should incorporate mitigation measures to address potential impacts to transit operations.

5.4 NEXT STEPS

The following near-term actions are recommended to align policy objectives and project development processes for El Camino Real.

- SamTrans and its agency partners should adopt a Transit-First Policy on El Camino Real to clarify the countywide importance of transit on El Camino Real and establish a coordinated approach to improving transit operations and infrastructure.
- SamTrans should lead the implementation of near-term operational enhancements, including TSP optimization, bus stop balancing and near-side stop removal, and cashless payments.
- SamTrans should establish an El Camino Real Program Manager and a Transit Capital Improvement Budget to advance capital projects on El Camino Real.
- For cities that have not yet established a preferred design for El Camino Real, SamTrans should work with these cities and Caltrans to develop multimodal corridor plans, advance these plans through Caltrans' project development process, and seek grant funds for construction. These plans may be led by cities or SamTrans.
- For cities that have established a preferred design for El Camino Real, SamTrans should work with these cities to implement applicable corridor-wide and location-specific improvements. In the near-term, such cities may be the best fit for construction of individual capital improvements.
- SamTrans may independently advance bus lanes as a demonstration project in a single city or across multiple cities. A demonstration project is recommended to last a minimum of 18 months and include ongoing monitoring of effects on bus speeds, vehicle speeds, intersection operations, and traffic diversion to parallel routes (where applicable).

Modernizing El Camino Real will require a range of implementation approaches, from a small-scale project that improves an individual bus stop to a multi-city project revamps several miles of streetscape. While El Camino Real presents complex challenges, it also provides ample opportunities to realize a transit-oriented, pedestrian- and bicycle-friendly grand boulevard.