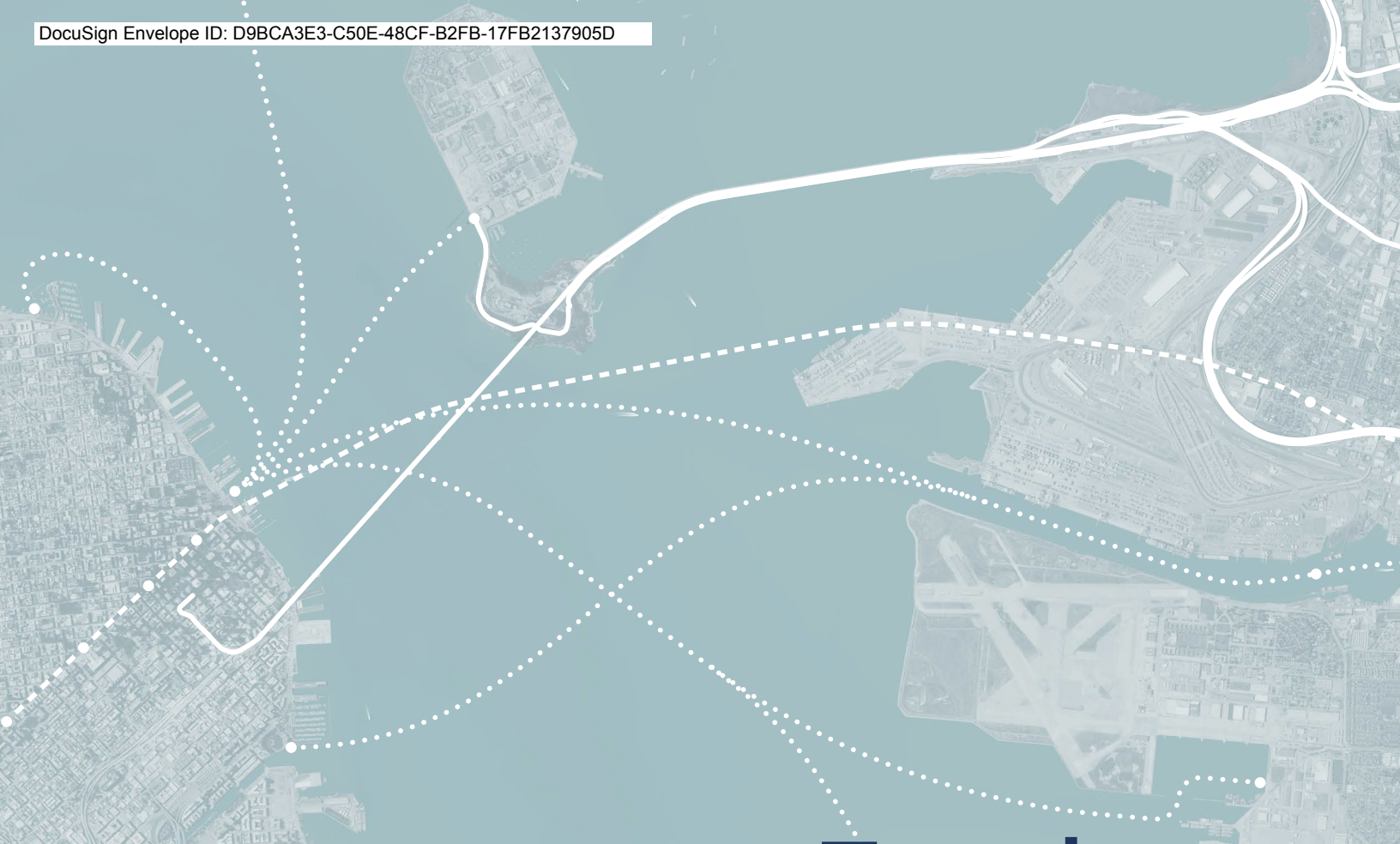

Transbay Comprehensive Multimodal Corridor Plan Supplement

Supplement to the BART Transbay Corridor Hybrid Summary Comprehensive Multimodal Corridor Plan

San Francisco County Transportation Authority

Caltrans

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0. Executive Summary

The Transbay Comprehensive Multimodal Corridor Plan (CMCP) presents a holistic approach for managing congestion, improving safety, and maximizing flow for all travel modes and incorporates measures to reduce air pollution and greenhouse gases.

The CMCP was developed pursuant to the statutory mandate for Caltrans to conduct long-range corridor planning, as well as in response to the Road and Repair Accountability Act of 2017, also known as Senate Bill 1 (SB 1), that was passed in April 2017. Among the multiple programs established by SB 1 is the Solutions for Congested Corridors Program (SCCP). This program provides $250 million annually on a competitive basis to Caltrans and regional agencies for projects designed to achieve a balanced set of transportation, environmental, and community access improvements within highly-congested travel corridors throughout the State. Eligible projects should make specific performance improvements and must be included in a CMCP.

The Transbay CMCP supplements the 2020 BART Transbay Corridor Hybrid Summary CMCP. It considers new modes of transportation – walking, bicycling, micromobility, and ferry – that were not included in the previous CMCP. This CMCP Supplement involves an integration of existing plans, studies, and project-specific information with limited new analysis.

The Transbay Corridor encompasses multi-modal travel between the East Bay and San Francisco and the Peninsula and is roughly defined as the area between West Oakland and the Peninsula, with important focus on Treasure Island and downtown San Francisco. The Transbay Corridor serves local, regional, and interregional traffic of people and goods between the East Bay and San Francisco and beyond. The corridor is used by a variety of modes, including personal vehicles, trucks, and transit – including AC Transit buses on the San Francisco-Oakland Bay Bridge (the Bay Bridge), BART trains in the Transbay Tube, WETA's San Francisco Bay Ferry terminals and routes, and other bus operators. The corridor is vital to interregional and regional commuting, freight movement and recreational travel.

This CMCP Supplement has five goals for the Transbay Corridor. Improvements should make the corridor:

- Connected and multimodal
- Safe and well
- Equitable
- Affordable and vibrant
- Sustainable

These goals guide the establishment of corridor objectives and performance measures, which help evaluate the effectiveness of potential projects.

Myriad transportation modes currently serve or could serve the Transbay Corridor. These include existing modes – motor vehicles and public transit (bus, passenger rail and ferry) – as well as potential new modes such as walking, bicycling, and traveling by micro-mobility modes including e-bike and e-scooter.

Projects selected for inclusion in this CMCP were identified because they include modes that had not been evaluated in past CMCPs or other studies of the Transbay Corridor, or address transportation to Treasure Island, which had not been considered in some previous studies. They were evaluated based on the CMCP goals and accompanying performance metrics. The recommended projects include all these modes of transportation. Table 0-1 provides a list of the recommended projects.

Table 0-1. Recommended Projects

#	PROJECT NAME	MODE(S)	DESCRIPTION	ESTIMATED COST ($M)*	SOURCE	HORIZON
1	Bay Skyway Phase 1	Walk, bike, e-bike, micromobility, ferry	West Oakland Link, East Span path, Yerba Buena Island / Treasure Island path, and Treasure Island zero-emission ferry	$170	MTC	Short
2	Bay Skyway Phase 2	Walk, bike, e-bike, micromobility, ferry	Bay Skyway Phase 1 plus West Span path	$500	MTC	Medium
3	Treasure Island Ferry	Ferry	Establish a new ferry service from Treasure Island to San Francisco with 15-minute peak period and midday frequencies	$10	WETA	Short
4	Expanded Muni service to Treasure Island	Bus	Expand bus service between San Francisco and Treasure Island	$19	SFMTA	Short
5	AC Transit service to Treasure Island	Bus	New bus service between Downtown Oakland and Treasure Island	$8	AC Transit	Short
6	West Oakland Industrial Streets	Walk, bike, e-bike, micromobility	Upgrade streets in West Oakland to complete streets as consistent with the recommendations of the West Oakland Specific Plan and West Oakland Community Action Plan	$40	OakDOT	Medium
7	Grand Avenue Mobility Plan Implementation	Walk, bike, e-bike, micromobility, bus	Implement improvements to bus operations, walking, and biking along the Grand Avenue corridor	$118	OakDOT	Medium
8	Richmond Ferry Frequency Increase	Ferry	Enhance the existing Richmond ferry service to 30-minute peak period frequencies and 60-minute off peak frequencies	$20	WETA	Medium
9	Redwood City-San Francisco-Oakland Ferry	Ferry	Establish a new ferry service from Redwood City to San Francisco and Oakland with 30-minute peak period frequencies	$60	WETA	Medium
10	BART Transbay Corridor Capacity and Station Access Supportive Improvements	Transit	Capacity, fire life safety, safety and security, access, customer experience, and TOD-related improvements at station throughout the BART system	$1,200	BART	Medium

Short: 0 – 5 years
Medium: 5 – 10 years
*Cost in 2022 dollars

1. Introduction

Transportation demand within the Transbay Corridor before the COVID-19 pandemic was at an all-time high and is expected to return to and eventually exceed those levels as the economy recovers and grows. As travel through the Transbay Corridor returns and exceeds pre-pandemic levels, the Transbay Corridor will need to keep pace with this increased demand. The Corridor is multimodal in nature: it is served by a variety of transportation options, including conventional automobiles and buses traveling on the Bay Bridge, BART trains below the Bay in the Transbay Tube, and ferries. Without new investment, or a radical change in the jobs-housing balance between San Francisco and the East Bay, the Transbay Corridor will face increasing congestion on the Bay Bridge and on BART and will again be unable to meet demand, as was the case before the pandemic.

This Transbay Comprehensive Multimodal Corridor Plan (CMCP) Supplement outlines existing and future conditions throughout the corridor, describes existing and potential transportation modes, and presents potential projects for improving transportation options throughout the corridor.

1.1 CALTRANS POLICY DEVELOPMENT

System Planning is the long-range Transportation Planning process for the California Department of Transportation (Caltrans). The System Planning process fulfills Caltrans statutory responsibility as owner/operator of the State Highway System (SHS) (Gov. Code §65086) by identifying deficiencies and proposing improvements to the SHS. Through System Planning, Caltrans focuses on developing products that address integrated multimodal transportation system needs and help advance the Caltrans mission, vision and goals. Over the past several years, especially with the passage of county-level sales tax measures for transportation funding, Caltrans has worked closely with local agencies such as the San Francisco County Transportation Authority (SFCTA) and the Metropolitan Transportation Commission (MTC) to conduct system planning for the SHS.

This CMCP was developed in alignment with the goals and strategies outlined in the Caltrans Strategic Plan 2020 – 2024. It is consistent with recommendations from the System Planning to Programming study and the Planning for Operations Strategic Work Plan, both developed in 2017 by Caltrans Headquarters to help redefine System Planning's roles and products. It also follows the corridor planning process described in the Caltrans Corridor Planning Process Guide, adopted in 2020.

1.2 SENATE BILL 1 AND THE SOLUTIONS FOR CONGESTED CORRIDORS PROGRAM

The Road and Repair Accountability Act of 2017, also known as Senate Bill 1 (SB 1), provides the first significant, stable, and on-going increase in State-directed transportation funding in more than two decades. SB 1 presents a balance of new resources and reasonable reforms to ensure efficiency, accountability, and performance from each dollar invested to improve California's transportation system.

Among the multiple programs established by SB 1 is the Solutions for Congested Corridors Program (SCCP). This program provides $250 million annually on a competitive basis to Caltrans and regional agencies for projects designed to achieve a balanced set of transportation, environmental, and community access improvements within highly congested travel corridors throughout the State. Eligible projects should make specific performance improvements and must be part of a CMCP designed to reduce congestion in highly traveled corridors by providing more transportation choices for residents, commuters and visitors to the area while preserving the character of the local community and creating opportunities for neighborhood enhancements.

SCCP-eligible projects include improvements to State highways, local streets and roadways, public transit facilities, bicycle and pedestrian facilities, and restoration or preservation work that protects critical local habitats or open spaces. To temper increases in vehicle miles traveled (VMT), greenhouse gases (GHG), and air pollution, highway lane capacity-increasing projects funded by the program are limited to high-occupancy vehicle (HOV) lanes, managed lanes, and other non-general purpose lane improvements such as auxiliary lanes, truck-climbing lanes and dedicated bicycle lanes.

The California Transportation Commission (CTC) adopted the 2018 Comprehensive Multimodal Corridor Plan Guidelines on December 5, 2018. The Guidelines prescribe a corridor planning process that largely mirrors what is outlined in the Caltrans Corridor Planning Guidebook. They also include sections and topics that a CMCP should consider as well as performance measures that are consistent with the latest Solutions for Congested Corridors Program Guidelines.

1.3 BART TRANSBAY CORRIDOR HYBRID CMCP SUMMARY

The San Francisco Bay Area Rapid Transit District (BART) created a Hybrid CMCP in 2020 in preparation for its SCCP funding application for the Train Control Modernization Project (TCMP). The Hybrid CMCP brought together the Bay Area Core Capacity Transit Study (BACCTS) and the Horizon Crossings Perspective Paper (Crossings).

The BACCTS, published in 2017, was a collaborative multi-agency effort to examine the San Francisco Bay Area (the Bay Area) transit system's capacity limitations and identify and prioritize the major investments needed to address these limitations. No prior study had brought the major transit operators together to address this regional issue

in a comprehensive, coordinated manner. The study was limited to studying public transit. The Crossings study, published in 2019, was one in a series of Perspective Papers developed as a part of the Horizon Initiative. Led by MTC and the Association of Bay Area Governments (ABAG), the Horizon Initiative comprehensively addressed transportation, housing, economic development, and environmental resilience. Horizon considers three 'what-if' scenarios for the future of the nine-county region to expand the traditional long-range planning process and incorporate uncertainty from a wide range of external forces. These what-if scenarios include "Rising Tides, Falling Fortunes" in which the population of the Bay Area increases by just 1 million people over the next 30 years; a "Clean and Green Future" in which the region's population increases by slightly more than 3 million; and "Back to the Future" in which, by 2050, some 6 million more people call the Bay Area home.

The Transbay CMCP serves as a supplement to the BART Transbay Corridor Hybrid Summary CMCP. It considers new modes of transportation – walking, cycling, micromobility and electric ferry – that were not included in the previous CMCP. The BART Hybrid will be referenced throughout this CMCP and can be found in full in Appendix A.

1.4 DOCUMENT STRUCTURE

The Transbay CMCP includes the following chapters:

- Chapter 1: Introduction
- Chapter 2: Corridor Goals & Performance Metrics
- Chapter 3: Corridor Overview
- Chapter 4: Connection to Other Planning Activities
- Chapter 5: Modes, Facilities, and Needs
- Chapter 6: Proposed Projects
- Chapter 7: Public Outreach
- Chapter 8: Project Evaluation
- Chapter 9: Recommended Projects

1.5 STAKEHOLDERS

Current CMCP development and its future updates are dependent upon the close participation and cooperation of all major transportation stakeholders in the Corridor. A Corridor Development Team (CDT) was formed and met regularly to collaborate on document development, provide strategic guidance at key decision points and ensure the on-time delivery of the Transbay CMCP. The CDT included representatives of the following agencies:

- Caltrans District 4
- MTC / Bay Area Toll Authority (BATA)
- San Francisco County Transportation Authority (SFCTA)

Additionally, several local stakeholder agencies were engaged to ensure that the Transbay CMCP Supplement considered all applicable modes and projects. Stakeholders included the following:

- Alameda-Contra Costa Transit (AC Transit)
- Alameda County Transportation Commission (Alameda CTC)
- San Francisco Bay Area Rapid Transit District (BART)
- Oakland Department of Transportation (OakDOT)
- Water Emergency Transportation Authority (WETA)
- San Francisco Municipal Transportation Agency (SFMTA)
- Treasure Island Mobility Management Agency (TIMMA)

2. Corridor Goals & Performance Metrics

2.1 CORRIDOR GOALS & PERFORMANCE METRICS

Information from a variety of sources helped inform the development of the goals, objectives and performance metrics outlined in this chapter. The most notable sources include:

- 2018 Comprehensive Multimodal Corridor Plan Guidelines, California Transportation Commission (CTC), 2018
- 2021 Interregional Transportation Strategic Plan (Caltrans), 2021
- California Transportation Plan 2050 (Caltrans), 2021
- Climate Action Plan for Transportation Infrastructure (California State Transportation Agency), 2021
- Guidelines for the 2022 Solutions for Congested Corridors Program, California Transportation Commission (CTC), 2022
- Plan Bay Area 2050 (MTC), 2021
- Alameda Countywide Transportation Plan (Alameda CTC), 2020

Table 2-1 lists the Transbay CMCP goals, objectives, and performance metrics. Corridor goals and project metrics were developed through review of the CMCP guidelines and previous plans' goals as well as through a collaborative process with the CDT. Not all performance metrics are applicable for all projects, either because they are inappropriate or because data is not available. This comprehensive list of metrics represents targets and measurements that can be carried into CMCP updates in the future, helping illustrate how the corridor performance changes over time.

See Appendix A for a discussion of BART Transbay Corridor Hybrid Summary CMCP goals and objectives.

Table 2-1. CMCP Goals, Objectives & Metrics

GOAL	OBJECTIVE	PERFORMANCE METRIC
Connected & Multimodal	Increase number of multimodal options in the corridor	• Ability to accommodate additional travel modes • Station locations' impact on ridership
	Reduce multimodal gaps in the corridor	• Availability of continuous modal facilities (spatial and temporal) • Availability of connections between modes
	Improve travel times and travel time reliability for current and future users of the corridor	• Potential to shorten transbay travel duration • Potential to reduce transit delay • Bay Bridge vehicle delay • Potential to improve peak period travel time reliability • Impact of external forces
	Support system and land use efficiency	• Potential to increase person throughput • Accessibility and transit crowding reductions • Transit utilization • Benefit to cost ratio
Safe & Well	Reduce collisions	• Potential to decrease number of fatalities and serious injuries along the corridor • Potential to decrease rate of fatalities and serious injuries along the corridor
	Increase positive public health outcomes through active transportation	• Potential to increase active transportation mode share
Equitable	Increase transportation options for Equity Priority Communities	• Improved accessibility for residents of Equity Priority Communities
	Increase transportation benefits for people with disabilities	• Improved accessibility for people with disabilities
Affordable & Vibrant	Increase access to jobs	• Increased number of households within 45-minute trip of major employment center by mode • Increased number of households in disadvantaged communities within 45-minute trip of major employment center by mode
	Reduce transportation costs	• Ability to provide low-cost transportation options
	Create jobs	• Jobs created
Sustainable	Provide alternatives to driving alone	• Potential to increase non-single-occupant mode share (e.g., walking, cycling, public transit use, rail use)
	Decrease VMT	• Reduction in vehicle miles traveled
	Decrease exposure to criteria pollutants and GHG emissions	• Reduction of criteria pollutants — airborne particulates, ground level ozone, and other pollutants • Reduction of greenhouse gas emissions such as carbon dioxide and methane

3. Corridor Overview

3.1 CORRIDOR LIMITS

The Transbay Corridor encompasses multi-modal travel between the East Bay and San Francisco and the Peninsula and is roughly defined as the area between West Oakland and the Peninsula, with important focus on Treasure Island and downtown San Francisco. The corridor includes the Bay Bridge, Transbay Tube, and San Francisco Bay waterways (Figure 3-1). Travel between Alameda, Contra Costa and Solano counties, and the Sacramento Region to the east, and West Bay destinations, including Treasure Island, downtown San Francisco and the Peninsula rely on the Transbay Corridor.

Figure 3-1. Transbay Corridor Overview

Several transit agencies serve the Transbay Corridor, including BART trains in the Transbay Tube, WETA's San Francisco Bay Ferry terminals and routes, and bus and shuttle operators on the Bay Bridge (Alameda-Contra Costa Transit District, Muni, Caltrans, and WestCAT Lynx).

These transit operators provide access through the Transbay Corridor via the following facilities:

- San Francisco-Oakland Bay Bridge: Automobiles, trucks, and buses use the Bay Bridge. Buses have dedicated queue-jump lanes and other priority measures for westbound travel starting east of the toll plaza.

- BART Transbay Tube: This immersed twin-chamber tube incorporates one westbound and one eastbound track. The tube stretches 5.8 miles between the Oakland Outer Harbor and the Embarcadero in San Francisco and is a key piece of infrastructure on the regional BART rail system.
- San Francisco Bay: The San Francisco Bay is used by ferries to travel between the East Bay and the San Francisco Peninsula.

3.2 ROUTE SIGNIFICANCE

The Transbay Corridor serves local, regional, and interregional trips by people and goods between the East Bay and San Francisco and beyond. The corridor is used by a variety of modes, including automobiles and motorcycles, trucks, and public transit – including buses on the San Francisco-Oakland Bay Bridge (the Bay Bridge), trains in the Transbay Tube, and ferries on the Bay. The corridor is vital to the regional and interregional economies by allowing travel across the Bay for commuting, freight movement, shopping, services, and recreational travel.

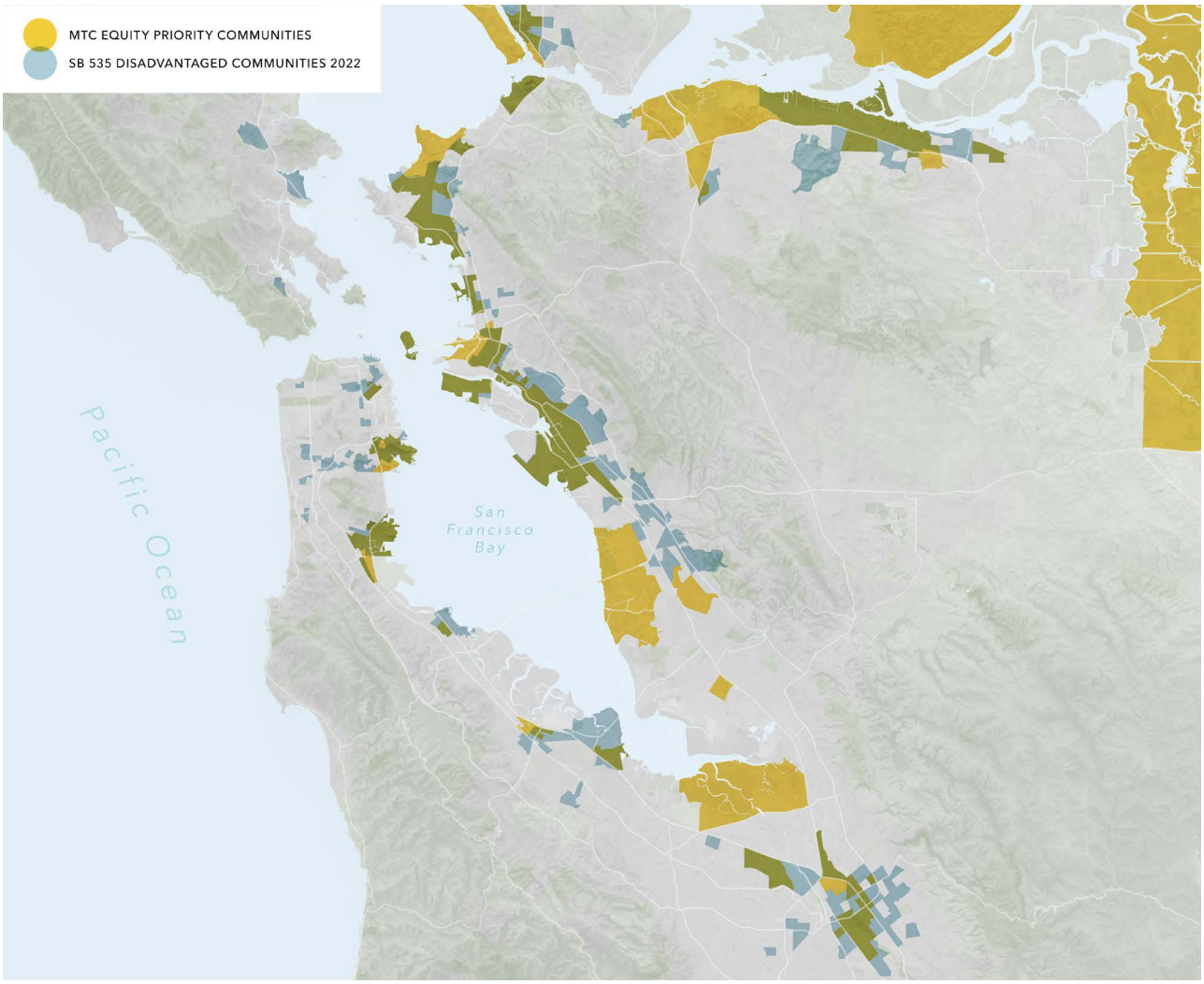
3.3 DISADVANTAGED COMMUNITIES SERVED

The Transbay Corridor serves several disadvantaged communities, as defined by federal, State, and regional levels of government. Most relevant to this planning document is California Senate Bill 535 (SB 535), which defines which census tracts in the State are considered disadvantaged based on the following criteria:

- Census tracts receiving the highest 25 percent of overall scores in CalEnviroScreen 4.0
- Census tracts lacking overall scores in CalEnviroScreen 4.0 due to data gaps but receiving the highest 5 percent of CalEnviroScreen 4.0 cumulative pollution burden scores
- Census tracts identified in the 2017 disadvantaged communities designation, regardless of their scores in CalEnviroScreen 4.0
- Lands under the control of federally recognized Tribes

According to these measures, 16 census tracts in West Oakland, one in Treasure Island, and five in downtown San Francisco have been designated as disadvantaged communities (see Figure 3-2 and Table 3-1).

Figure 3-2. SB 535 Disadvantaged Communities & Plan Bay Area 2050 Equity Priority Communities



Source: CalEPA, MTC

Table 3-1. SB 535 Census Tracts

SUB-AREA	CENSUS TRACTS
West Oakland	6001401700, 6001400000, 6001400900, 6001401000, 6001401300, 6001401400, 6001401500, 6001401600, 6001402200, 6001402400, 6001402500, 6001402600, 6001402700, 6001402800, 6001410500, 6001425104
Treasure Island	6075017902
Downtown San Francisco	6075012301, 6075012502, 6075017601, 6075017801, 6075017802

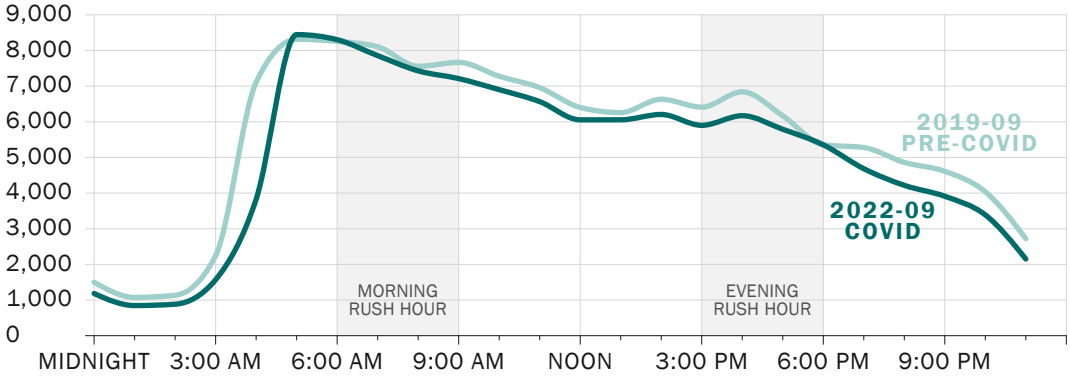
The corridor also serves communities designated as Equity Priority Communities in Plan Bay Area 2050 (see Figure 3-2). Formerly called "Communities of Concern," Equity Priority Communities are census tracts that have a significant concentration of underserved populations. Plan Bay Area 2050 Equity Priority Communities are designated at the census tract level and are based on eight American Community Survey 2014 – 2018 variables:

- People of Color (70% threshold)
- Low-Income (less than 200% of Fed. poverty level, 28% threshold)
- Level of English Proficiency (12% threshold)
- Seniors 75 Years and Over (8% threshold)
- Zero-Vehicle Households (15% threshold)
- Single Parent Households (18% threshold)
- People with a Disability (12% threshold)
- Rent-Burdened Households (14% threshold)

3.4 TRANSBAY CORRIDOR CAPACITY & PRE-PANDEMIC DEMAND

The Transbay Corridor is the region's most heavily utilized transportation link, carrying more than 40,000 trips per hour in the peak on transit and on the San Francisco-Oakland Bay Bridge (pre-COVID). Travel demand in the Transbay Corridor was growing significantly before the pandemic, resulting in overcrowded highways. The Bay Bridge was operating at or above capacity for much of the weekday peak hours. As of 2018 (the latest year for which rankings ware available), US-101/I-80 from Cesar Chavez to Treasure Island ranked as the most congested regional segment during the p.m. peak period.[1] In 2019, the Bay Bridge carried over 270,000 vehicles daily. Recent data indicates that traffic volumes, and congestion, on the Bay Bridge are at 95 percent of pre-pandemic levels (Figure 3-3).

Figure 3-3. Bay Bridge Volumes, 2019 and 2022



1 Vital Signs (data visualization by MTC and ABAG)

Similarly, public transit in the Transbay Corridor was heavily congested pre-pandemic. During this time BART operated at 110 percent of its designed capacity and ridership on AC Transit transbay buses and WETA ferries nearly reached their designed capacity levels (94 percent and 96 percent, respectively). With the corridor operating over capacity, even minor incidents like service delays and breakdowns can trigger major ripple effects throughout the entire system.

Based on transit schedules and the operators' stated policy capacities per vehicle, demand exceeded capacity and the corridor had an occupancy rate of 105 percent prior to the COVID-19 pandemic. Congestion of all modes in the corridor were forecast to continue even with planned capacity increases from projects including Bay Bridge Forward, Link21, and the BART Transbay Core Capacity Program. While the pandemic caused transit ridership to plummet, ridership is steadily increasing; the combined ridership on BART, AC Transit, and WETA in September 2022 is 48 percent of September 2019, up from 22 percent in September 2020.

3.5 FUTURE GROWTH

Although public transit ridership and vehicle trips have dipped considerably during the pandemic, Bay Bridge congestion has nearly returned fully to 2019 levels. In the long run, transportation and public transit demand is expected to continue rising and to outpace the system's capacity.

Plan Bay Area 2050 forecasts that the region will be home to just over 10 million people and add 1.4 million new jobs between 2015 and 2050, for a total of 5.4 million Bay Area jobs, with 26 percent of the new growth in San Francisco and Alameda counties. Fluctuations in travel demand are driven by local, regional, and national economic, demographic and real estate market trends and can happen rapidly. For instance, as the region recovered from the Great Recession, the technology industry and related sectors drove San Francisco employment to grow by 25 percent between 2010 and 2014 alone. While the path of post-pandemic recovery is currently uncertain, this planning effort relies on the long-term projections described in Plan Bay Area 2050.

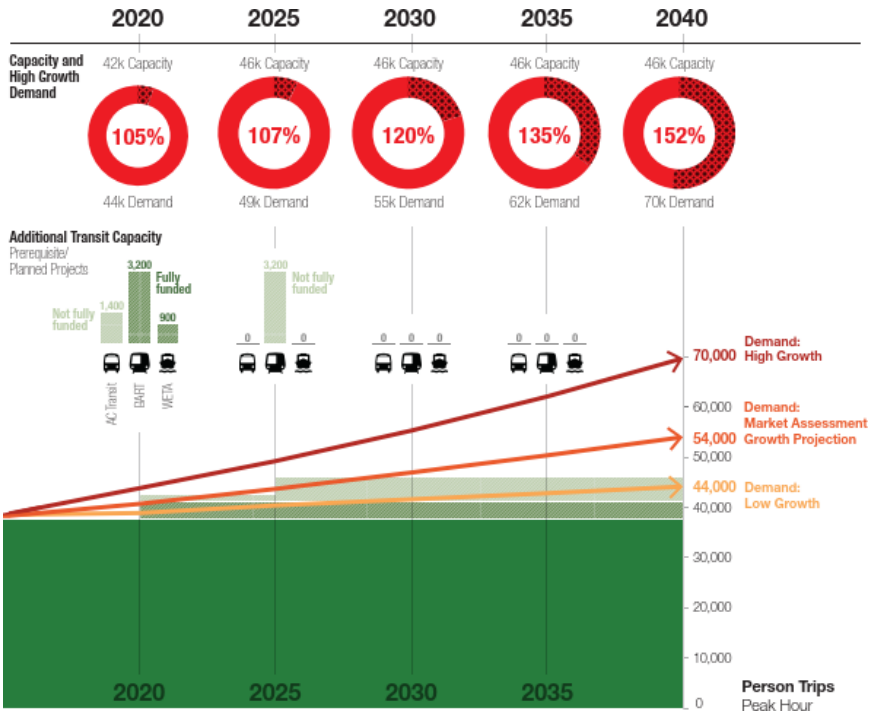
Bay Area cities are planning to add tens of thousands of housing units over the next 10 – 15 years. As of early 2022, San Francisco had 63,000 housing units in the pipeline – either permitted or in the permitting process. Major developments are in progress on San Francisco's eastern waterfront, including housing and millions of square feet of commercial space. The 2019 Downtown Oakland Specific Plan called for 29,000 new homes and 20 million square feet of new office space. Emeryville has over 1,000 units in the pipeline. Both San Francisco and Oakland are updating the Housing Element of their General Plans to meet more ambitious targets for housing production.

In the middle of the Bay, Treasure Island and Yerba Buena Island are being transformed into a new mixed-use community with 8,000 new residences, of which 27 percent will

be affordable; restaurants, retail, and entertainment venues; three hotels; 100,000 square feet of office space; and 300 acres of open space. The first new units are occupied, and another 1,600 units are projected to be complete by 2027. Full buildout is expected in 2036 and will result in tens of thousands of additional trips between the islands and "mainland" San Francisco and the East Bay each day. A key goal of the Treasure Island mobility plan, described below, is to achieve 50 percent of trips to use transit, walking, and bicycling.

If transit demand in the corridor continues growing at a moderate or high rate, capacity will be inadequate to meet demand, even with planned prerequisite projects. Figure 3-4 illustrates how Transbay Corridor capacity compares to potential growth in transit demand between 2015 and 2040. While Figure 3-4 uses growth projections from Plan Bay Area 2040, the analysis would be similar using Plan Bay Area 2050 projections, as the jobs and population growth projections in Plan Bay Area 2050 are slightly higher, with 400,000 more people and 100,000 more jobs. Under both the high-growth and market assessment growth projection model scenarios, demand in the Transbay Corridor is estimated to increase beyond the system's capacity, even accounting for capacity increases associated with planned prerequisite projects described in previous Transbay Corridor plans. Future growth in demand will need to be met by means other than the single occupant vehicle since the Bay Bridge's roadway capacity cannot be increased.

Figure 3-4. Forecast Transbay Corridor Peak-Hour Capacity & Demand, 2015 – 2040



Source: Bay Area Core Capacity Transit Study

4. Connection to Other Planning Activities

The Transbay CMCP has been informed by, and therefore is consistent with, the goals and principles from many federal, State, and local planning efforts and funding sources. The following sections summarize some examples that align with the goals and principles of this Transbay CMCP.

4.1 FEDERAL

The Congestion Mitigation and Air Quality Improvement Program provides federal funds to States for transportation projects designed to reduce traffic congestion and improve air quality, particularly in areas of the country that do not attain national air quality standards, such as the San Francisco Bay Area. This CMCP Supplement focuses on active transportation, micromobility, and congestion reduction, which are areas of eligibility under the CMAQ program.

The Intelligent Transportation Systems (ITS) Strategic Plan 2020 – 2025 (2020), developed by the USDOT ITS Joint Program Office (JPO), includes in-depth discussion of the ITS JPO's strategic goals, related research areas, and strategies to improve safety and mobility for all transportation users. Its first strategy is to identify and assess emerging technology alternatives for the transportation system.

4.2 STATE

The goals and objectives of this CMCP Supplement were developed by reviewing these state plans, in particular the California Transportation Plan (2050) and The Climate Action Plan for Transportation Infrastructure (CAPTI) (2021). Plans informing this Supplement include the following:

The California Transportation Plan (CTP) 2050 (2021) is the State's long-range transportation plan, which articulates strategic goals, policies, and recommendations to improve multimodal mobility and accessibility while reducing greenhouse gas emissions. The purpose of the plan is to present innovative, sustainable, and integrated multimodal mobility solutions.

The Interregional Transportation Strategic Plan (ITSP) (Caltrans, 2021) is the long-range planning document that helps prioritize interregional transportation projects across the state and supports Caltrans' role in improving the interregional movement of people, vehicles, and goods. The ITSP guides Interregional Transportation Improvement Program funds towards intercity rail corridors and a subset of routes identified in California's legislatively designated Interregional Road System. The 2021 ITSP identifies eleven Strategic Interregional Corridors statewide. I-80 is part of the San Jose / San Francisco Bay Area-Sacramento-Northern Nevada Corridor and is also identified as a Priority Interregional Facility that is critical in supporting interregional transportation. Transportation projects on these facilities

are expected to be the focus of the Interregional Transportation Improvement Program (ITIP) investment in the future. Improvements and strategies from the ITSP for I-80 include the following:

- Expand Express Bus Service Consistent with the California Intercity Bus Study
- Expand Truck Parking
- Expand Vehicle and Freight Truck ZEV Charging and Fueling Infrastructure
- Implement Managed Lanes to Maximize People Movement
- Improve Freight Reliability by Keeping Highway Infrastructure in a State of Good Repair
- Improve Safety
- Increase Connectivity and Accessibility to Modal Options

Caltrans Smart Mobility Framework Guide 2020 (Caltrans, 2020), guides implementation of multimodal transportation strategies in support of compact and sustainable communities through a broad range of transportation and housing choices. *Smart Mobility 2010: A Call to Action for the New Decade*, developed in partnership with the US Environmental Protection Agency, the Governor's Office of Planning and Research, and the California Department of Housing and Community Development, provided concepts and tools to incorporate smart mobility principles into all phases of transportation decision-making.

In December of 2020, *The Caltrans Smart Mobility Framework Guide 2020* introduced strategies, performance measures, and analysis methods for implementing smart mobility, organized around five themes: network management, multimodal choices, speed suitability, accessibility and connectivity, and equity. The guide also describes the application of five "place types," to identify transportation planning and project development priorities across the state. These place types describe existing geographic areas based on location, land use, density, and other characteristics:

- Central Cities
- Urban Communities
- Suburban Communities
- Rural Areas
- Protected Lands and Special Use Areas

Each of the place types correspond to transportation planning priorities and serves as a guide, not a rule, for development of recommendations. Planners consider the specific characteristics of a given planning area in addition to local, regional, and State plans when recommending strategic transportation system investments.

San Francisco and Oakland are primarily classified as under the Center Cities and Urban Communities place types. Many San Francisco and Oakland neighborhoods are shaped by streetcar routes connecting them to the downtown and waterfront areas. Treasure Island and Yerba Buena are Suburban Community place types with most of the housing development occurring on Treasure Island. Treasure Island, a flat man-made island connected to Yerba Buena Island, is in transition to have high density housing, retail, and commercial developments. While new housing developments are planned for Yerba Buena Island, 75 percent of the land is being preserved as open space. Treasure Island has about 300 acres of open space. Across the Bay Bridge, the area located west of I-880 includes maritime facilities in the Port of Oakland as well as shoreline parks. These areas of open space, port facilities, and parks are deemed Protected Lands and Special Use Areas. Table 4-1 lists Place Types along the Corridor and identifies examples of transportation strategies.

SB 743 directs use of VMT as a metric in place of Level of Service (LOS) to better measure transportation-related environmental impacts of any project and, "promote the reduction of greenhouse gas emissions, the development of multimodal transportation networks, and a diversity of land uses." The SMF Guide incorporates the intention of SB 743 as well as social equity and environmental justice, which are integral to all planning decisions. The SMF also guides Caltrans and stakeholder agencies in assessing how well plans, programs, and projects support Smart Mobility.

Table 4-1. Transportation Strategies Examples

LOCATIONS	PLACE TYPE	TRANSPORTATION STRATEGIES
Downtown areas of San Francisco and Oakland	Center Cities	• Direct service by high capacity and high-speed transit serving local and regional destinations and state-wide destinations • Creation and improvement of major transportation hubs connecting modes for intercity and international travel as well as intra- and inter-regional movement • Coordination of transit and related systems to provide convenient multimodal trips • Pedestrian facilities with high amenity levels • Extensive network of bicycle facilities • Shared mobility opportunities • Complete streets facility treatments • Limited parking to reduce demand • Projects providing service, facility, and connectivity improvements to provide an equivalent level of activity connectedness to all population groups • Design and speed compatibility with surroundings • Operating strategies to optimize use of existing roadway capacity
San Francisco, Oakland	Urban Communities	• Pedestrian facilities with high amenity levels • Extensive network of bicycle facilities • Convenient opportunities for multimodal transfers and transit transfers • Design and speed compatibility with surroundings • Shared mobility opportunities • Complete streets facility treatments • Limited parking to reduce demand
Treasure Island, Yerba Buena Island	Suburban Communities	• Improvements to network connectivity to reduce route/trip lengths and opportunities to encourage non-SOV trips • Complete street facility treatments near schools and areas with an opportunity to transition to Urban Community place types • Transit, on-demand transit, or ride share implementation attached to employment centers where appropriate • Access management and speed management on arterial streets
Treasure Island, Yerba Buena Island, Port of Oakland	Protected Lands and Special Use Areas	• For any lands not fully protected, projects and programs should assure permanent retention in open space / resource conservation status. Green prints that identify important natural resource lands and working landscapes can provide opportunities to align open space protection efforts with regional blueprints. • For special use areas, projects are determined by the purpose and context of the special use area.

The California Climate Change Scoping Plan (California Air Resources Board, 2022) assessed progress towards achieving at least 40 percent below 1990 emissions by 2030 provided through SB 32 legislation and laid out a path to achieve carbon neutrality for every sector of the economy no later than 2045. For the transportation sector, this means rapidly moving to zero-emission transportation; electrifying the cars, buses, trains, and trucks that now constitute California's single largest source of planet-warming pollution. The plan ensures our communities are provided with sustainable options for walking, biking, and public transit to reduce reliance on cars and their associated expenses.

The California State Rail Plan (CSRP) (2018) is an element of the California Transportation Plan (see above) that identifies operating and capital investment strategies that will lead to a coordinated, statewide rail system. In concert with CTP 2050 and other plans, the Rail Plan will help clear the air, invigorate cities, and provide the mobility that Californians will need in the future. In compliance with federal and state laws, it proposes a unified statewide rail network that better integrates passenger and freight service, connects passenger rail to other transportation modes, and supports smart mobility.

The Climate Action Plan for Transportation Infrastructure (CAPTI) (2021) details how the State recommends investing billions of discretionary transportation dollars annually to aggressively combat and adapt to climate change while supporting public health, safety and equity. CAPTI builds on executive orders signed by Governor Gavin Newsom in 2019 and 2020 targeted at reducing GHG emissions in transportation to reach the State's climate goals.

4.3 REGIONAL

The Supplement is heavily influenced by regional plans, goals and objectives, including the following plans:

The Alameda Countywide Transportation Plan (2020) establishes near-term priorities and guides long-term decision-making for the Alameda CTC. It establishes a vision for the county's complex transportation system that supports vibrant and livable communities. This CMCP is consistent with the Plan's vision, which promotes healthy, safe, and livable communities through mobility and access for all. It has four goals: accessible, affordable, and equitable; safe, healthy, and sustainable; high quality and modern infrastructure; and economic vitality.

Plan Bay Area 2050 (MTC, 2021) serves as the region's sustainable communities strategy. It is a long-range plan charting the course for the future of the nine-county San Francisco Bay Area's land use and transportation realms. Plan Bay Area 2050 focuses on four key issues – the economy, the environment, housing and transportation – and identifies a path to make the Bay Area more equitable for all

residents and more resilient in the face of unexpected challenges. This CMCP is consistent with the Plan's guiding principles, which include affordability, connectedness, diversity, health, and vibrancy for the region.

The Bay Area Core Capacity Transit Study (BACCTS) (2017) was a collaborative multi-agency effort to identify and prioritize investments to improve public transportation to and from the core of San Francisco. The purpose of the study was to determine what types of transit investments are necessary and when they are needed while being able to safely and reliably move a growing number of people to and from San Francisco's core job centers. The BACCTS concluded that short- and medium-term recommendations should prioritize more transit service; supportive infrastructure to improve reliability; and toll increases to manage queues and improve transit reliability. Transit fare adjustments were to be considered on an as-needed basis. The proposed long-term investment options, which recommended a new transbay crossing, were further refined in the Horizon Crossings plan.

The Horizon Crossings Perspective Paper (Association of Bay Area Governments, 2019) was one in a series developed as a part of the Horizon Initiative. The plan considers three 'what-if' scenarios for the future of the nine-county region in order to expand the traditional long-range planning process and incorporate uncertainty from a wide range of external forces. The Crossings paper picked up where the BACCTS left off, incorporating a study of a possible new transbay crossing and ultimately informing the inclusion of a potential crossing in Plan Bay Area 2050. The Crossings paper recommended that the three transit-only crossing concepts – BART Market Street Redundancy, BART New Markets, and Greater Regional Rail – be advanced for further analysis, along with the BART/auto and BART/rail concepts.

The Regional Active Transportation Plan (MTC, adoption expected in 2023) will guide regional policy-making to help increase bicycling, walking and the use of other micro-mobility modes and investment in related infrastructure. The Plan supports the Plan Bay Area 2050 strategy to build a Complete Streets Network and helps to meet Plan Bay Area 2050 goals for safety, equity, health, resilience, and climate change. A key element of the plan is the development of a regional active transportation network, which is a Plan Bay Area Blueprint strategy, that builds on adopted state, regional, county, and local bicycle, pedestrian, and trail plans.

The Bay Area Regional Rail Plan (2007), developed by MTC in partnership with the California High-Speed Rail Authority, BART and Caltrain, outlines near-, intermediate- and long-term strategies to incorporate more passenger trains into existing rail systems; expand the regional rail service network; improve connections between high-speed rail and other transit services; and coordinate rail investment around transit-oriented neighborhoods and business districts.

The Alameda Countywide Transit Plan (2016), developed by the Alameda CTC in close coordination with local jurisdictions and transit providers identifies near- and long-term transit capital and operating priorities aimed to create a transit system in Alameda County that is dependable, easy-to-use, safe, affordable, and competitive with travel by other modes while aligning with land use and economic development goals across the County. The plan addresses fixed-route transit, paratransit and public and private shuttles. Input was solicited from private industry groups, community groups and the public. The plan links BART, AC Transit, and WETA service to other regional providers like the Altamont Corridor Express and Capitol Corridor intercity train services.

The State of the San Francisco Bay Ferry (2022) discusses the Pandemic Recovery Program in addition to a number of other initiatives WETA advanced in 2021 to increase ridership, improve the rider experience, and plan for the future. It describes the launch of WETA's new long-term planning effort, the 2050 Service Vision and Business Plan. Relevant focus areas of this plan include regional ferry network expansion and service enhancement and community connections through landside integration, passenger experience, rider equity, and multi-modal coordination.

The Caltrans District 4 Bike Plan for the San Francisco Bay Area (2018) evaluates bicycling needs on and across the State transportation network in District 4 and prioritizes infrastructure improvements to enhance bicycle safety and mobility and remove barriers to bicycling in the region. Connections along the Transbay Corridor and to West Oakland are identified as top tier priorities for the district, due in part to potential demand for bicycling along the corridor and poor quality of existing facilities for bicycling along West Grand Avenue.

The Caltrans Bay Area Bike Highway Study (2022) evaluates where bike highways may be installed alongside State highways and prioritizes potential corridors for a future bike highway network. A bike highway is a high-quality, continuous, long-distance bikeway that reduces barriers to regional destinations. Bike highways should accommodate people of all ages and abilities riding bikes, as well as people walking and rolling where appropriate. For this Study, the Transbay Corridor was ranked among the top three highway corridors in the region for bike highway suitability, based on potential demand for regional bike trips and connectivity to Equity Priority Communities.

4.4 LOCAL

The San Francisco Transportation Plan (SFTP) (SFCTA, 2017, 2022) is the citywide, long-range investment and policy blueprint for San Francisco's transportation system. The plan analyzes every transportation mode, every transit operator, and all streets and freeways every four years. The San Francisco Transportation Plan 2050 process coincides with the development of Plan Bay Area 2050 and incorporates input from all transportation providers within San Francisco including BART. The SFTP 2050 lays

out two investment scenarios, an investment plan that programs about $80 billion in expected transportation revenues, and a vision plan that includes another $15 billion in potential new revenue.

Connect SF is a city-led, multi-year process to envision, plan and build a more effective, equitable, and sustainable transportation system for the future. A 50-year vision of San Francisco's future was designed through a collaborative community process that included over 5,000 individuals and 60-plus organizations that represent the City's collective priorities, goals, and aspirations within the larger Bay Area. The vision will guide plans and policies for the City and its transportation system including SFTP 2050.

The Treasure Island Transportation Implementation Plan (TITIP) (2011) lays out the measures and strategies needed to deliver a unique transportation experience on Treasure Island. Grounded in the principles of transit-oriented, sustainable development, the Island's residents, visitors, and employees will enjoy access to high quality travel opportunities that prioritize walking, bicycling, and transit; that incentivize travel by modes other than private automobiles; and that provide disincentives to those who choose to travel by single-occupancy vehicle. It includes plans for a new ferry service to be provided in conjunction with WETA between San Francisco's Ferry Terminal and Treasure Island as well as expanded bus transit to San Francisco and the East Bay. In 2014 the San Francisco County Transportation Authority was designated the Treasure Island Mobility Management Agency (TIMMA), which is responsible for delivering the TITIP. This Supplement evaluates these projects included in the TITIP in the context of transbay travel.

The Treasure Island Mobility Management Program Implementation Report (2021) provides updates to the 2011 Treasure Island Transportation Implementation Plan. This plan, like the 2011 original, lays out a transportation program with a series of measures and strategies that will meet the transportation goals for redeveloping Treasure Island, a former Naval Station. The pedestrian network is focused on providing routes for active mobility from a new Transit Hub on Treasure Island Road, where bus and ferry will meet. The bicycle network includes high quality facilities connecting the Island neighborhoods to the touchdown of the San Francisco-Oakland East Span Bay Bridge pedestrian and bicycle path on Yerba Buena Island. The ferry service outlined in this report utilizes all electric or electric hybrid vessels instead of diesel-only boats.

The Yerba Buena Island (YBI) Bicycle/Pedestrian Path Feasibility Study (2020) explores the feasibility of constructing a multi-use pathway network on YBI to improve safety and connectivity for bicyclists and pedestrians and provide convenient access for residents and visitors between Treasure Island and YBI. The project team developed the study in coordination with multiple stakeholders including BATA, Treasure Island Development Authority, Treasure Island Community Development, United States Coast Guard, San Francisco Municipal Transportation Agency, San Francisco Bicycle Coalition,

and Bike East Bay. The Feasibility Study recommendations build upon the Vista Point improvements by envisioning a safe multi-use path network that will enable bicyclists and pedestrians to reach multiple destinations on the island. This network includes a primary segment to the future Ferry Terminal on Treasure Island and a connection point for the SFOBB West Span Bike Path that is currently under development by BATA.

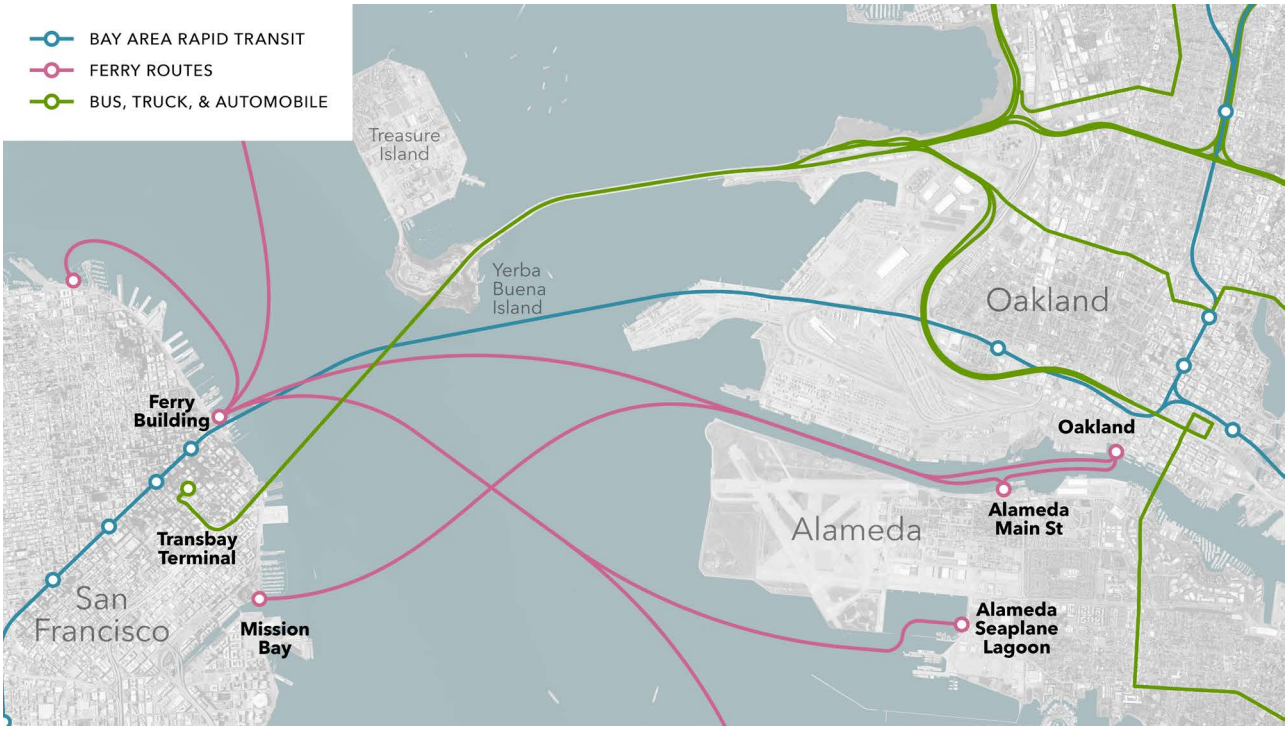
The West Oakland Community Action Plan (2019) lays out a series of community-identified measures to reduce pollution in West Oakland to be implemented through 2024 by State, regional, and local agencies. An example of these measures includes improving the design and safety of local streets to indirectly reduce emissions by encouraging residents to walk or ride bicycles and scooters instead of driving cars.

The General Plan Update for Oakland's 2045 General Plan (adoption expected in 2025) will guide the development of the City for the following two decades. It is envisioned to craft a new direction for the future of Oakland focused on creating an equitable and just city. Phase 1 includes the Environmental Justice Element, Safety Element, and update to the Housing Element, among other components. Phase 2 includes additional elements, Zoning Code and Map update, environmental process and adoption.

5. Modes, Facilities, and Needs

The Transbay Corridor serves the movement of people and goods with a variety of transportation modes (Figure 5-1). This chapter describes existing modes – personal vehicles, rail, bus, ferry, and freight – as well as new modes that could one day serve the Transbay Corridor – bicycle, walking, and micromobility. It also identifies programmed, planned, and proposed projects within the Corridor.

Figure 5-1. Existing Transbay Modes



5.1 PERSONAL VEHICLES

In the Transbay Corridor, the Bay Bridge crossing is at its saturated capacity with vehicles, leaving it highly constrained. Approximately 130,000 average daily vehicles traveled westbound through the toll plaza in 2019.[2] Vehicles pay $7 to travel westbound on this 8.4-mile span, while carpools pay $3.50 weekdays during the peak hour.

Several projects are planned to encourage carpooling and car-sharing in the corridor. The TITIP aims to make car sharing and programs like carpool-matching available on the island by 2025. Bay Bridge Forward is a set of investments and strategies to improve

2 Caltrans Traffic Census Program 2020

efficiency, reduce delays and move more people and buses across the most-traveled bridge in the Bay Area. It includes several investments related to carpooling, including the creation of Casual Carpool locations, and optimizing traffic management systems, and working with employers to encourage carpooling to work.

5.2 PASSENGER RAIL

BART provides rail service between West Oakland and San Francisco through an immersed twin-chamber tube with one track in each direction. The tube stretches 5.8 miles, from the Oakland Outer Harbor to the Embarcadero in San Francisco and is a key piece of infrastructure on the regional BART rail system. All BART lines except the Berryessa-Richmond line operate through the Transbay Tube, making it one of the busiest sections of the system in terms of passenger and train traffic.

In 2019, BART's ridership during the morning peak hour averaged approximately 26,000, with a peak of 27,000 in October 2019 – 104 percent of capacity.[3] While recent data shows that BART system ridership is only at 42 percent of pre-pandemic levels as of September 2022, these numbers are continuously rising.[4]

The BART Transbay Core Capacity Program, begun in 2018, is a package of strategic investments to increase train passenger throughput in the Transbay Tube. The program includes four elements: 306 additional rail cars; a new communications-based train control system; an additional railcar storage yard; and additional traction power substations to provide the additional power needed for the more frequent service.

The 2018 State Rail Plan and MTC's 2019 Horizon initiative include a new transbay passenger rail crossing in their vision for a more connected passenger rail network in Northern California. Link21 is a 21-county effort to connect the BART and Regional Rail networks to transform passenger rail in Northern California. At the core of Link21 is a new transbay passenger rail crossing between Oakland and San Francisco. The program is currently in the planning phase. Where possible, Link21 aims to plan and deliver benefits by 2040. Associated projects vital for the Link21 network will likely be fully operational before then.

5.3 BUS

Prior to the pandemic, AC Transit provided 27 transbay bus routes offering service between San Francisco's Salesforce Transit Center and the East Bay, as far north as San Pablo, and as far south as Newark. AC Transit made over 600 trips each weekday into and out of downtown San Francisco; during the weekday peak period, it deployed 130 buses.[5] AC Transit does not currently serve Treasure Island. In 2019,

3 BART

4 Bay Area Bridge Crossings Monthly Tracker

5 AC Transit

AC Transit carried almost 4 million riders across the Bay Bridge; as of September 2022, AC Transit's transbay ridership was at 20 percent of 2019 levels, with nine of the transbay routes still suspended.

SFMTA provides 24-hour bus service between the Salesforce Transit Center and Treasure Island. This route has 15-minute peak frequencies most of the day and 30-minute frequencies between midnight and 6:00 a.m.

The Bay Bridge already supports high bus use, with nearly 25 percent of morning peak hour commuters traveling by bus – double the transit commute rate for the region as a whole.[6] Both AC Transit and Muni buses are subject to delays and variations in travel times due to congestion on the Bay Bridge.

Several projects and initiatives are planned to encourage more transbay transit use. Bay Bridge Forward is an ongoing set of investments and strategies to improve efficiency, reduce delays and move more people and buses across the Bay Bridge. It includes near-term and long-term projects to improve transit travel time and reliability, and promote carpooling and transit ridership, all while reducing greenhouse gas emissions. Bay Bridge Forward improvements made since 2016 include increasing frequencies of transbay bus routes and adding transit signal priorities on the West Grand Avenue approach to the Bay Bridge. Planned investments include operational improvements to I-80 and I-580, and an express bus service pilot.

On Treasure Island, an initiative is planned to increase affordability of transit options. Treasure Island residents in below-market rate housing will soon qualify for a Clipper Card at a 50 percent discount. That pass will allow unlimited rides on Muni, AC Transit, and the Treasure Island ferry.[7]

5.4 FREIGHT

An average of almost 6,900 trucks crossed the Bay Bridge (bi-directional) daily in 2019.[8] This accounted for approximately 2.5 percent of total Bay Bridge traffic.

I-80 is on the federally designated National Highway Freight Network as a Primary Highway Freight System route. The Transbay Corridor is the primary access route between San Francisco and the East Bay. It serves the Oakland International Airport and the ports of Oakland and San Francisco and is used for intraregional goods movement. The corridor is part of the Surface Transportation Assistance Act National Network, which supports interstate commerce by regulating the size of trucks. The State is committed to a broader, long-term vision for accelerating the transition of California's

6 SPUR, Giving Buses Priority on the Bay Bridge Will Improve Access and Equity, March 2021

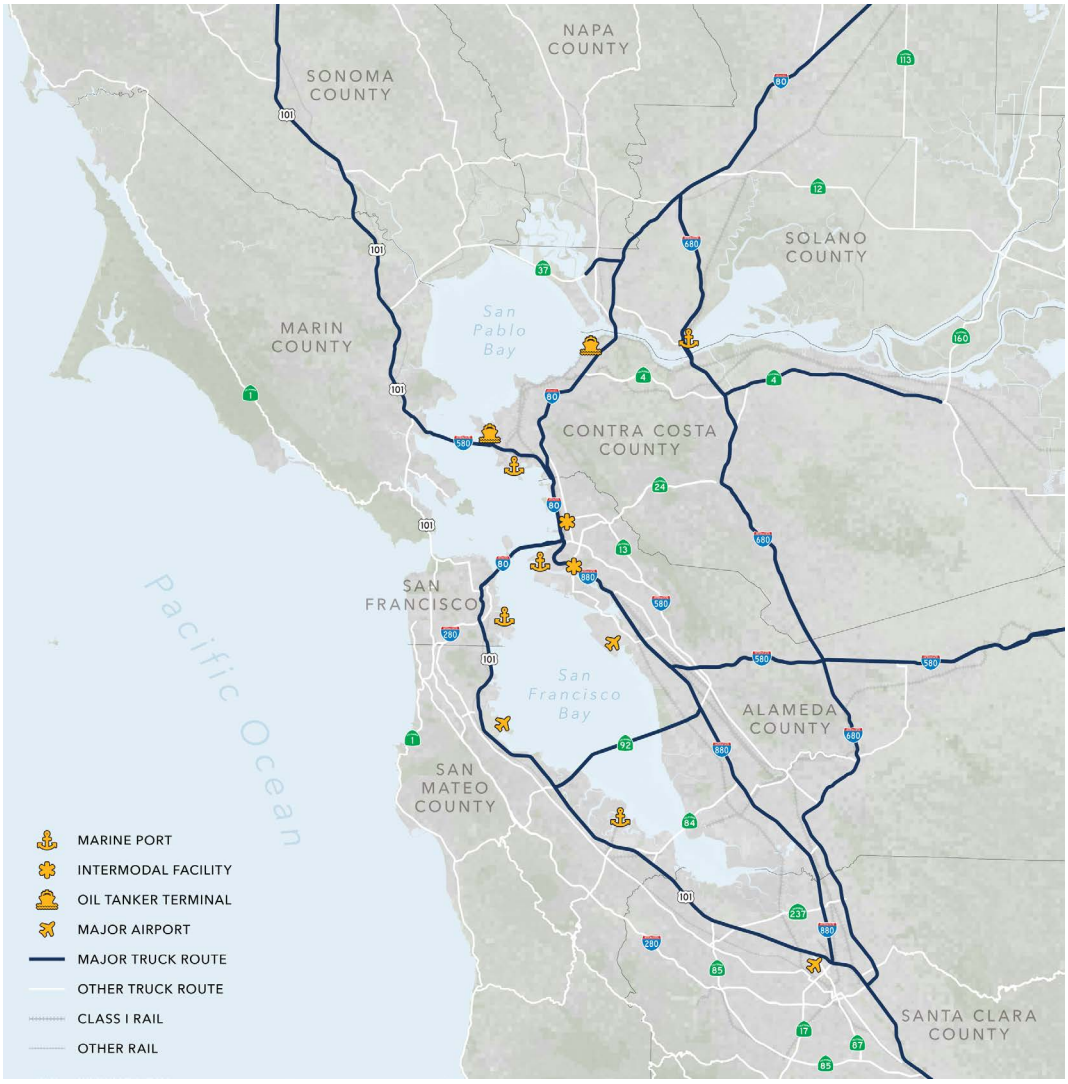
7 Treasure Island Transportation Program

8 Caltrans Traffic Census Program 2020

multimodal freight system from its already robust state to a safer, more efficient and reliable, and less polluting freight system. The California Freight Mobility Plan 2020, approved in 2020, responds to these needs through various initiatives and contains an extensive set of projects.

Regionally, freight facilities along the I-80 corridor including the Transbay Corridor are discussed in MTC's 2016 San Francisco Bay Area Goods Movement Plan. The route is also part of the Northern California Megaregion Goods Movement Study by MTC. Together these reports serve as the long-range regional goods movement plans for the San Francisco Bay Area and will help shape future freight policies at the regional level. Figure 5-2 shows truck routes in the Bay Area.

Figure 5-2. Bay Area Freight Corridors



Source: San Francisco Bay Area Goods Movement Plan

5.5 FERRY

Public ferries serve several locations on both sides of the Bay (see Figure 5-1), including San Francisco's Ferry Building, Oakland, Alameda, Richmond, and Vallejo. Additional service is available between Oakland and San Francisco's Mission Bay. Ferry service is typically available on weekdays between 6:30 a.m. and 10:00 p.m.

3.2 million passengers took a public ferry in the San Francisco Bay in 2019.[9] While daily ridership dropped to 6 percent in the immediate aftermath of COVID-19 shelter-at-home orders, ridership is now at 62 percent of pre-pandemic levels, rising steadily since June 2021 when WETA's Pandemic Recovery Program went into effect (see Section 4.3).

The Treasure Island developer currently provides limited diesel-powered ferry service to and from San Francisco. Weekday service is offered from approximately 7:30 a.m. – 8:30 p.m. with one to two ferries each hour. On weekends, service begins at 9:30 a.m. and ends at approximately 9:00 p.m. Residents of the island have cited the need for service to begin earlier to accommodate residents who work in San Francisco.

The BACCTS recommends instituting ferry service between Berkeley and San Francisco at 30-minute headways during the peak period and 60-minute headways off-peak. This service would require two new vessels. Progress was made on this project in 2021, and the WETA Board and Berkeley City Council were asked to take next steps in design, permitting, and funding in early 2022.

WETA is also planning a two-pronged zero-emission ferry study to consider shoreside charging infrastructure and zero-emission vessel technology needed to transition to a zero-emissions fleet. The State of the San Francisco Bay Ferry plans for several other operational improvements including new boats and real-time transit information (see Section 4.3).

5.6 BICYCLES

There are currently no continuous bicycle facilities that serve the Transbay Corridor linking San Francisco and Oakland.

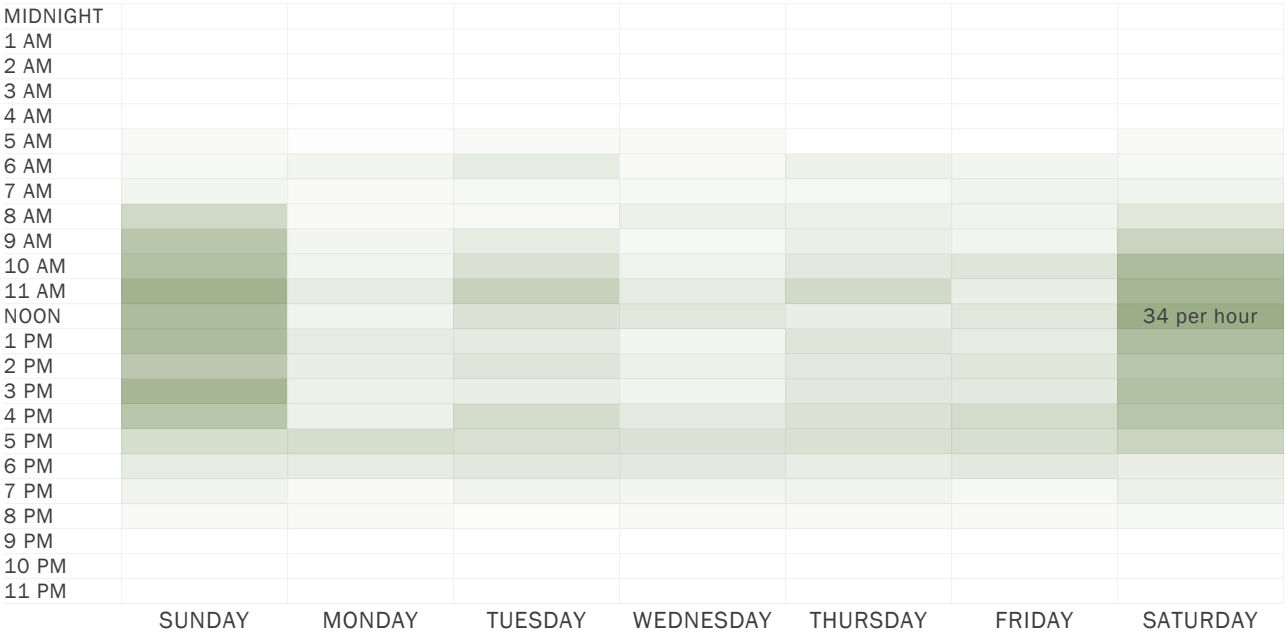
Walking and cycling connections are available between Berkeley and Emeryville and Yerba Buena Island on the Bay Bridge East Span Path, which is a segment of the San Francisco Bay Trail. This path was opened to the public in 2013 and is open daily from 6:00 a.m. to 9:00 p.m. However, there is not currently a safe bicycle or pedestrian link from Oakland to the East Span Path.

9 State of the San Francisco Bay Ferry 2022

On the west end of the East Span Path, it is possible to bike from the path touchdown on Yerba Buena Island to Treasure Island via a bicycle path along Macalla Road; however, the route is extremely steep. From Treasure Island, bicyclists can then board a bus to San Francisco (as described in Section 5.3); each bus can carry up to two bicycles. There is also temporary ferry service from Treasure Island to San Francisco that allows bicycles.

Given that the East Span path ends at Yerba Buena Island and operates during limited hours, it is largely a recreational facility at present. Nonetheless, more than 125 cyclists use the path on the average weekday, and about 280 on Saturdays and Sundays.[10] Figure 5-3 shows a heat map of bicycle trips on the Bay Bridge path by time of day and day of week. The highest density of trips is during the weekend, underscoring the current use of the path for recreational purposes.

Figure 5-3. Bay Bridge Bicycle Trips by Time of Day and Day of Week



Source: MTC

Figure 5-4 shows planned paths and protected bicycle facilities on both sides of the Transbay Corridor, including on Treasure Island. These separated pathways and protected bicycle lane networks will be designed for riders of all ages and abilities. These improvements have the potential to reduce vehicles on the road and to improve air quality.

10 mySidewalk 2022

Figure 5-4. Existing & Planned Paths & Protected Bicycle Lanes

5.7 WALKING

Pedestrian facilities are limited along the Transbay Corridor, and facilities do not currently exist linking San Francisco and Oakland.

Walking and cycling connections are available between Berkeley and Emeryville and Yerba Buena Island on the Bay Bridge East Span Path. This path was opened to the public in 2013 and is open daily from 6:00 a.m. to 9:00 p.m. Pedestrian access between Yerba Buena Island and Treasure Island was limited due to construction along Macalla Road but has now reopened.

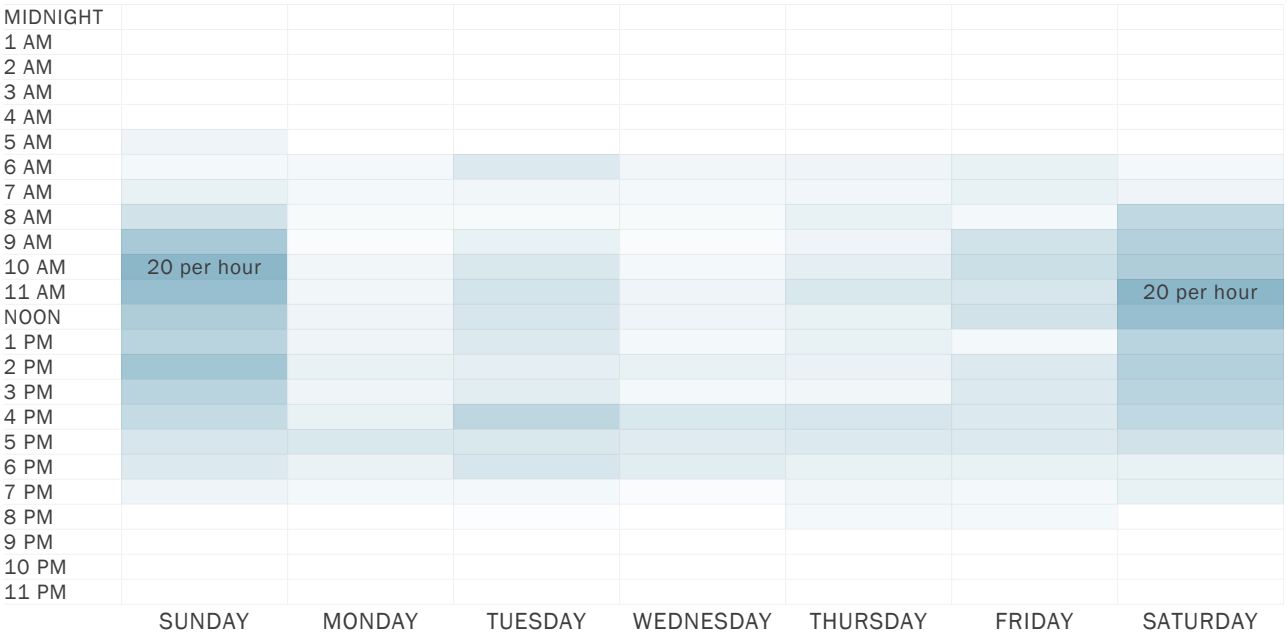
On average, approximately 110 pedestrians use the East Span path each weekday, while approximately 160 pedestrians use the path each weekend day.[11] Figure 5-5 shows a heat map of pedestrian trips on the Bay Bridge path by time of day and day of week. The highest density of trips is during the weekend, underscoring the current use of the path for recreational purposes.

Figure 5-4 shows planned paths and protected bicycle facilities on both sides of the Transbay Corridor, including Treasure Island. Several pedestrian enhancement projects

11 mySidewalk 2022

are envisioned in the Treasure Island Transportation Implementation Plan, Oakland Pedestrian Plan, and various San Francisco pedestrian plans. These improvements have the potential to increase walking in the vicinity of and in the Transbay Corridor.

Figure 5-5. Bay Bridge Pedestrian Trips by time of Day & Day of Week



Source: MTC

5.8 E-BIKES & OTHER MICROMOBILITY DEVICES

Micromobility transportation modes are those that are fully or partially human-powered, such as e-bikes, e-scooters and mobility-assistance devices or wheelchairs. Most commonly, micromobility vehicles do not exceed 15 miles per hour. Electric scooters and other micromobility vehicles are gaining popularity, and the Bay Area is served by several micromobility providers. Bay Wheels and Lime both provide shared bicycles, e-bikes, and e-scooters on both sides of the Bay. Other companies, such as Superpedestrian, VeoRide, and Spin, are only available in either San Francisco or the East Bay. Despite the availability of micromobility devices, micromobility options in the corridor are currently limited by a lack of transbay connections.

Sales of e-bikes are skyrocketing around the country: more than 880,000 e-bikes were sold in 2021, compared to 288,000 in 2019.[12] E-bikes allow users to travel longer distances with less effort, which makes them appealing to current cyclists for going longer distances, and to others who do not currently bike because of their ease: this

12 Bicycling 2022, The Washington Post 2021

is particularly appealing for seniors and people with long commutes. Pathways and separated bikeways also make e-bikes more appealing for people who may not feel comfortable sharing the road with motor vehicles.

In addition to purchasing an e-bike, there are several options for people on both sides of the Transbay Corridor to access these vehicles. As mentioned above, Lyft's Bay Wheels provides shared e-bicycles in both San Francisco and Oakland. In Oakland, residents can access shared e-bicycles through the City's Electric Bike Library program. A Bay Wheels expansion onto Treasure Island and Yerba Buena Island is part of the Treasure Island Transportation Plan, with the first station to be located near the ferry. Bay Wheels also offers a subsidy program to provide lower-income riders access to micromobility devices.

At the State level, recent legislation is easing restrictions on e-bikes. AB 1909, the "OmniBike Bill," signed in October 2022, opens more bikeways to e-bikes, while still allowing communities to bar them from equestrian and hiking trails. In 2021, the California legislature set aside $10 million to create a program that would provide incentives for e-bike purchases. This effort is being led by the California Air Resources Board and the program is expected to launch in mid-2023.

5.9 BROADBAND

Regional Communications Infrastructure

Currently fiber infrastructure owned by Caltrans exists on I-80 between Yerba Buena Island and the Bay Bridge toll plaza in Oakland. A State Highway Operation and Protection Program (SHOPP) project slated to begin construction in spring 2023 will install fiber optic cable and install and upgrade Transportation Management System elements along I-80 between the northern Alameda County border and the Bay Bridge toll plaza.

State Broadband Planning

The California Governor's Executive Order S-23-06 (Twenty-First Century Government) established the California Broadband Task Force, consisting of Caltrans and other public and private stakeholders, to identify opportunities to facilitate broadband installation across the state. Assembly Bill 1549 (2016) requires Caltrans to notify broadband deployment organizations on construction methods that are suitable for broadband installation in order to bring together private and public partnership for opportunities to increase advanced communication technologies. Caltrans developed the Incorporating Wired Broadband Facility on State Highway Right-of-Way User Guide, providing guidelines for wired broadband providers about Caltrans processes to incorporate wired broadband facilities in State highway right-of-way.

CTC's 2018 CMCP guidelines identify the need to install conduit along certain California highways for future deployment of broadband fiber to service the needs and demands of a wide range of users. The California Advanced Services Fund funded 17 regional

broadband consortia across the state to identify "Strategic Broadband Corridors" that should become part of future Caltrans planning to provide broadband services to areas currently without broadband access and to build out facilities in underserved areas. The Transbay Corridor is not among the proposed strategic broadband corridors.

MTC's Regional Broadband Communications Strategic Investment Plan

MTC's 2019 Regional Broadband Communications Strategic Investment Plan proposed projects and created a roadmap for future investments. The plan calls for MTC, Caltrans, and other regional stakeholders to develop a regional communication network that can potentially support future broadband deployment in the Bay Area.

The plan proposes projects that will contribute to a shared regional communications network utilizing existing and planned communications infrastructure. These projects focus on sharing infrastructure, installing new infrastructure, and connecting to transportation management centers along the Transbay Corridor:

- Make existing conduit infrastructure available for regional communications purposes along I-80 from Yerba Buena Island to Bay Bridge Toll Plaza
- Install communications infrastructure along I-80 and I-880 from the Bay Bridge Toll Plaza to Hegenberger Road
- Install communications infrastructure along I-80 from US 101 to Yerba Buena Island
- Dedicate planned fiber strands for regional communications purposes to connect Caltrans Division 4 office to regional communications network connection (I-80, Bay Bridge Toll Plaza)

These proposed projects are not automatically linked to a form of funding and are subject to change based on stakeholder input, funding constraints, and other priorities.

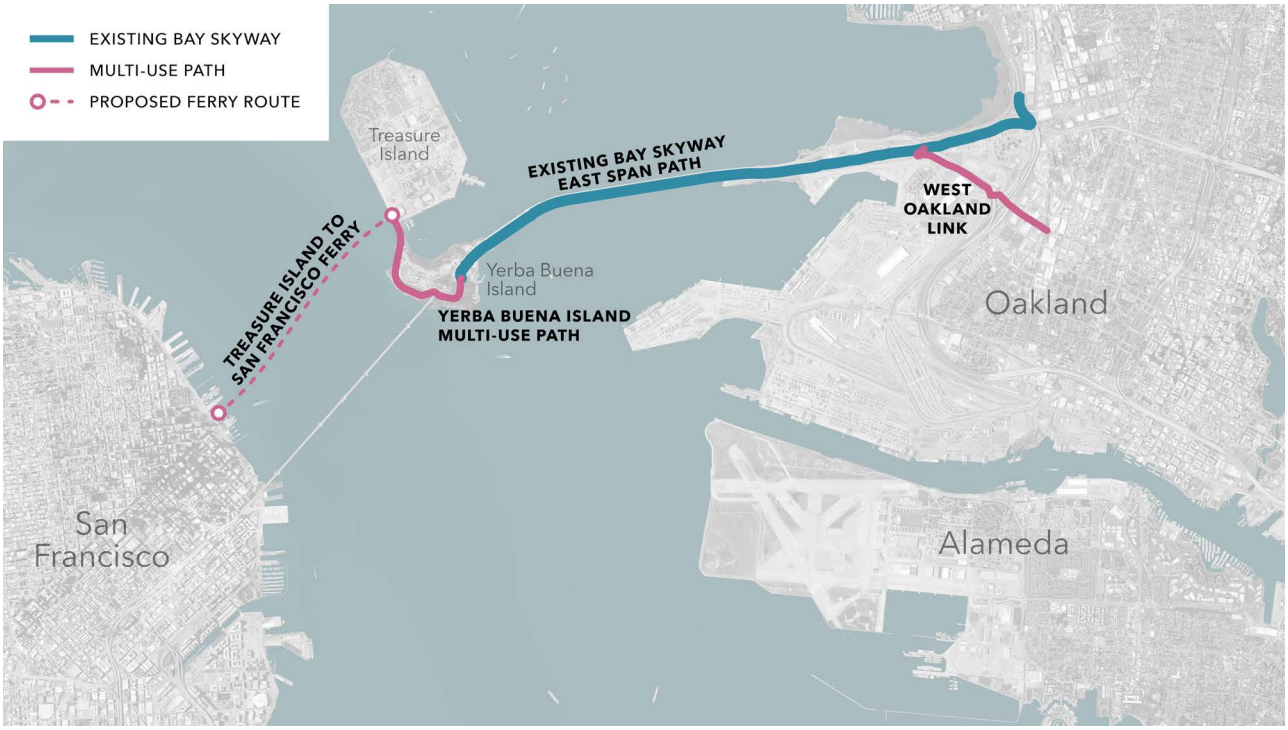
6. Proposed Projects

This chapter presents ten proposed projects within the Transbay Corridor. They offer improvements to existing transportation modes and facilitate new modes on the corridor. For the purposes of this CMCP, short-term projects are those implementable within 5 years; medium-term 5 – 10 years; and long-term 10-plus years. The proposed projects are presented below and are summarized in Table 6-1. See Appendix A for long-term projects from the BART Transbay Corridor Hybrid Summary CMCP. Estimated costs are for construction, or capital investments in the case of transit services, and are expressed in 2022 dollars.

6.1 BAY SKYWAY PHASE 1

Horizon: Short-term
Estimated Cost: $170 million

Figure 6-1. Bay Skyway Phase 1



The Bay Skyway aims to give people more options for traveling across the Bay without driving. It has two phases. Phase 1, planned to open in 2027, builds on the existing Bay Bridge East Span path and will connect Oakland and San Francisco with a combination of pathways and a zero-emission ferry. The Bay Skyway has three main components:

- The West Oakland Link is a proposed 1.3-mile-long elevated multi-use pathway that will link the intersection of Mandela Parkway and West Grand Ave in West Oakland to the existing Bay Bridge East Span path. It is estimated that almost 3,000 people would use the Link daily during Phase 1 to reach the Port of Oakland Judge John Sutter Regional Shoreline and the East Span path.
- The Yerba Buena Island Multi-Use Path will provide an essential link in the pedestrian and bicycle network connecting Treasure Island and its new Ferry Terminal with the Bay Bridge.
- Electric ferry service between Treasure Island and San Francisco will start in 2025.

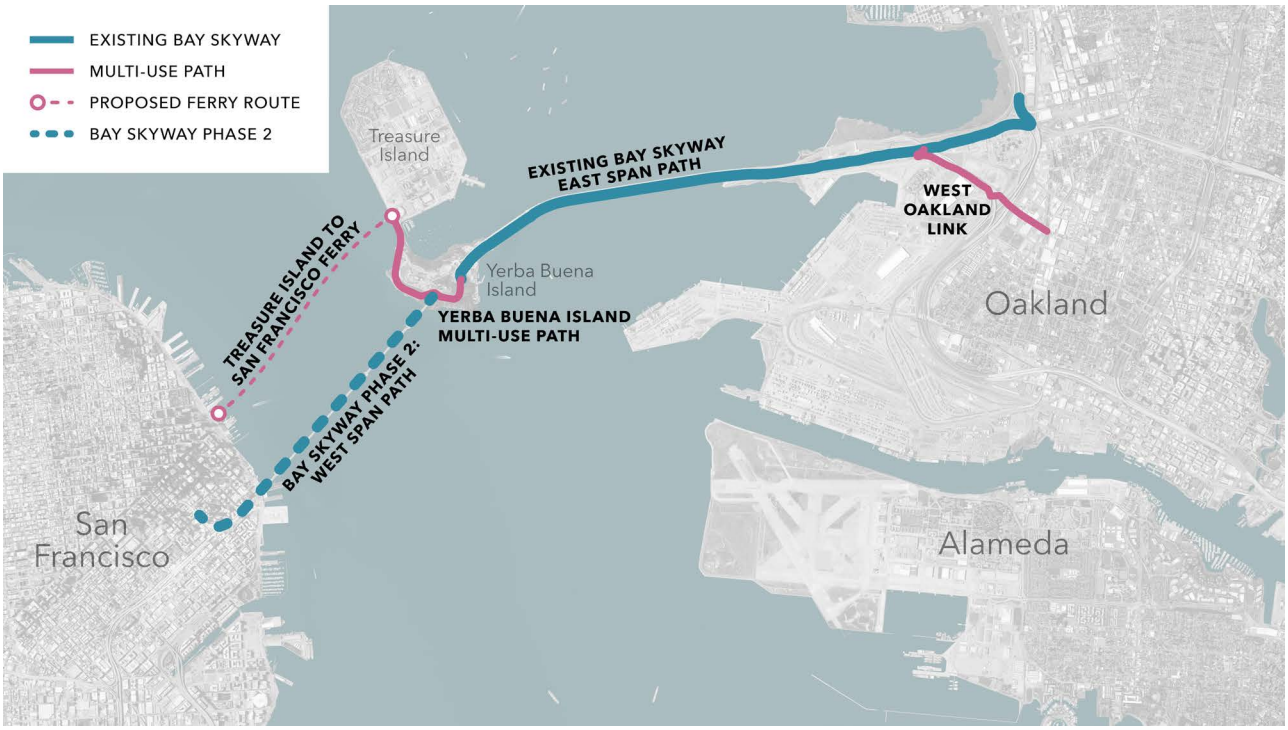
The project will integrate with the surrounding community in terms of placemaking, supporting local values and the existing transportation network. To promote community identity and support local small businesses, the project designers will work with the community to identify placemaking elements, including landscaping, public arts, signage/wayfinding, customized aesthetics of the bridge structures and abutments, and other features of community interests. The Yerba Buena Island Multi-Use Path will also provide opportunities for neighborhood enhancement through wayfinding, viewpoints, and informational markers along the path.

The environmental analysis and full design of all components of Bay Skyway Phase 1 have been funded. These Bay Skyway Phase 1 projects are estimated to cost a total of approximately $170 million to construct.

6.2 BAY SKYWAY PHASE 2

Horizon: Medium
Estimated Cost: $500 million

Figure 6-2. Bay Skyway Phase 2



The Bay Skyway Phase 2 project includes the elements of Phase 1 as well as construction of a bicycle and pedestrian path on the Bay Bridge West Span. This would allow people to walk, cycle, or use micromobility devices all the way across the Bay. The path would most likely be located on the north side of the Bay Bridge West Span and would not impact the existing vehicle lanes. The East Span and West Span paths would connect via a portion of the Yerba Buena Island Multi-Use Path constructed in Phase 1. In San Francisco, the path would potentially touch down at Essex Street. It is estimated that over 17,000 daily cyclists would use the Bay Skyway to travel between San Francisco, Treasure Island and the East Bay by 2050, plus more than 3,200 pedestrians connecting via the West Oakland Link.

The West Span path will provide opportunities for neighborhood enhancement through wayfinding, viewpoints, and informational markers along the path. Community engagement was previously performed regarding the touchdown in San Francisco and more outreach efforts will be undertaken as the project progresses.

The next step in the Bay Skyway Phase 2 is the completion of the State and Federal environmental analyses, expected to be completed in 2024. Construction could be complete as early as 2030, but no source of funding has yet been identified.

6.3 TREASURE ISLAND FERRY

Horizon: Short
Estimated Cost: $10 million

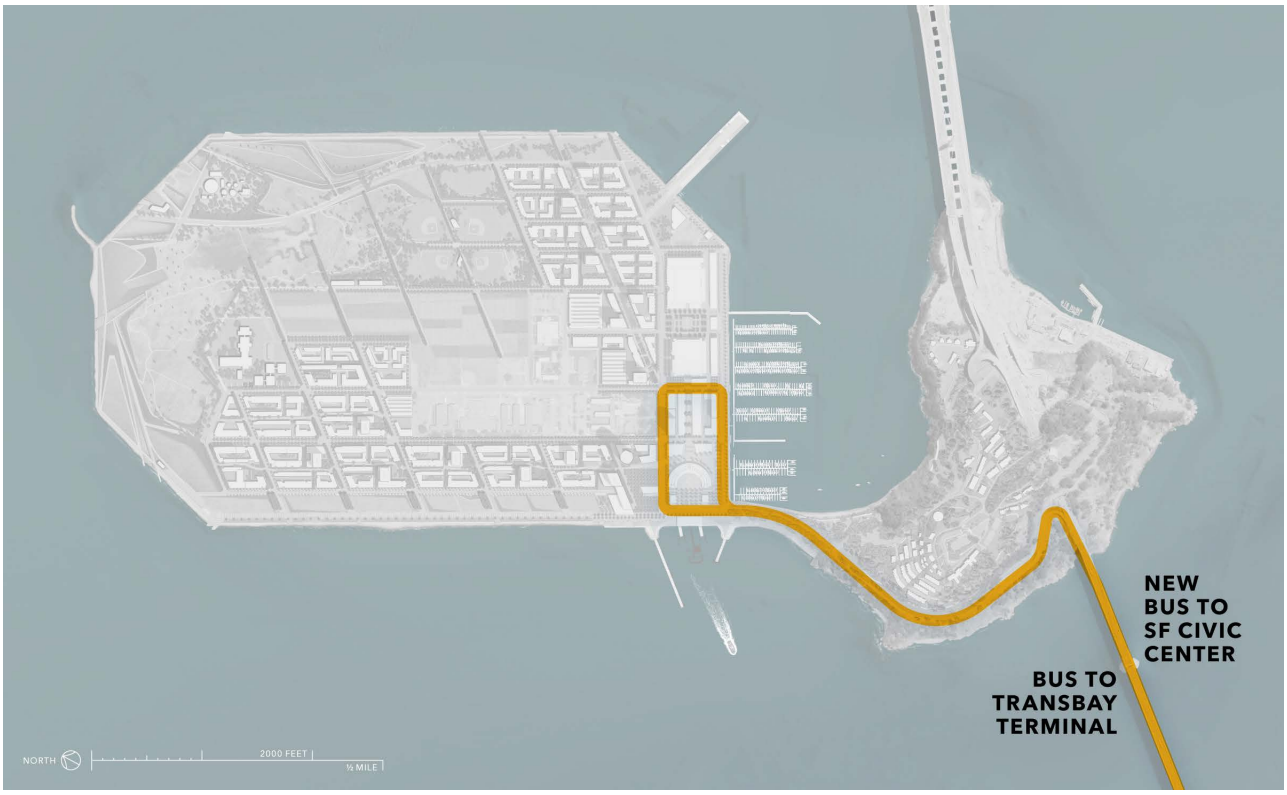
Figure 6-3. Treasure Island Ferry

The Treasure Island Ferry will establish a new ferry service between Treasure Island and downtown San Francisco. The full build scenario includes 15-minute frequencies on weekdays and weekends, with service available at a minimum from 6:00 a.m. until 10:00 p.m. Two vessels would serve the route. Additionally, a plaza constructed at the new ferry terminal would provide an opportunity for neighborhood enhancement. The project cost is estimated at $10 million.

6.4 EXPANDED MUNI SERVICE TO TREASURE ISLAND

Horizon: Short
Estimated Cost: $19 million

Figure 6-4. Expanded Muni Service to/from Treasure Island

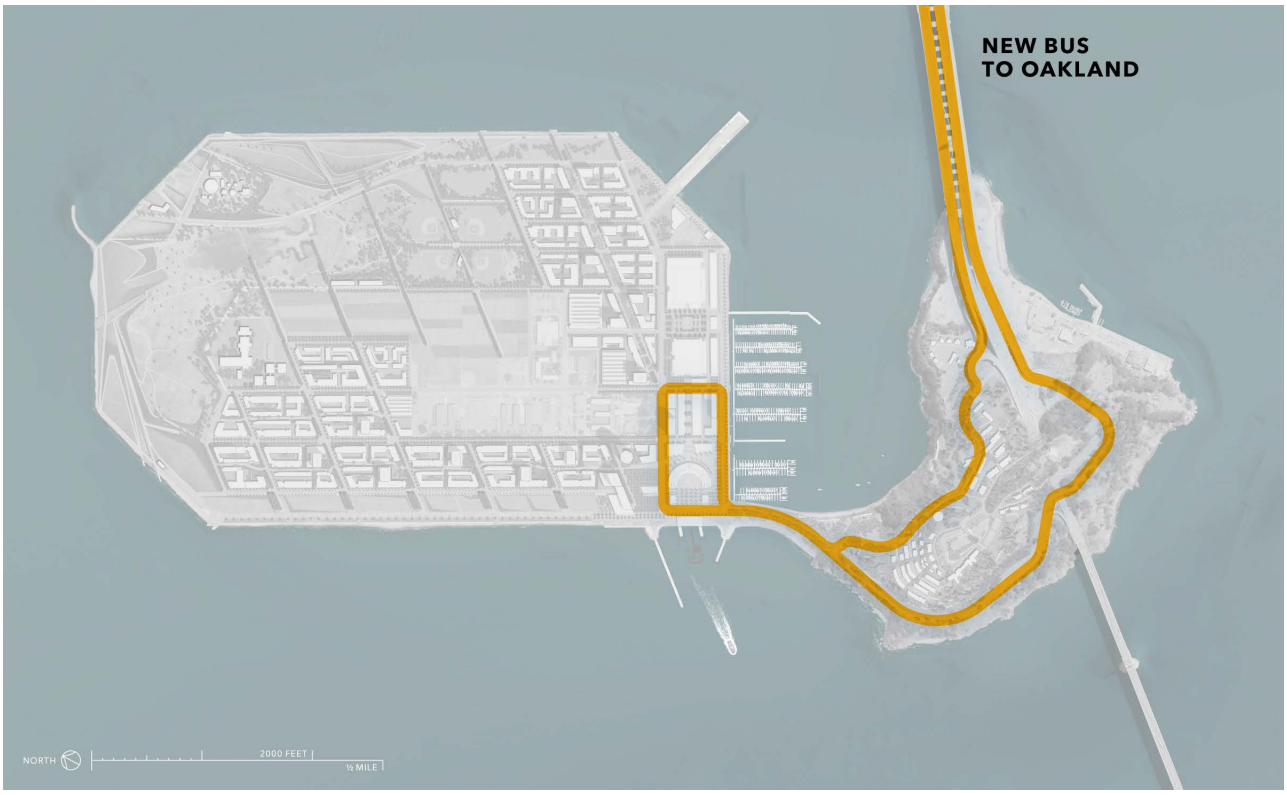


This project will provide expanded bus service between San Francisco and Treasure Island. Two bus routes to San Francisco are proposed at full buildout – one between the Treasure Island Transit Hub and the San Francisco Transbay Terminal (5 – 10 minute frequency on weekdays), and one between the Transit Hub and the Civic Center area (12 minute frequency). Both routes would have exclusive westbound Bay Bridge on-ramp access. The project has an estimated capital cost of $19 million for Muni vehicles and facility upgrades.

6.5 AC TRANSIT SERVICE TO TREASURE ISLAND

Horizon: Short
Estimated Cost: $8 million

Figure 6-5. AC Transit Service to/from Treasure Island

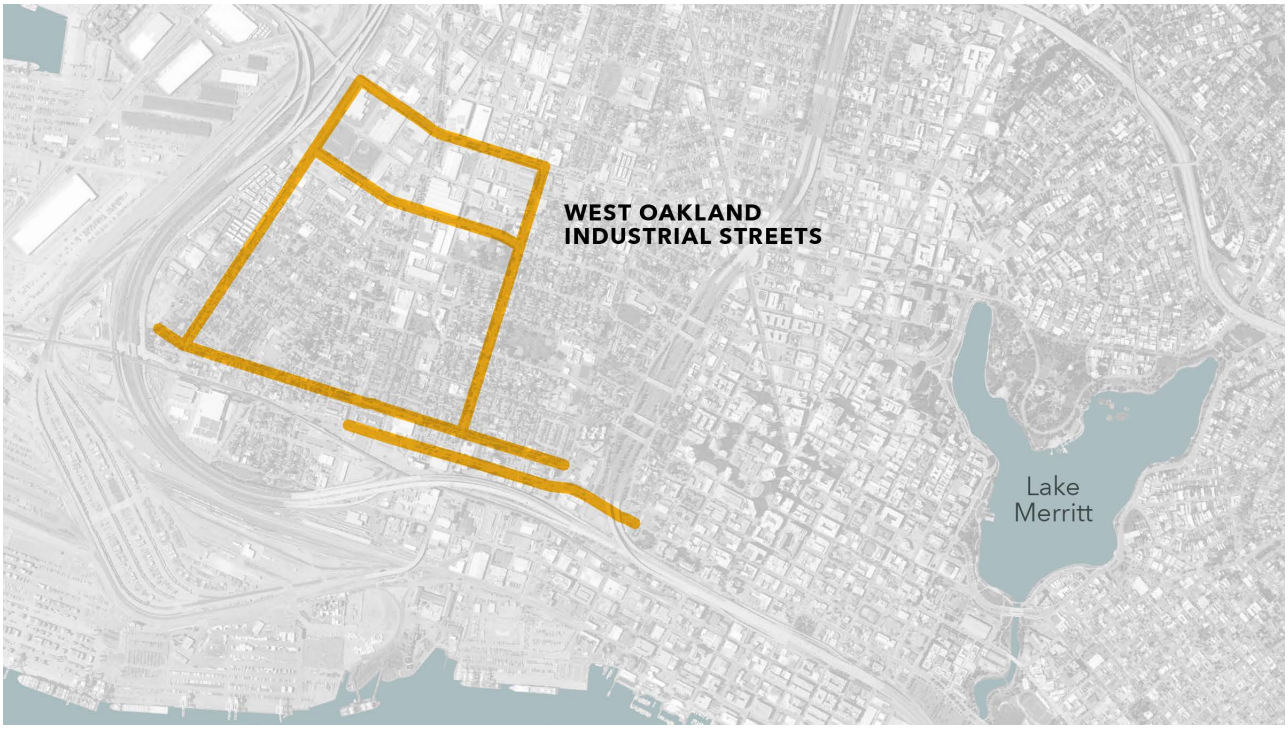


This project would create a new bus service between Downtown Oakland and Treasure Island. The service is expected to be provided by an on-demand operator under contract to either TIMMA or AC Transit during the initial years of the program. At full buildout, the service would be provided as a regular bus service operating all day during weekdays and weekends with 10-minute peak frequency (maximum 15-minute wait time). The project has an estimated cost of $8 million for AC Transit vehicles.

6.6 WEST OAKLAND INDUSTRIAL STREETS

Horizon: Medium
Estimated Cost: $40 million

Figure 6-6. West Oakland Industrial Streets



Oakland's adopted Capital Improvement Program (CIP) recommends the West Oakland Industrial Streets project for fiscal years 2021 – 2023. The project, which is located in an area with a high rate of injury collisions that is also an Equity Priority Community, will upgrade streets around the West Oakland Link to become "complete streets" – streets designed and operated to be safe, comfortable, and convenient for all people regardless of transportation mode. The project is consistent with the West Oakland Specific Plan and West Oakland Community Action Plan, including elements such as the removal of inactive railroad tracks, road diets, repaving, and pedestrian and bicycle infrastructure improvements. The project will also provide community enhancements including street lighting and landscaping.

The project scored highly in the CIP's evaluation, which took into account factors including equity, health and safety, environment, and project readiness. The project is currently in the planning phase. The total project cost is estimated at $40 million. No funding source has yet been identified.

6.7 GRAND AVENUE MOBILITY PLAN IMPLEMENTATION

Horizon: Medium
Estimated Cost: $118 million

Figure 6-7. Grand Avenue Mobility Plan Implementation

The Grand Avenue Mobility Plan Implementation is recommended in Oakland's adopted CIP for fiscal years 2021 – 2023. The project will improve bus operations, walking, and biking without impeding necessary goods movement to connect with diverse communities for jobs, education, services, and various regional transportation connections.

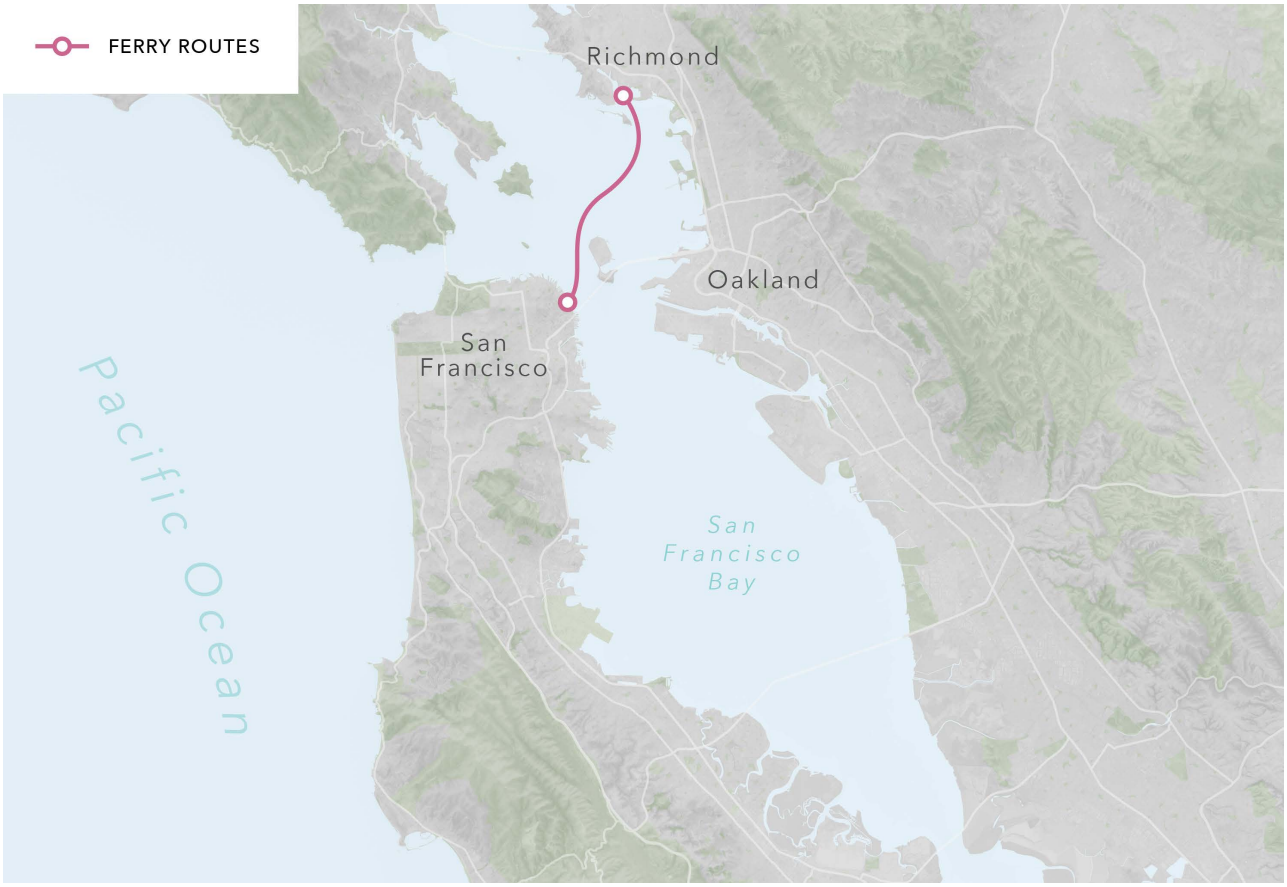
This project involves extensive community involvement to ensure that chosen designs reflect the local identities of people who live and operate businesses along the corridor.

The project scored highly in the CIP's evaluation, which took into account factors including equity, health and safety, environment, and project readiness. OakDOT is currently working on a conceptual design for the eastern portion of the corridor from Broadway to Elwood Avenue to include bike and pedestrian improvements. These improvements will be implemented through repaving of that segment, which is scheduled for completion by 2025. The planning-level cost estimate to implement the Grand Avenue Mobility Plan is $118 million.

6.8 RICHMOND FERRY FREQUENCY INCREASE

Horizon: Medium
Estimated Cost: $20 million

Figure 6-8. Richmond Ferry Frequency Increase

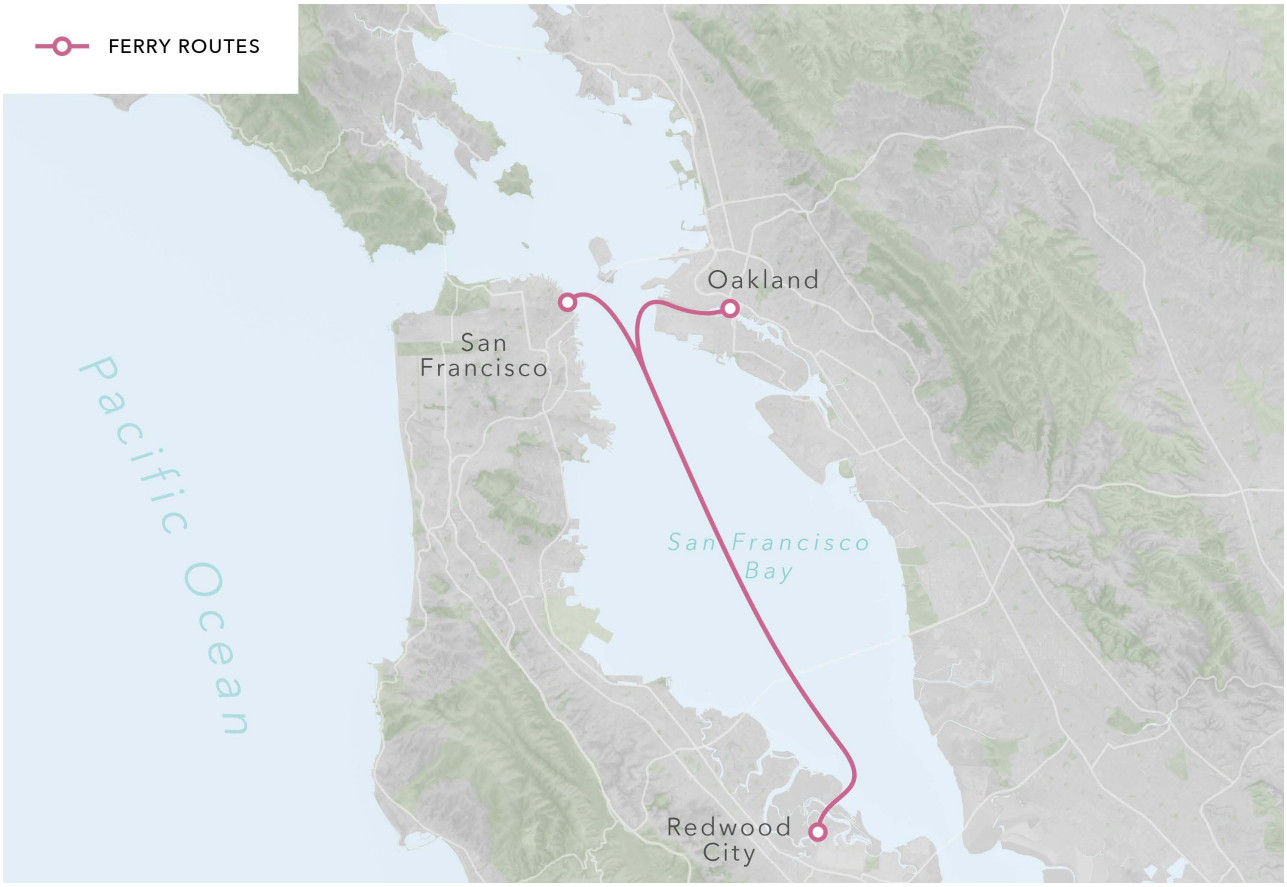


Currently, the Richmond-San Francisco ferry offers only hourly peak service that ends before 9:00 p.m. The Richmond Ferry Frequency Increase will enhance service to 30-minute peak period frequencies and 60-minute off peak frequencies and will extend service until 11:00 p.m. The project requires the acquisition of one new vessel. The first year of operation is planned for 2028. The project's capital cost is $20 million.

6.9 REDWOOD CITY-SAN FRANCISCO-OAKLAND FERRY

Horizon: Medium
Estimated Cost: $60 million

Figure 6-9. Redwood City-San Francisco-Oakland Ferry



This project will establish a new ferry service between Redwood City, San Francisco and Oakland with 30-minute peak period frequencies. It will require acquiring three new vessels. The new terminal could include public access amenities such as trails, benches, and picnic tables. The first year of operations is planned for FY28. The project's capital cost is $60 million.

6.10 BART TRANSBAY CORRIDOR CAPACITY AND STATION ACCESS SUPPORTIVE IMPROVEMENTS

Horizon: Medium

Estimated Cost: $1.2 billion

Figure 6-10. BART Transbay Corridor Capacity and Station Access Supportive Improvements

This project includes systemwide capacity enhancement and user experience improvements to encourage more transbay travel using BART. The project aims to support transbay travel and reverse commute transit-oriented job growth. The project cost is estimated to be $1.2 billion. Improvements include:

- Capacity: e.g., redundant vertical circulation, platform expansion
- Safety & security: e.g., lighting, station hardening, fire/life safety
- Access: e.g., elevators, escalators, ADA, bike facilities
- Customer experience: e.g., wayfinding, PA system, pigeon abatement
- Transit-oriented development-related improvements: e.g., parking consolidation, access improvements

Table 6-1. Proposed Projects

#	PROJECT NAME	MODE(S)	DESCRIPTION	ESTIMATED COST ($M)*	SOURCE	HORIZON
1	Bay Skyway Phase 1	Walk, bike, e-bike, micromobility, ferry	West Oakland Link, East Span path, Yerba Buena Island / Treasure Island path, and Treasure Island zero-emission ferry	$170	MTC	Short
2	Bay Skyway Phase 2	Walk, bike, e-bike, micromobility, ferry	Bay Skyway Phase 1 plus West Span path	$500	MTC	Medium
3	Treasure Island Ferry	Ferry	Establish a new ferry service from Treasure Island to San Francisco with 15-minute peak period and midday frequencies	$10	WETA	Short
4	Expanded Muni service to Treasure Island	Bus	Expand bus service between San Francisco and Treasure Island	$19	SFMTA	Short
5	AC Transit service to Treasure Island	Bus	New bus service between Downtown Oakland and Treasure Island	$8	AC Transit	Short
6	West Oakland Industrial Streets	Walk, bike, e-bike, micromobility	Upgrade streets in West Oakland to complete streets as consistent with the recommendations of the West Oakland Specific Plan and West Oakland Community Action Plan	$40	OakDOT	Medium
7	Grand Avenue Mobility Plan Implementation	Walk, bike, e-bike, micromobility, bus	Implement improvements to bus operations, walking, and biking along the Grand Avenue corridor	$118	OakDOT	Medium
8	Richmond Ferry Frequency Increase	Ferry	Enhance the existing Richmond ferry service to 30-minute peak period frequencies and 60-minute off peak frequencies	$20	WETA	Medium
9	Redwood City-San Francisco-Oakland Ferry	Ferry	Establish a new ferry service from Redwood City to San Francisco and Oakland with 30-minute peak period frequencies	$60	WETA	Medium
10	BART Transbay Corridor Capacity and Station Access Supportive Improvements	Transit	Capacity, fire life safety, safety and security, access, customer experience, and TOD-related improvements at station throughout the BART system	$1,200	BART	Medium

Short: 0 – 5 years
Medium: 5 – 10 years
*Cost in 2022 dollars

7. Public Outreach

Community outreach was an integral part of the Transbay CMCP development. This chapter provides an overview of community outreach activities conducted for this CMCP. Feedback, both through outreach event discussions and survey responses (see Section 7.3), was used to inform the project evaluation and to guide final project recommendations. Please refer to Appendix 1 for community outreach undertaken as part of the BART Transbay Corridor Hybrid Summary CMCP development.

7.1 TRANSBAY CMCP OUTREACH

Community Partners

The Corridor Development Team enlisted the expertise of three community-based organizations (CBOs) to recruit participants and facilitate community discussions on new transbay transportation modes and ways to make transbay travel more accessible (Figure 7-1).

One Treasure Island

One Treasure Island is committed to fostering and stewarding an equitable, inclusive, and thriving community for all Treasure Island residents, employees, businesses, and visitors. Lower-income households and people who have experienced homelessness are at the center of its mission. As the Island develops, the organization champions integration and access to opportunities with a particular expertise in leading focus groups around how to improve transportation and connectivity.

East Cut Community Benefit District

The East Cut is a neighborhood in downtown San Francisco with some of the densest concentration of new home construction in the Bay Area, and thousands of new jobs. The organization was formed in July 2015 by area property owners and other stakeholders to advance the neighborhood's quality of life, enhance its public realm, and reinforce the viability of its economic base.

West Oakland Environmental Indicators Project

The West Oakland Environmental Indicators Project (WOEIP) is a resident-led, community-based environmental justice organization dedicated to achieving healthy homes, healthy jobs, and healthy neighborhoods for all who live, work, learn, and play in West Oakland. Its mission is to build grassroots capacity to provide local leadership for positive change. The organization's work aids residents in understanding the political, social, and natural forces that impact their lives. It gives impacted residents the tools to participate in these processes and to drive change from the bottom.

Figure 7-1. Community-Based Organization Areas of Focus

Community Engagement Events

Community partners each co-led one event with government agencies including MTC and SFCTA. The meetings were held remotely with attendees who live on Treasure Island and in Southeast San Francisco, West Oakland, and the greater East Bay.

Community partners promoted the events through various platforms and led the outreach efforts. As many as 2,700 subscribers were notified of each event through the organizations' listservs. Additionally, events were promoted on the CBOs' Instagram, LinkedIn, Twitter, and Facebook pages. One Treasure Island distributed flyers advertising the event at its weekly food pantry. The East Cut Community Benefit District co-promoted its event with San Francisco Bicycle Coalition, WalkSF, Downtown San Francisco Partnership, Yerba Buena Community Benefit District, and IDEATE SF.

At the beginning of each event, a public agency representative presented current transportation options for travel between Oakland, Treasure Island, and San Francisco, as well as information about expected housing growth and potential new modes of transbay travel.

Following the presentations, the CBO leaders facilitated participant discussions. Attendees provided feedback on discussion questions and general details outlining their transportation habits, needs, barriers, and desires when it comes to transbay travel. The following section provides a summary of key discussion themes.

The community engagement process succeeded in connecting with three CBOs, each with the capacity and interest to engage their members in discussion about new travel

modes on the Transbay Corridor. The three events yielded intimate conversations with community members who were willing to share valuable information about their daily lives and travel habits. This information, combined with feedback from additional outreach efforts (see sections 7.2 and 7.3), informed the CMCP process.

Community Engagement Findings

Resident feedback from all three geographies centered around improving accessibility to low- and zero-emission transportation options. Participants wanted alternatives to driving to traverse the Bay between Oakland, Treasure Island, and San Francisco.

Prioritizing equity was another common theme in all three meetings. For example, Treasure Island residents wanted to ensure that any new pedestrian paths are designed to accommodate people with disabilities. At the meeting hosted by East Cut Community Benefit District, one attendee asked how government agencies would prevent displacement with the creation of new infrastructure.

Current Transbay Travel Modes

Residents reported using a private vehicle, transit (including BART and AC Transit), ride share (e.g., Lyft), and ferries to travel across the Bay. One West Oakland resident shared that they walked from West Oakland to Treasure Island once, but the route was very "noisy." While many participants would like to use alternative modes of transportation, the current transit schedules and offerings do not meet their daily needs.

Barriers to Access on the Transbay Corridor

The most common barriers to access discussed at the three community meetings were infrequent transit service and incomplete facilities for residents who wanted to travel without a personal vehicle.

Ferry service was a central discussion point at the meetings, particularly for Treasure Island residents. It is currently the only way to travel directly between Treasure Island and San Francisco without risking congestion on the Bay Bridge. Residents noted that limited ferry schedules serve as a barrier: some residents are unable to use the ferry for their commutes as service does not begin early enough. Additionally, West Oakland participants shared that they do not frequently take the ferry to San Francisco because it is difficult to access from West Oakland, (e.g., multiple buses are required to get to the Oakland ferry terminal), and BART access to San Francisco is quicker and more convenient from West Oakland.

Limited transit connectivity to grocery stores and transportation options is a barrier to livability cited by Treasure Island residents.

Participants at all three meetings cited traffic on the Bay Bridge as a barrier to travel. They pointed out that providing alternative transportation modes would improve both livability and emissions.

Transbay Corridor Transportation Improvements

Improved bus routes and service frequency for connections to ferry services and major BART connections, (e.g., West Oakland station) would make it easier for residents to get around without a car. One West Oakland resident said the ferry is difficult to access. This person only takes it for "special occasions."

Treasure Island participants shared that increased ferry frequency and operating hours would help them rely on ferries as a reasonable alternative to driving. Beginning ferry service earlier would connect commuters who commute outside of the typical 9 a.m. to 5 p.m. period. Increased ferry service would also improve bicycle connectivity; because buses can only hold two bicycles, ferries are a more reliable way to commute by bicycle.

Participants from Treasure Island also cited the need for direct bus service to the East Bay. A shuttle connecting Treasure Island residents with grocery stores, the local ferry, and transbay bus service was also suggested.

In the East Cut community meeting, there was a request to study a contraflow bus lane on the Bay Bridge (top deck in the morning / bottom deck in the evening).

West Oakland residents stressed the need for more BART trains to serve the West Oakland station, especially since trains are often full. They cited a need for increased frequency of BART to San Francisco from West Oakland, including during non-commute hours.

Participants also stated that improved priority seating for seniors and people with disabilities would improve BART. They noted that priority seating is often occupied by riders who don't meet the criteria. One West Oakland resident and co-founder of WOEIP shared that this is a deterrent and barrier to riding BART to San Francisco.

Affordability was a concern to participants, who desired discounted transit passes for residents traveling between West Oakland, Treasure Island, and downtown San Francisco. One West Oakland resident said that a "commuter pass" for those who frequently travel between the East Bay and San Francisco would increase their travel. More outreach is required to educate community members on existing regional discount programs, (e.g., Clipper START); several residents expressed interest in more affordable transit options to cross the Bay, but no one referenced Clipper START, MTC's pilot program to provide single-ride discounts for eligible riders on BART, AC Transit, San Francisco Bay Ferry, and other services.

In addition to advocating for increased transit service and infrastructure, residents from San Francisco and West Oakland expressed support for more biking and walking paths. Participants noted that separate paths for walking and biking – as there are on the East Span path – would make travel by people with disabilities safer. A different surface signifying a pedestrian path could better serve residents who are visually impaired.

Community members would benefit from increased shared bicycles and scooters to improve connectivity. Treasure Island residents also requested recumbent bicycles for rent. Increased charging infrastructure nearby to charge wheelchairs and e-bikes would facilitate intra-island travel, including to reach bus and ferry.

A common theme during discussions was that the West Span Path funding and construction needs to be expedited. Many participants, particularly those present at the East Cut meeting, expressed frustration over the long timeline and uncertainty of connecting Treasure Island and downtown San Francisco by bicycle. Converting one car lane to a bicycle lane was suggested multiple times as a faster way to complete the bicycle path.

Participants would like bus infrastructure to be well-lit and to include shelters with shade and seats. West Oakland residents elevated safety as a concern when traveling to bus stops. One resident shared that existing bus stops "don't look like bus stops" and as a result "cars speed past," making bus stops unsafe.

Increased green space would also improve daily life in West Oakland. Slow streets and active transportation infrastructure are preferred over car infrastructure. One West Oakland community member commented that they leave the neighborhood to exercise outdoors, while another commented that running down Mandela Parkway for exercise is not an option without worrying about pollution exposure.

Potential Effects of New Modes and Projects on Transbay Travel

Overall, residents were supportive and inquisitive about transbay transportation alternatives to the single-occupant motor vehicle. They provided feedback on priorities and how their travel options could be improved.

Residents, particularly in West Oakland and Treasure Island, travel to San Francisco to enjoy entertainment, dine out, and recreate. Increased connectivity would improve their opportunities to enjoy the region's cultural offerings.

Bicycle and pedestrian infrastructure on and around the Bay Bridge would increase walking and biking in the area. West Oakland residents stressed the importance of improving road conditions near the future West Oakland Link and existing Bay Bridge East Span path. Current street conditions, (e.g., potholes) don't support active transportation and deter residents from cycling and walking.

Participants mentioned that improved bicycle and pedestrian infrastructure would better connect two of the region's largest job centers, creating new opportunities to commute without contributing to pollution.

Residents want to be better informed of upcoming projects and funding allocations. Particularly in the East Cut community meeting, with fervent support to complete the West Span Path, Bay Area residents wanted clear communication of the likelihood of a proposed project coming to fruition.

The upcoming West Oakland Link and connection to the Bay Trail would potentially enhance West Oakland's economic development by increasing the number of people traveling from San Francisco to West Oakland.

7.2 ADDITIONAL OUTREACH

Several additional outreach events were also used to spread information and get feedback about transportation through the Transbay Corridor.

BATA and the West Oakland Link project team hosted a virtual public meeting in June 2022, which 44 people attended, including the project team and representatives from the City of Oakland, the Port of Oakland, Rails to Trails, and Bike East Bay. A presenter from BATA provided an overview of the corridor that today connects Oakland with San Francisco across the Bay Bridge and the challenges to the current walking and cycling route. He shared slides highlighting the West Oakland Link segment of Bay Skyway Phases 1 and 2, project benefits, a map showing the bike path segments, and project renderings. The CMCP survey (see Section 7.3) was launched at this meeting with over 30 responses gathered at that time. Participant feedback focused on the need for a safe, separated bicycle and pedestrian route connecting West Oakland with the Bay Bridge, as well as the desire for traffic calming in the area.

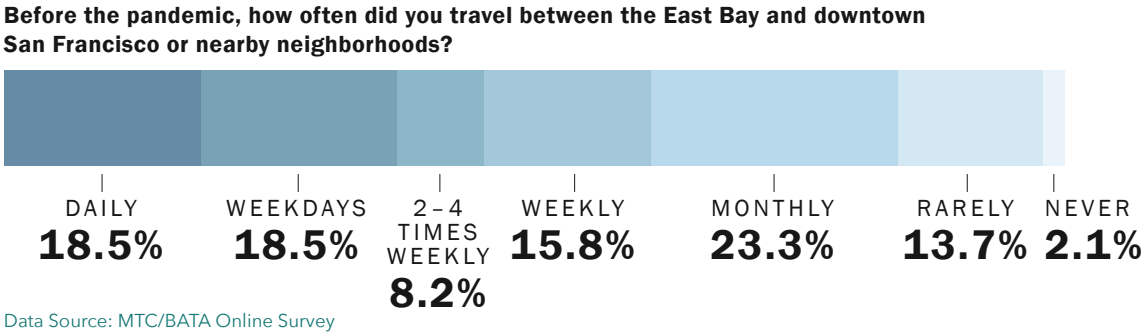
The CMCP was one of four major items addressed at the One Treasure Island monthly meeting in August 2022. Approximately 15 community members attended a presentation on new modes on the Transbay Corridor and provided their feedback. Participants asked about accessibility, particularly whether the new modes would be designed with ADA considerations. They also shared concern about safety while walking or cycling over the corridor and expressed interest in separation between cyclists and pedestrians.

7.3 NEW MODES ON THE TRANSBAY CORRIDOR SURVEY

BATA and the SFCTA launched a public survey on June 1, 2022 to solicit the public's feedback about potential new modes on the Transbay Corridor, with a focus on a combination of a new multi-use path and frequent ferry to travel between the East Bay, Treasure Island, and downtown San Francisco. The survey was publicized on MTC's Bay Skyway webpage, at the three Transbay CMCP public outreach workshops and via e-blasts from the transportation authorities and bicycle advocacy groups in San Francisco and the East Bay. MTC will continue to collect feedback using the New Mode on the Transbay Corridor Survey until the next round of community input, when the questions will be updated.

As of April 30, 2023, 147 people have responded to the survey. The respondents lived in the East Bay (49 percent), San Francisco (31 percent), and other Bay Area cities (15 percent). Most respondents were between the ages of 26 – 45 (48 percent) and 46 – 60 (30 percent). Sixty-four percent of respondents were Caucasian/White, while 14 percent were Asian / Asian American, 9 percent were African American / Black, and 6 percent were Hispanic/Latinx. Over 71 percent of respondents traveled between the East Bay and San Francisco at least once weekly prior to the COVID-19 pandemic: 19 percent made daily trips and another 19 percent traveled on weekdays only. Twenty-three percent traveled across the Transbay Corridor only on a monthly basis (Figure 7-2).

Figure 7-2. Pre-COVID Transbay Travel Frequency



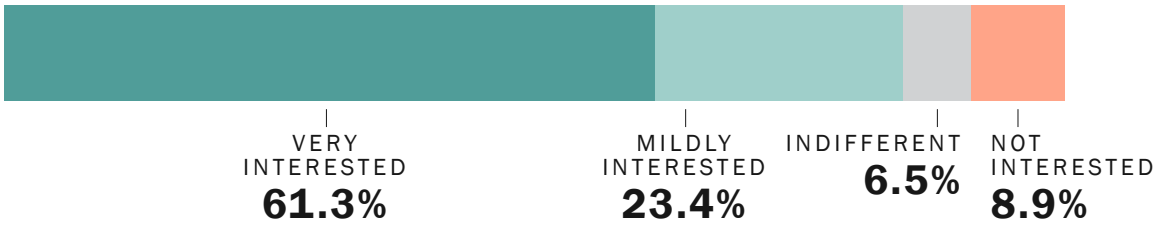
Data Source: MTC/BATA Online Survey

Respondents were asked whether they would be interested in using a multi-use path connecting the East Bay to Treasure Island, assuming frequent ferry service between Treasure Island and San Francisco. Sixty-one percent of respondents said that they would be very interested and 23 percent said that they would be mildly interested. When asked if access to an e-bike or other electric-assist micro-mobility devices would change their willingness to use the same route, 50 percent of respondents indicated that it would while 28 percent indicated that it would not change their preferences (Figure 7-3 & Figure 7-4). When asked what a new multi-use path and frequent ferry service would mean for them, responses included that a path and ferry combination

would mean easier and more affordable commutes, healthier transportation options, greener modes of travel, and an increased likelihood to travel across the Transbay Corridor for shopping, recreation, and dining.

Figure 7-3. Initial Interest in Bay Skyway Phase 1

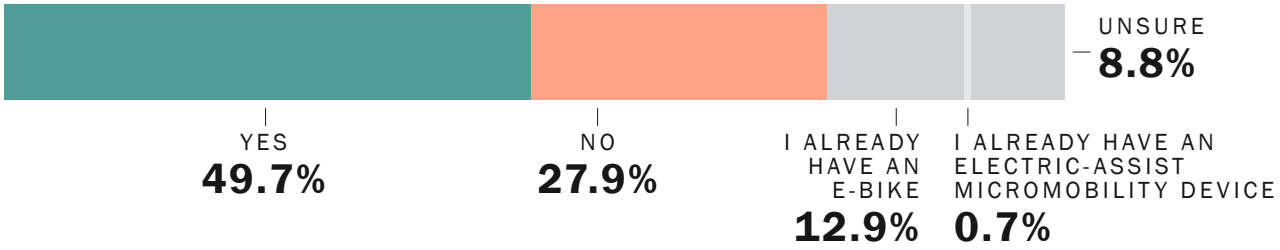
If there were a shared use path allowing you to walk, e-bike, bicycle or use a personal mobility device between the East Bay and Treasure Island ferry terminal, with frequent ferry service to downtown San Francisco, how interested would you be in using this path?



Data Source: MTC/BATA Online Survey

Figure 7-4. Potential Change in Bay Skyway Phase 1 Interest Given E-Bike Access

If you had access to an e-bike or other electric-assist micromobility devices such as an e-scooters would you be more interested in taking the trip described in the previous question?



Data Source: MTC/BATA Online Survey

8. Project Evaluation

8.1 PROJECT EVALUATION

Chapter 2 of this CMCP (Corridor Goals & Performance Measures) summarizes the goals, objectives and performance metrics that were used to evaluate the projects introduced in Chapter 6 (Proposed Projects). The plan's five goals were informed by several sources, including CTC's CMCP guidelines, CAPTI, and Plan Bay Area 2050.

Objectives were developed to provide context for how each project could meet each goal. To help measure this progress, performance metrics were then developed for each objective. Not all metrics are applicable to all projects; nor is data available to develop metrics for all projects. The final list of metrics was compared to the performance measures listed in the CMCP Guidelines. CMCP Guidelines – recommended metrics that are applicable to the proposed projects are captured in the final list used in this Plan, although the language has been modified slightly in some cases.

A qualitative evaluation based on existing quantitative studies was used to gauge how well each of the ten projects presented in Chapter 6 will help meet the Corridor Goals outlined in Chapter 2. Each project was evaluated and assigned a score of High (H), Medium (M), or Low (L) for each of the five goals and their objectives based on the project's anticipated ability to accomplish the metric. Generally, each project's score for each goal was the average of scores for the objectives under that goal. The following assumptions were made to evaluate disparate projects as consistently as possible:

- In the absence of prior studies, projects were assumed to reduce VMT and increase person throughput if they provide infrastructure or transit service that supports taking transit, walking or cycling.
- In the absence of prior studies, projects that span the entire Transbay Corridor, provide new connections, or increase service frequency were assumed to significantly reduce vehicle demand or alleviate bottlenecks such that traffic will flow more smoothly, leading to lower likelihood of collisions and increases in safety.
- In the absence of prior studies, transit and active transportation projects were assumed to reduce criteria pollutants and greenhouse gas emissions; however, street-level projects that encourage active transportation were assumed to also increase active transportation users' exposure to these pollutants.

Table 8-1 displays the results of the evaluation exercise, and Appendix B contains the rationale for these scores. The remainder of this section presents, for each project, the goals and objectives that it is anticipated to accomplish especially well, as well as the projects that community engagement meeting participants supported.

Table 8-1. Evaluation Results

			GOAL 1: CONNECTED & MULTIMODAL					GOAL 2: SAFE & WELL			GOAL 3: EQUITABLE			GOAL 4: AFFORDABLE & VIBRANT				GOAL 5: SUSTAINABLE			
#	PROJECT NAME	ESTIMATED COST ($M)*	Increase number of multimodal options in the corridor	Reduce multimodal gaps in the corridor	Improve travel times and travel time reliability for current and future users of the corridor	Support system and land use efficiency	Goal 1 Total	Reduce collisions	Increase positive public health outcomes through active transportation	Goal 2 Total	Increase transportation options for Equity Priority Communities	Increase transportation benefits for people with disabilities	Goal 3 Total	Increase access to jobs	Reduce transportation costs	Create jobs	Goal 4 Total	Provide alternatives to driving alone	Decrease VMT	Decrease exposure to criteria pollutants and GHG emissions	Goal 5 Total
1	Bay Skyway Phase 1	$170	M	M	M	L	**M**	M	M	**M**	M	M	**M**	M	H	M	**M**	M	M	M	**M**
2	Bay Skyway Phase 2	$500	H	H	H	M	**H**	H	H	**H**	H	M	**H**	H	H	M	**H**	H	M	H	**H**
3	Treasure Island Ferry	$10	M	M	M	L	**M**	M	L	**M**	M	M	**M**	M	M	L	**M**	M	M	M	**M**
4	Expanded Muni service to Treasure Island	$19	L	M	M	M	**M**	M	L	**M**	M	M	**M**	M	M	M	**M**	M	M	M	**M**
5	AC Transit service to Treasure Island	$8	M	M	M	M	**M**	M	L	**M**	M	M	**M**	M	M	M	**M**	M	M	M	**M**
6	West Oakland Industrial Streets	$40	L	M	L	L	**L**	M	M	**M**	M	L	**M**	L	L	L	**L**	L	L	L	**L**
7	Grand Avenue Mobility Plan Implementation	$118	L	M	L	L	**L**	M	M	**M**	M	M	**M**	L	L	L	**L**	L	L	L	**L**
8	Richmond Ferry Frequency Increase	$20	L	M	M	M	**M**	H	L	**M**	M	M	**M**	M	M	L	**M**	M	M	M	**M**
9	Redwood City-San Francisco-Oakland Ferry	$60	M	H	H	M	**H**	H	L	**M**	M	M	**M**	H	M	M	**M**	M	M	M	**M**
10	BART Transbay Corridor Capacity and Station Access Supportive Improvements	$1,200	L	L	L	M	**L**	M	L	**M**	M	H	**H**	L	L	L	**L**	M	M	M	**M**

*Cost in 2022 dollars

Bay Skyway Phase 1

This project scored Medium for all goals and most performance metrics as it creates a new connection across the corridor but does not allow for a direct, one-mode trip. The project scored particularly well on the Reduce Transportation Costs objective under Goal 4 (Affordable and Vibrant). It scored High for this objective since the project will create a low-cost way for people to travel between the East Bay and San Francisco, particularly given subsidies for low-income Treasure Island residents as part of the TIMMA affordability program. Although not directly affecting the evaluation scoring, this project serves as a linchpin required to connect the Bay Skyway Phase 2 to Treasure Island, the East Span path, and Oakland. Community meeting participants were excited about the prospect of being able to walk, bike, e-bike and take an electric ferry across the Bay both for the convenience and affordability of these modes.

Bay Skyway Phase 2

This project scored High for all goals and for most performance metrics as it will create a new active transportation connection between San Francisco and the East Bay. The project scored High for all objectives under the Safe & Well goal. It will reduce collisions through a reduction in VMT as travelers shift to active modes via the separated West Span path. Additionally, this shift towards more active transportation use will result in positive public health outcomes as people use healthier modes of transportation to travel across the corridor. Meeting participants were especially enthusiastic about this project for the reasons stated in support of Bay Skyway Phase 1 and for the additional opportunity to travel shore-to-shore under their own power.

Treasure Island Ferry

This project scored Medium for all goals and for most performance metrics: while a new ferry connection will contribute to achieving the Plan goals, this connection will only span part of the corridor. The project scored particularly well on the Equitable and Sustainable goals. It scored Medium for both Equitable objectives as the project will provide additional options for Equity Priority Community residents and people with disabilities to travel between San Francisco and Treasure Island. It also scored Medium on all three Sustainable objectives: the project will reduce the need for single-occupancy vehicles for travel between San Francisco and Treasure Island, decreasing VMT and vehicle emissions. This project was attractive particularly to meeting participants who live on Treasure Island due to its convenience, affordability, and positive environmental impacts.

Expanded Muni Service to Treasure Island

This project scored Medium for all goals and Medium for most performance metrics as it will improve travel for part of the corridor by expanding an existing service. The project scored Medium for all objectives under the Equitable, Affordable & Vibrant, and Sustainable goals. It scored Medium for both Equitable objectives as the project will provide additional options for Equity Priority Community residents and people

with disabilities to travel between San Francisco and Treasure Island. It scored well for Affordable & Vibrant objectives as the project will increase the number of Treasure Island households with non-driving access to job in San Francisco; provide more low-cost transportation options; and create new transit jobs. Its contributions towards the Sustainable goal will be to reduce the need for single-occupancy vehicles for travel between San Francisco and the East Bay, which will in turn reduce VMT and transportation emissions. Treasure Island meeting participants welcomed expanded Muni service as another way to feel better-connected to mainland San Francisco.

AC Transit Service to Treasure Island

This project scored Medium for all goals and Medium for most performance metrics. New service will work towards achieving Plan goals by focusing on travel through the eastern part of the corridor. It will increase connectivity between Treasure Island and the East Bay by providing a car-free alternative; reduce collision exposure by reducing VMT while also encouraging some positive health outcomes through last-mile active transportation; increase low-cost transportation options for Equity Priority Community residents and people with disabilities; create transit operator jobs; and reduce the environmental impacts of transportation by encouraging more mass transit. Meeting participants who live in the East Bay and work on Treasure Island strongly supported this new bus service, including its affordability with new subsidies.

West Oakland Industrial Streets

On its own, this project scored Medium or Low for most goals and performance metrics; however, when combined with Bay Skyway Phase 1, whose eastern touchdown is amidst these West Oakland Streets, its true value will be much higher. The project scored particularly well for the Safe & Well and Equity objectives. It will reduce collisions and encourage healthy transportation habits through the provision of improved cycling and walking infrastructure. It will also increase transportation options for residents of West Oakland's Equity Priority Communities. West Oakland meeting participants stressed the importance of projects like this to improve road conditions near the West Oakland Link (i.e., easternmost) segment of the Bay Skyway Phase 1.

Grand Avenue Mobility Plan Implementation

This project's rating was almost identical to that of the West Oakland Industrial Streets project. Its value, too, increases greatly in conjunction with Bay Skyway Phase 1 and Phase 2. Similar to the previous project, this project scored well on Safe & Well and Equitable objectives. Improved active transportation infrastructure will increase safety for active transportation users while encouraging a shift towards more active transportation modes. The project will benefit West Oakland's Equity Priority Community residents while also particularly providing improved transportation options for people with disabilities by improving transit operations. West Oakland meeting participants were familiar with this project and were happy to hear that it is being coordinated with the design of Bay Skyway Phase 1.

Richmond Ferry Frequency Increase

This project scored Medium for all goals and most performance metrics as it will increase the effectiveness and attractiveness of an existing transbay service. It scored particularly well on several objectives, earning a High for Support System and Land Use Efficiency (Goal 1) and Reduce Collisions (Goal 2). The project will support system and land use efficiency by providing a high benefit – in terms of system improvement and person throughput – compared to its cost. It will also reduce collisions by encouraging a shift from single-occupancy vehicles to a transportation mode that does not use the roadway and therefore decreases exposure to collisions. Community meeting participants did not weigh in on the Richmond Ferry project as these meetings took place in Oakland, downtown San Francisco, and Treasure Island.

Redwood City-San Francisco-Oakland Ferry

This project scored High for the Connected & Multimodal goal and Medium for the remaining four goals, as well as for most performance measures, as it provides a new transportation service for people traveling across the corridor. The project earned a High for the Connected & Multimodal goal owing to its provision of a new, non-vehicular transportation service. Whereas South Bay residents currently must drive to the East Bay, the project will close this gap in ferry availability, increase multimodal transportation options, and improve travel time reliability as travelers will be able to avoid Bay Bridge congestion. As was the case with the Richmond Ferry project, community meeting participants will be less likely to use this service and so did not comment on it.

BART Transbay Corridor Capacity and Station Access Supportive Improvements

This project scored High for the Equitable goal and Medium for most other performance measures as it will make systemwide improvements but not expand or provide new transportation service. The project scored well for the Equitable goal as its systemwide ADA access improvements will make BART a more feasible and comfortable option for people with disabilities. Other improvements, including those to both station capacity and user experience, will make transit a more viable option for residents of BART-adjacent Equity Priority Communities on both sides of the Bay. Meeting participants were pleased to hear about improvements to accessing BART stations on both sides of the Bay, particularly in the East Bay.

8.2 PERFORMANCE IMPACTS

The following sub-sections provide a high-level overview of the impacts of the ten potential projects considered in this CMCP. These are grouped to discuss the impacts as they relate to each of the five Plan goals. See Appendix A for a discussion of multimodal impacts from the BART Transbay Corridor Hybrid Summary CMCP (BACCTS and Crossings investment packages).

Goal 1: Connected & Multimodal

The four short-term projects considered in this plan will increase access to multimodal choices, improve connections between modes, and reduce traffic congestion on the Bay Bridge. These projects will serve people who do not have access to a private vehicle as well as allow those with the option to drive to choose a cleaner, healthier alternative. The Treasure Island Ferry will increase access temporally, as the ferry will run earlier, later, and more frequently than the current, temporary service, to provide greater access to San Francisco for Treasure Island residents. The exclusive bus lane from Treasure Island to the westbound Bay Bridge will allow existing and new Muni service to be more reliable, further increasing access from Treasure Island to San Francisco and reducing delay. A shift in modes for travel between San Francisco and the East Bay will reduce the number of vehicles on the Bay Bridge and will therefore reduce congestion.

The six medium-term projects will further increase connectivity within the Transbay Corridor. Phase 2 of the Bay Skyway will provide round-the-clock active transportation access between San Francisco and the East Bay. Improvements to multimodal facilities in Oakland will make travel safer and more appealing for users traveling between Downtown Oakland, West Oakland, Treasure Island and downtown San Francisco. The Redwood City-San Francisco-Oakland ferry service will increase accessibility and travel time reliability for Redwood City and other South Bay residents. Meanwhile, the Richmond ferry increase will make it easier and more convenient for people traveling to San Francisco from west Contra Costa County. The BART Transbay Corridor Capacity and Station Access Supportive Improvements project could result in more people taking transit across the Bay instead of driving. All of these improvements will continue to reduce the number of single-occupancy vehicles on the road and will as a result ease congestion along the Bay Bridge.

Induced Demand

Induced demand is suppressed potential demand for using an existing system. When capacity is added to a system, that potential demand materializes as actual need.

Short-term decision-based induced demand generally stems from changes in transportation supply, in that travelers may choose to change their travel destinations, amount of travel, mode of travel, travel route, or time of travel based on accessibility changes from the project. For example, adding buses or ferries to existing routes adds transit capacity (“supply”). Transit users and/or road users of other corridors may alter their mode or route to take advantage of the new capacity. The increase of transit capacity improves accessibility, making that travel choice a more attractive option compared to a “no build” condition. Increasing supply of a mode generally results in increased usage of that mode. As none of the projects involves an increase in road capacity, the projects will not lead to more use of the roadway.

Medium-term decision-based induced demand is generally captured from changes in household/job locations. Households may "choose" or change their auto ownership decisions and work locations based on accessibility changes from increases in supply. Therefore, some medium-term decision-based induced demand is captured, in that more residents may prefer to change their job locations if that improves their travel outcomes. Other medium-term effects are related to changes in household/job locations resulting from the project (e.g., a new ferry station may spur more housing construction in station areas).

Goal 2: Safe & Well

In the short-term, users will see safety increases resulting from the Bay Skyway Phase 1 (including the Treasure Island ferry link) and expanded Muni and AC Transit service. These projects will reduce collisions by separating people biking and walking from traffic on routes some currently use, and by shifting transbay trips to public transit from single-occupancy vehicles, thereby reducing the number of vehicles on the Bay Bridge and their exposure to collisions. Public health outcomes will also improve as more trips are replaced by active transportation and transit, including some first/last mile active transportation.

Medium-term projects – including Bay Skyway Phase 2, West Oakland Industrial Streets, Grand Avenue Mobility Plan Implementation, ferry increases / new service, and the BART Transbay Corridor Capacity and Station Access Supportive Improvements project – will result in even better safety and health outcomes due to a greater mode shift away from single-occupancy vehicles in favor of bus, rail, ferry, and active transportation.

Goal 3: Equitable

All ten projects considered in this plan will improve transbay travel options for disadvantaged communities on Treasure Island and in Oakland and San Francisco (see Section 3.3). New AC Transit service between Treasure Island and Oakland, as well as expanded bus and ferry service between Treasure Island and San Francisco, will provide new options for all Treasure Island residents, particularly those who do not own a car. The Bay Skyway Phase 1 will allow residents of Oakland and San Francisco disadvantaged communities to cross the Bay without owning a personal vehicle, although it does not provide a continuous active transportation route. Enhanced and expanded bus and ferry service will particularly improve accessibility for people with disabilities.

Medium-term projects studied in this plan will provide even more transbay travel options for residents of disadvantaged communities in Oakland and downtown San Francisco and on Treasure Island, as well as those with disabilities. In particular, the Bay Skyway Phase 2 will allow residents of disadvantaged communities (and others) to cross the Bay without having access to a personal vehicle or relying on / paying for public transit. The new Redwood City-San Francisco-Oakland ferry will provide a new transportation mode for people without personal vehicles and/or with disabilities living in the vicinity of Redwood City.

Goal 4: Affordable & Vibrant

All ten projects considered in this plan will enhance the region's economic development by increasing transportation affordability, improving access to jobs, goods and services, and creating new jobs. In the short-term, greater access to buses, ferries and active modes will provide less costly transportation options compared to single-occupancy vehicles, which require paying for gas and upkeep, bridge tolls, and parking fees. This is especially true when combined with discount fare programs such as Clipper START and subsidized transit passes for residents of Treasure Island affordable housing. Transportation improvements will increase access between job centers and households in San Francisco and the East Bay, including joining the tens of thousands of residents forecast to live on Treasure and Yerba Buena Islands with downtown San Francisco and the East Bay. Short-term projects, particularly the Bay Skyway and Treasure Island Ferry, will create a limited number of shorter-duration jobs while the projects are being constructed. The ferry and bus projects will also result in new ongoing jobs as these new services are implemented.

Medium-term projects will expand low-cost transbay travel options with better BART access, new and expanded ferry service and a continuous active transportation route, which will provide free passage between San Francisco and the East Bay. These projects will further connect Bay Area residents to job centers. The Redwood City ferry will provide a new connection for South Bay residents, while the Richmond ferry expansion will increase access from western Contra Costa County. The BART improvements will also increase the number of households within reach of major employment centers via transit by making transit a more appealing option for current BART station-area residents. The medium-term active transportation and roadway projects will create construction jobs, while the transit projects will result in service jobs.

Goal 5: Sustainable

The short-term projects will reduce greenhouse gas emissions and VMT through a mode shift towards active transportation and transit. Implementation of an electric ferry will yield further air quality benefits. Given that short-term projects do not provide one-trip connections across the Bay, moderate benefits are expected.

The medium-term projects considered in this plan will encourage further mode shift towards public transit and active transportation modes. Higher degrees of connectivity are expected to lead to greater shifts away from single-occupancy vehicles. However, an uptick in active transportation users, particularly in West Oakland, could lead to an increase in exposure to ambient air pollution.

Other Impacts: Resilience & Climate Change Adaptation

Resilient transportation networks provide multiple options, enabling the use of alternative routes and modes when necessary. The projects evaluated in this plan will increase the Transbay Corridor's resiliency by offering multiple avenues and modes for

crossing the Bay: via the Bay Bridge by bike, on foot, or by bus; through the Transbay Tube; or by water. These multimodal ways to cross the Bay will provide options for people faced with unexpected setbacks. Additionally, the projects will help reduce the transportation system's contributions to climate change by decreasing VMT through shared and active transportation options.

9. Recommended Projects

9.1 RECOMMENDED PROJECTS

Given the breadth and high usage of the Transbay Corridor, several projects spanning various timeframes and modes will be needed to improve transportation options and achieve the CMCP goals. Community engagement findings support a need and desire for alternative travel modes to single-occupancy vehicles. Recommended projects will need to have the potential to synergize with and build on each other, improving multimodal transportation options for the entire corridor.

The following short-term projects are recommended for implementation. These projects will improve transbay travel by expanding existing modes and introducing new modes, offering improved travel options to and from Treasure Island and a new, multi-modal option for traversing the Bay.

- Bay Skyway Phase 1
- Treasure Island Ferry
- Expanded Muni service to Treasure Island
- AC Transit service to Treasure Island

The following medium-term projects are also recommended because they will provide safe, continuous active transportation access between Oakland and San Francisco while also reducing the number of single-occupancy transbay vehicle trips more regionally through ferry and BART improvements.

- Bay Skyway Phase 2
- West Oakland Industrial Streets
- Grand Avenue Mobility Plan Implementation
- Richmond Ferry frequency increase
- Redwood City-San Francisco-Oakland Ferry
- BART Transbay Corridor Capacity and Station Access Supportive Improvements

See Appendix A for recommended projects from the BART Transbay Corridor Hybrid Summary CMCP, which include long-term projects.

9.2 FUNDING

This section includes a comprehensive summary of state and federal funding sources that can be used by Caltrans and Transbay Corridor partners and stakeholders to

implement the recommended projects. There are also regional and local fund sources available to support the recommendations.

Federal Funding Sources

Federal transportation funding is administered by the US Department of Transportation and authorized by Federal transportation bills. The most recent transportation funding bill, the Infrastructure Investment and Jobs Act / Bipartisan Infrastructure Law (IIJA/BIL), was signed into law in 2021. Through the IIJA/BIL, the USDOT provides competitive discretionary funding programs for transportation projects as well as formula funding programs. Notable discretionary grant programs include Rebuilding American Infrastructure with Sustainability and Equity (RAISE), which emphasizes capital investments in surface transportation that will have a significant local or regional impact.

Much of the funding available through the US DOT's Highway Trust Fund is allocated to California via formula, based on the state's population. The State of California, in turn, distributes those funds to local agencies by formula or through competitive grant programs. For instance, the majority of the federally funded Surface Transportation Program funding in California is programmed through the Statewide Transportation Improvement Program (STIP) and a portion is directed to regional agencies like MTC which, for the Bay Area, distributes funding to projects through the One Bay Area Grant (OBAG) program.

The Federal Transit Administration (FTA) provides grants to local public transit systems, including buses, subways, light rail, commuter rail, trolleys, and ferries. Since 1964, FTA has partnered with state and local governments to create and enhance public transportation systems. FTA provides annual formula grants to transit agencies nationwide as well as discretionary funding in competitive processes.

Table 9-1 lists the USDOT programs that may be utilized for the recommended projects.

Table 9-1. Federal Funding Sources

NAME	FUNDING TYPE	DESCRIPTION
Congestion Mitigation Air Quality (CMAQ)	Formula	Federally designated air quality containment areas receive funding by formula to program local and regional projects.
Federal Transit Administration Electric or Low-Emitting Ferry Program	Discretionary	On July 8, 2022, FTA announced approximately $294.5 million available for Fiscal Year 2022 funding to improve and expand ferry service in communities across the country to help people connect to jobs and opportunity.
Federal Transit Administration Section 5307	Formula	The Passenger Ferry Grant Program makes funding available competitively to assist in the financing of capital projects to support passenger ferry systems in urbanized areas, such as ferry vessels, terminals, and related infrastructure.
Federal Transit Administration Section 5337	Formula	The State of Good Repair Program is dedicated to repairing and upgrading the nation's rail transit systems along with high-intensity motor bus systems that use high-occupancy vehicle lanes, including bus rapid transit.
Federal Transit Administration Section 5339	Formula	The Bus and Bus Facilities Program provides federal resources to states and direct recipients to replace, rehabilitate, and purchase buses and related equipment. This program also allows for the construction of bus-related facilities, including technological changes or innovations to modify low or no-emission vehicles or facilities.
Low or No Emission and Grants for Buses and Bus Facilities Competitive Program	Discretionary	The Low-No Program provides funding to state and local governmental authorities for the purchase or lease of zero-emission and low-emission transit buses, including acquisition, construction, and leasing of required supporting facilities.
Rebuilding American Infrastructure with Sustainability and Equity (RAISE)	Discretionary	The program helps urban and rural communities move forward on projects that modernize roads, bridges, transit, rail, ports, and intermodal transportation and make our transportation systems safer, more accessible, more affordable, and more sustainable.
Reconnecting Communities Pilot Program	Discretionary	The program supports planning grants and capital construction grants, as well as technical assistance, to restore community connectivity through the removal, retrofit, mitigation, or replacement of eligible transportation infrastructure facilities.
Safe Streets and Roads for All	Discretionary	The Safe Streets and Roads for All (SS4A) discretionary program was established in 2022 with $5 billion in appropriated funds over the next 5 years. The SS4A program funds regional, local, and Tribal initiatives through grants to prevent roadway deaths and serious injuries. Grants are for action plan development and implementation.
Surface Transportation Block Grant Program (STBG)	Formula	STBG provides funding that states and local governments may use for projects on any Federal-aid highway, including the National Highway System; bridge projects on any public road; transit capital projects; and public bus terminals and facilities.

In addition to these federal funding sources, the IIJA/BIL continues the Transportation Infrastructure Finance and Innovation Act (TIFIA) Program, which provides federal credit assistance to eligible surface transportation projects, including public transit.

The IIJA/BIL continues the authority of the TIFIA Program to provide to states, localities, and other public authorities, as well as private entities undertaking projects sponsored by public authorities, three distinct types of financial assistance:

- Direct federal loans with flexible repayment terms for construction and permanent financing of capital costs.
- Loan guarantees for institutional investors, such as pension funds, which make loans for projects.
- Lines of credit to supplement project revenues, if needed, during the first 10 years of project operations.

State Funding Sources

The CTC administers several grant programs that could fund one or more of the projects recommended in this CMCP.

The Active Transportation Program (ATP) consolidates most federal and State funding sources for bicycle and pedestrian projects into a single program.

With the passage of SB1, the Road Repair and Accountability Act of 2017, the State of California allocates additional transportation funding for local and regional projects. SB1 augmented existing sources of funding, such as the Active Transportation Program and SHOPP. It also created competitive funding programs, such as the SCCP which provides funding to achieve a balanced set of transportation, environmental, and community access improvements to reduce congestion throughout the State, and the Local Partnership Program, which provides incentive funding to match local voter-approved transportation measures. Table 9-2 highlights the State funding sources that are most relevant to the Transbay CMCP projects.

Table 9-2. State Funding Sources

NAME	FUNDING TYPE	DESCRIPTION
Active Transportation Program (ATP)	Discretionary	Program encourages increased use of active modes of transportation, such as walking and biking. For 60 percent of funding, projects are selected by the California Transportation Commission through a statewide program and small/rural region program. For 40 percent of funding, Metropolitan Planning Organizations select projects for their formula share of funding based on population.
Local Highway Safety Improvement Program (HSIP)	Discretionary	Funding program administered by Caltrans for work on any public road that improves user safety. Focused on infrastructure projects with nationally recognized crash reduction factors. Projects must be identified on the basis of crash experience, crash potential, crash rate, or other data-supported means.
Local Partnership Program (LPP)	60 percent Discretionary 40 percent Formula	Eligible funding for "self-help" jurisdictions. Most transportation improvements are eligible.
Local Streets and Roads	Formula	Cities and counties receive funds for road maintenance, safety projects, railroad grade separations, complete streets, and traffic control devices.
Solutions for Congested Corridors (SCCP)	Discretionary	Regional transportation authorities and Caltrans may nominate projects for funding to achieve a balanced set of transportation, environmental, and community access improvements to reduce congestion.
State Transportation Improvement Program (STIP)	Formula	Projects are proposed by county and regional transportation agencies and approved by the CTC on a bi-annual basis.
Trade Corridor Enhancement (TCEP)	Discretionary	Caltrans and regional entities can be project sponsors. Funding is available for infrastructure improvements that improve goods movement in the Bay Area, Central Coast, Central Valley, LA / Inland Empire, and San Diego / Border.
Transit and Intercity Rail Capital Program (TIRCP)	Discretionary	Discretionary program administered by Caltrans and the California State Transportation Agency (CalSTA). Funds transformative capital improvements that will modernize California's intercity, commuter, and urban rail systems, and bus and ferry transit systems, to significantly reduce emissions of greenhouse gases, vehicle miles traveled, and congestion.

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APPENDIX A

BART Transbay Corridor Hybrid Summary CMCP

Transbay Corridor Hybrid Summary Comprehensive Multimodal Corridor Plan

San Francisco Bay Area
Rapid Transit District

In Accordance with the California Transportation Commission Solutions for Congested Corridors Program Guidelines

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1 Executive Summary

The Bay Area region of California is one of the largest regions in the state, and transit ridership to San Francisco's busy and dense downtown employment centers has grown rapidly over the past several years. This has led to a significant increase in transit demand within the Transbay Corridor, which is composed of two major pieces of infrastructure; the San Francisco-Oakland Bay Bridge, and BART's Transbay Tube. The corridor is served by several multimodal routes across the San Francisco Bay including heavy rail transit, bus, and ferry service.

This Hybrid Comprehensive Multimodal Corridor Plan (Corridor Plan) brings together two plans produced by the Metropolitan Transportation Commission (MTC), the Bay Area Core Capacity Transit Study (BACCTS) and Horizon Crossings Perspective Paper (Crossings), to supplement the San Francisco Bay Area Rapid Transit District's (BART) California SB-1 Solutions for Congested Corridors Program Cycle 2 application for the Train Control Modernization Program (TCMP). BART is submitting the application in partnership with the MTC and the California Department of Transportation (Caltrans).

This plan begins with an overview of the Transbay Corridor's capacity needs as well as current and future demand. The system's demand has already exceeded capacity and will continue unless significant investments in transportation throughout the corridor are made. The Train Control Modernization Program, the lynchpin of BART's Transbay Corridor Core Capacity Program, has been identified by BART as a method to increase capacity through the Transbay Corridor and the BART system as a whole. Both the BACCTS, which focuses on short- and medium-term investments, and Crossings paper, which focuses on long-term investments and needs, highlight the necessity of the TCMP as a cost-effective investment to increase transit capacity through the Transbay Corridor. With increased transit capacity, this highly traveled corridor will see reduced congestion by providing more transportation choices for travelers to the area while preserving the character of the local community and creating opportunities for neighborhood enhancement projects.

The two plans are similar in their guiding principles, using a comprehensive approach to addressing congestion and quality-of-life issues within the Transbay Corridor through investment in transportation and transit. The planning horizons of the two studies differ, and while the BACCTS includes analyses for the short-, medium-, and long-term, the Crossings paper expands the traditional long-term evaluation period and considers a wider range of factors than the BACCTS. Both studies place a large focus on different modes, considering the Transbay Corridor is serviced by several different transit operators in addition to heavy traffic from personal and commercial vehicles. The development of both studies involved extensive collaboration with state, regional, and local partners. While neither study went in depth for how the investments should be funded, both made recommendations on funding prioritizations and timelines for

implementation in order to adequately meet Transbay Corridor demand now and in the future.

This plan summarizes the multimodal impacts of each of the investment packages and crossing concepts on congestion, accessibility, and efficient land use. For the short- and medium-term, the focus of the BACCTS is on increasing transit capacity and reliability by implementing the TCMP and adding new rail cars to the BART system, while also expanding bus and ferry routes. In the long-term, the focus is on increasing transit capacity and ridership through a new BART Transbay crossing. Both studies anticipate large impacts on demand, and the ability to meet future demand if the right capacity investments are taken. The induced demand analyses of the studies are also summarized in addition to consideration of relevant performance metrics.

A summary of federal, state, and local planning activities that connect to the BACCTS and Crossings paper is discussed. The consistency of the Hybrid Plan with the goals and objectives of the Regional Transportation Plan (Plan Bay Area 2040) along with the inclusion of the TCMP in that and other planning activities is further evidence for the TCMP's need. Finally, the outcomes and recommended investments of both studies is discussed.

2 Introduction

Transit demand within the Transbay Corridor is at an all-time high and will continue to grow as the region responds to a strong and continually growing economy, worsening roadway congestion, and a preference for living in transit-oriented areas. However, as the region continues to develop and ridership continue to grow, the Transbay Corridor has become overburdened because infrastructure has not kept pace with increased demand. The Transbay Corridor is multimodal in nature and is composed of two major pieces of infrastructure; the San Francisco-Oakland Bay Bridge and BART's Transbay Tube. The corridor is served by a variety of transportation options using that infrastructure, including conventional automobiles traveling on the Bay Bridge, the BART Transbay Tube, AC Transit and WestCat buses, suburban buses, and WETA ferries. Without capacity-increasing investment, the Transbay Corridor will continue to face the same issues in the future.

This Hybrid Comprehensive Multimodal Corridor Plan brings together two studies that worked to address these Transbay Corridor deficiencies in the short-, medium-, and long-term. The Bay Area Core Capacity Transit Study (BACCTS), published in 2017, was a multi-agency effort led by the Metropolitan Transportation Commission, meant to identify the primarily short- and medium-term transit improvements necessary in order to meet Transbay Corridor demand. Crossings: Transformative Investments for an Uncertain Future (referred to as Crossings), was one in a series of Perspective Papers developed as a part of the Horizon initiative led by the Metropolitan Transportation Commission (MTC) and the Association of Bay Area Governments (ABAG).

As a part of the Solutions for Congested Corridors Program guidelines for funding, San Francisco Bay Area Rapid Transit District (BART) presents this Hybrid Comprehensive Multimodal Corridor Plan, developed in accordance with Cycle 2 guidelines, to supplement the grant application and demonstrate the necessity of the Train Control Modernization Program as it relates to these existing plans and the future of the Transbay Corridor as a whole.

This Hybrid Corridor Plan was developed with significant support and guidance from both MTC and the California Department of Transportation (Caltrans).

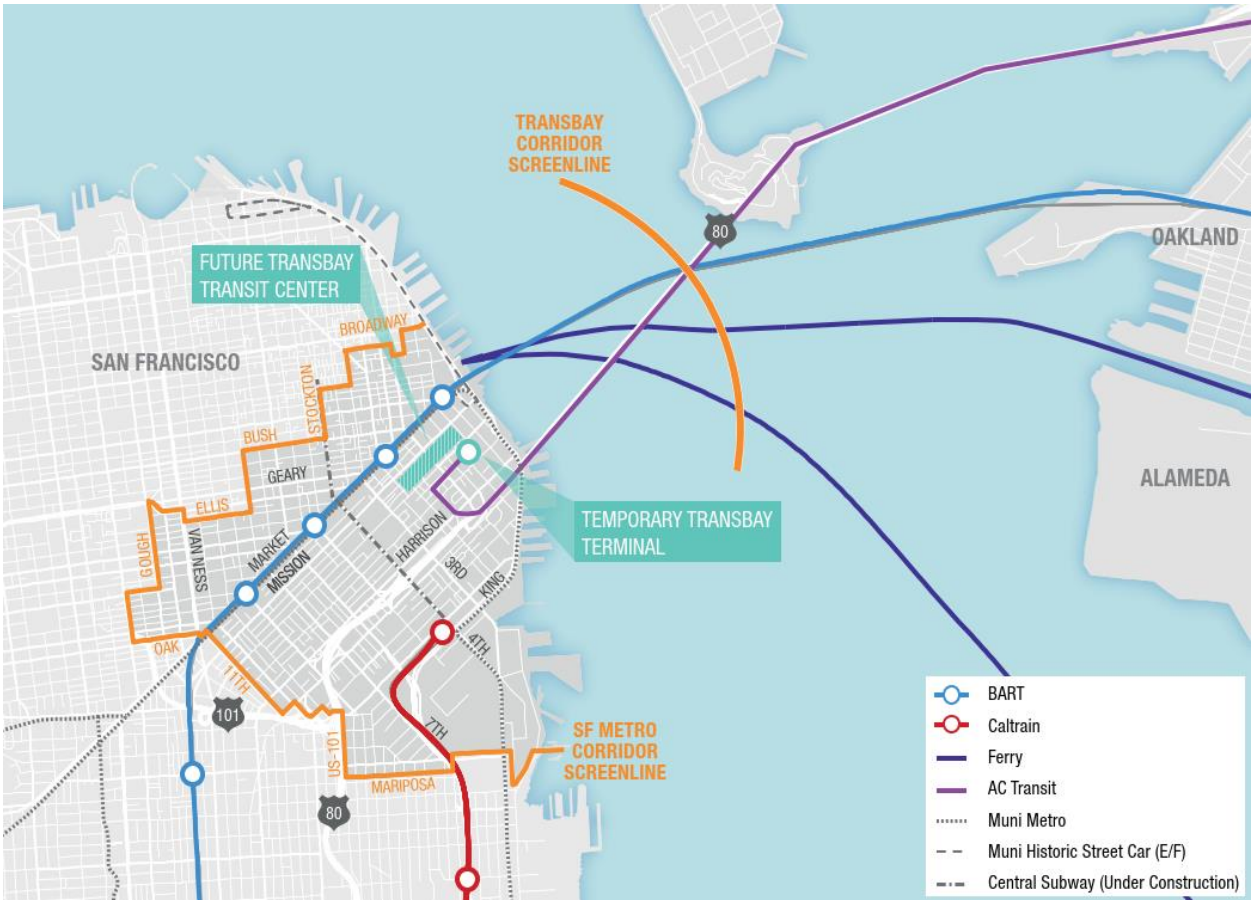
The following subsections give an overview of the Transbay Corridor and associated capacity and demand, future growth for the region, and an overview of the Train Control Modernization Program.

2.1 System Overview

The San Francisco Core (or simply, the Core, per the BACCTS) is the largest concentrated transit market west of Chicago. The Core represents an area larger than the traditional downtown or Financial District of San Francisco. The Core covers an area approximately bounded by 17th Street to the south, Gough and 11th Streets to the west, the San Francisco Bay to the east, and California Street and Pacific Avenue to the

north. This area expands the traditional central business district definition to include emerging job centers and defines subareas including the Financial District, South of Market (SoMa), Mid-Market, and Mission Bay. Travel to the Core is through two travel corridors; the Transbay Corridor and the San Francisco Metro Corridor. Each corridor is served by different transit operators and faces different service and infrastructure challenges. The Train Control Modernization Program (TCMP) project will directly affect the capacity potential in the Transbay Corridor and will be discussed in detail throughout the subsequent sections. Figure 2-1 depicts the screenlines for the Transbay and SF Metro Corridors, along with the transit agencies that support each corridor. As of August 2019, the Transbay Transit Center, now known as the Salesforce Transit Center, was completed and the Temporary Transbay Terminal was closed for use.

Figure 2-1: Transbay Corridor Screenlines



Source: Bay Area Core Capacity Transit Study

2.1.1 The Transbay Corridor

The Transbay Corridor encompasses travel between the East Bay and San Francisco and the Peninsula and is roughly defined as the area between the Bay Bridge and the San Mateo-Hayward Bridge to the southeast. Travel in the corridor is multi-

destinational, and includes travel between the counties to the east, including Alameda, Contra Costa and Solano counties, and the Sacramento Region, connecting with the West Bay destinations of the downtown San Francisco Core, San Francisco outside the downtown core, and travel through to the Peninsula. The Transbay Corridor is multimodal in nature and is composed of two major pieces of infrastructure; the San Francisco-Oakland Bay Bridge, and BART's Transbay Tube. The Transbay Corridor is served by a variety of transit service options, including Alameda-Contra Cost Transit District (AC Transit) buses on the San Francisco–Oakland Bay Bridge (the Bay Bridge), BART trains in the Transbay Tube, Water Emergency Transportation Authority's (WETA) San Francisco Bay Ferry terminals and routes, and other suburban bus operators on the Bay Bridge. Shaped by the geography of the bay, this corridor is defined by the individual routes that serve the Core. Transit access to the Core through the Transbay Corridor is achieved via the following:

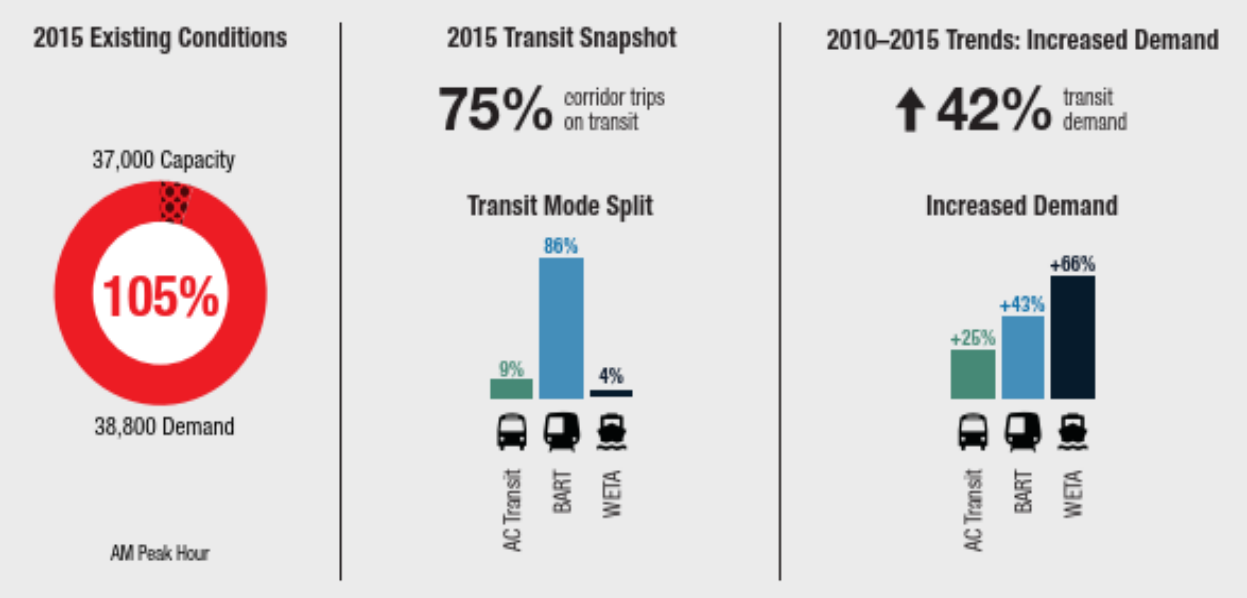
- BART Transbay Tube: This immersed twin-chamber tube incorporates one westbound and one eastbound track. The tube stretches 5.8 miles, from the Oakland Outer Harbor to the Embarcadero in San Francisco and is a key piece of infrastructure on the regional BART rail system.
- Bay Bridge: Buses use the Bay Bridge, and starting east of the toll plaza, they have dedicated queue-jump lanes and other priority measures for westbound travel.
- San Francisco Bay: Used by ferries, the bay is another transportation resource that provides additional capacity to the Core.

2.1.2 Transbay Corridor Capacity and Demand

The Transbay Corridor represents travel from the East Bay to San Francisco and is served by a variety of transit service options, including AC Transit buses on the San Francisco–Oakland Bay Bridge (the Bay Bridge), BART trains in the Transbay Tube, WETA's San Francisco Bay Ferry terminals and routes, and other suburban bus operators.

Bay Area residents make around 500,000 Transbay trips on a typical workday. The San Francisco-Oakland Bay Bridge carries approximately 270,000 vehicles per day, and BART's Transbay Tube transports approximately 230,000 passengers in the corridor. During 2018 peak hours, BART carried approximately two-thirds of the Transbay trips, with approximately 27,000 BART riders per hour, and approximately 14,000 people per hour on the Bay Bridge in cars and buses.

Figure 2-2: Transbay Corridor Snapshot AM Peak Hour

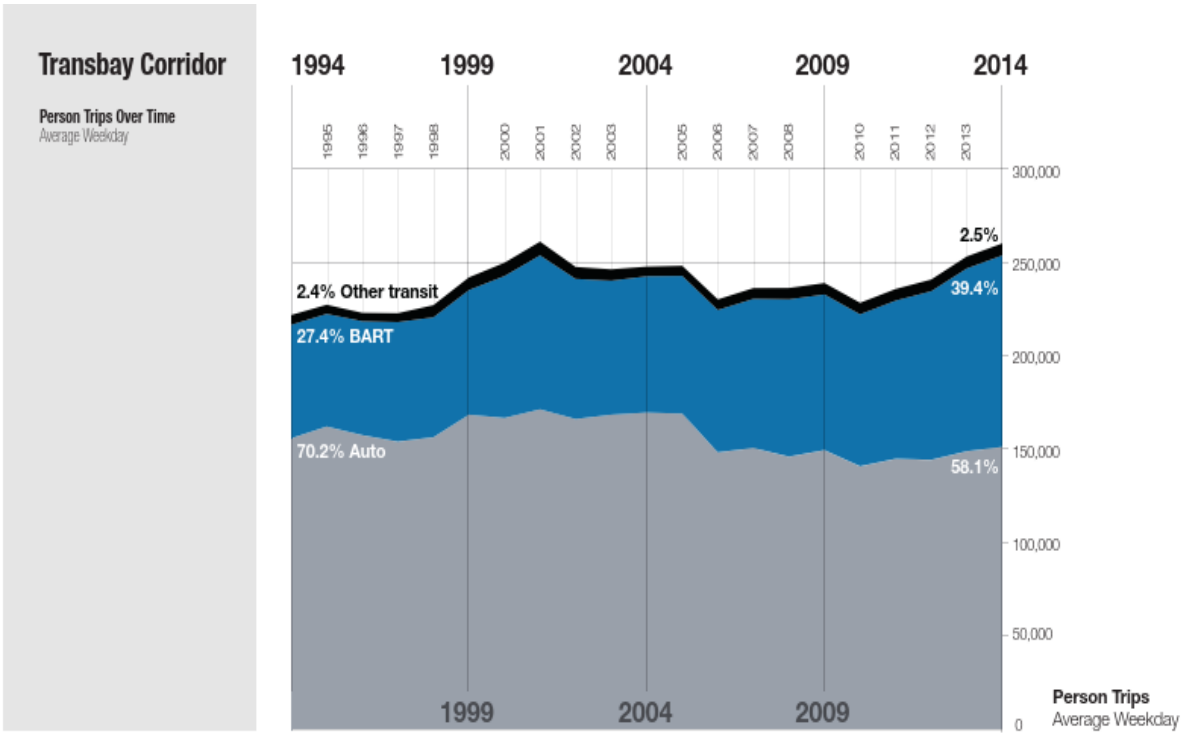


Source: Bay Area Core Capacity Transit Study

Travel demand in the Transbay Corridor has grown significantly over the past decade, resulting in overcrowded highways and transit systems. The Bay Bridge and BART are operating at or above capacity for much of the weekday peak hours, with the Bay Bridge and its approaches occupying the second spot on the region's list of most-congested freeway corridors as of 2018. The current level of travel demand in the corridor is placing significant strain on the transit network, particularly operators serving the Core. In 2015, overall peak-hour demand was 38,800 morning peak-hour trips, of which nearly 29,000 trips (75%) were on transit, an increase of 42% since 2010, as displayed in Figure 2-2.

Meanwhile, based on transit schedules and the operators' stated policy capacities per vehicle, the corridor had capacity for 37,000 peak-hour trips in 2015, of which 27,000 could be carried on transit; this means that demand exceeded capacity and the corridor had an occupancy rate of 105%. BART, which carries nearly two-thirds of all peak-hour trips in the corridor, operated at 110% of policy capacity. Figure 2-3 shows that over the last several decades, transit has carried an increasing share of trips in the corridor; almost 40% as of 2014. Additionally, ridership on AC Transit Transbay buses and WETA ferries nearly reached their policy capacity levels (94% and 96%, respectively). With the corridor operating over capacity, even minor incidents like service delays and breakdowns can trigger major ripple effects throughout the entire system.

Figure 2-3: Historic Transbay Corridor daily person trips by mode, 1994-2014



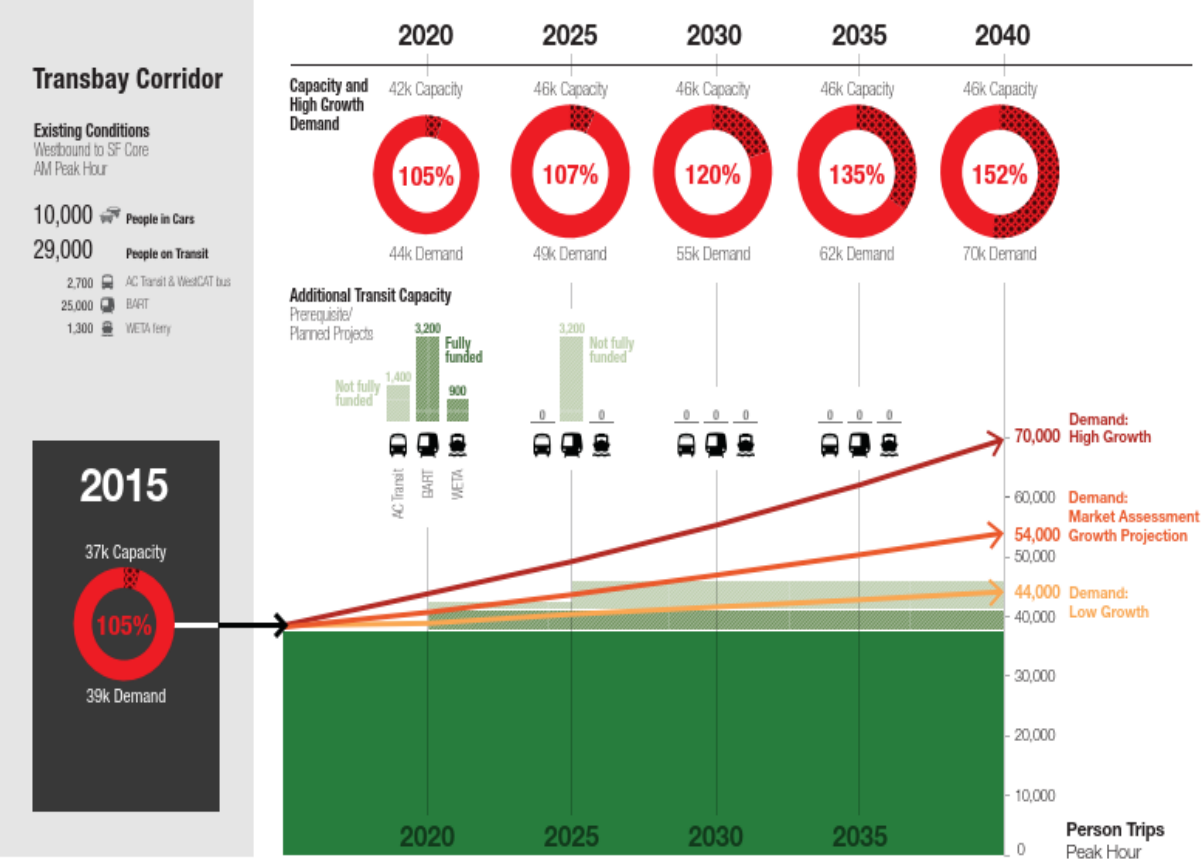
Source: Bay Area Core Capacity Transit Study

2.1.3 Future Growth

If transit demand in the corridor continues growing at a rate similar to 2010 through 2015, capacity will be inadequate to meet demand, even with planned prerequisite projects. Figure 2-4 illustrates how Transbay Corridor capacity compares to a range of potential growth in transit demand between 2015 and 2040. Past regional plans establish the upper and lower bounds for potential growth in demand, while the BACCTS identifies a medium ('Market Assessment') growth line of 1.35% annually, which reflects forecasted employment growth over the period.[1] This medium growth rate is also approximately the same as the rate used by the preferred scenario for Plan Bay Area 2040, the update to Plan Bay Area approved in 2017.

[1] The high growth rate is based on MTC's Transportation 2035, while the low growth rate is based on *Plan Bay Area*

Figure 2-4: Forecast Transbay Corridor peak-hour capacity and demand 2015-2040



Source: Bay Area Core Capacity Transit Study

Growing at the medium rate from 2015, demand in the Transbay Corridor would increase by more than 14,000 trips by 2040. In the same period, planned projects, which include the TCMP, are expected to increase capacity by 12,000 trips, which when combined with the 2015 capacity shortfall, results in a 4,000-trip capacity shortfall. Future growth in demand will need to be met by transit due to capacity constraints on the bridge.

Growth in travel demand is driven by local, regional, and national demographic and real estate market trends. As the region has recovered from the Great Recession, the technology industry and related sectors have driven rapid and significant growth. Between 2010 and 2014 alone, San Francisco employment grew 25%, surpassing the projections from the last regional transportation plan, Plan Bay Area 2040. How and where employment growth occurs in the Core and the region will have significant impacts on long-term demand for transit service and thus where investments in expanded capacity will be necessary.

2.1.4 Train Control Modernization Program (TCMP)

The BART Train Control Modernization Program (TCMP) is a $1.14 billion investment to replace the existing train control system with a new communication-based train control system and associated train control power cables and interlock cables, allowing BART to achieve the shorter headways needed to operate 30 regularly scheduled trains per hour on the trunk line between Daly City and the Oakland Wye. The new communications-based train control system will be based on a moving block signaling approach throughout the existing system and will be installed within or adjacent to the existing BART trackway and wayside facilities. New zone controllers, interlocking controllers and wayside radio transponder tags will be installed throughout the trackside alignment, train control rooms and central control facilities. Cars and maintenance vehicles will be outfitted with processor-based controllers, transponders, communication equipment and location sensors.

The TCMP is a part of BART's Transbay Corridor Core Capacity Program, a comprehensive program of projects that will increase capacity, relieve congestion and crowding, increase transit ridership, and decrease greenhouse gas (GHG) emissions and vehicle miles traveled (VMT) by increasing the frequency and capacity of trains operating on the BART heavy rail system. The Core Capacity Program will allow the number of trains operating through the Transbay Tube to increase from 23 to 30 per hour, and peak hour train lengths to be increased from an average of 8.9 cars to 10, maximizing throughput capacity in the most heavily used and most congested travel corridor in the San Francisco Bay Area. BART's Transbay Corridor Core Capacity Program has four major project components:

1. Train Control Modernization Program (TCMP)
2. an additional 306 new rail cars;
3. additional vehicle storage at BART's Hayward Maintenance Complex (HMC); and
4. five new traction power substations.

The TCMP is the linchpin of BART's Transbay Corridor Core Capacity Program and is key to expanding capacity as well as enhancing system reliability and safety. In 2017, between 15 and 25 percent of all delayed trains were caused by problems with the existing train control system, which is over 45 years old. BART is proposing to completely replace its aging and obsolete equipment with a communications-based system which will allow trains to run closer together safely, thereby increasing system capacity. This new system is a fully tested and operational system and is used all over the world including New York, London, Paris, Hong Kong and Denmark.

2.2 Hybrid Comprehensive Multimodal Corridor Plan Development

Streets and Highways Code 2391 requires that Solutions for Congested Corridors Program (SCCP) funding "be available for projects that make specific performance improvements and are part of a comprehensive corridor plan designed to reduce

congestion in highly traveled corridors by providing more transportation choices for residents, commuters, and visitors to the area of the corridor while preserving the character of the local community and creating opportunities for neighborhood enhancement projects."

The California Transportation Commissions (CTC) 2018 Comprehensive Multimodal Corridor Plan guidelines, in recognition of the length of time needed to complete a comprehensive multimodal plan, have allowed agencies to conduct an integrated analysis of existing plans within a corridor, also known as a "Hybrid Plan" to define the corridor.

BART, as a part of the agency's SCCP funding application for the TCMP, has created this Hybrid Plan, bringing together the Bay Area Core Capacity Transit Study and the Horizon Crossings Perspective Paper. In both plans, the TCMP projects are described as a priority; projects that are necessary to increase capacity BART trains in order to meet the growing demand within the Transbay Corridor. The TCMP projects are also classified as priority projects within the California State Rail Plan, discussed in more detail in Section 5.2 of this plan.

2.2.1 Bay Area Core Capacity Transit Study (BACCTS)

The Bay Area Core Capacity Transit Study (BACCTS), published in 2017, was a collaborative multiagency effort to examine the Bay Area transit system's capacity limitations and identify and prioritize the major investments needed to address these limitations. While all the transit operators serving San Francisco independently consider various improvements to their respective systems, no prior study had brought the major transit operators together to address this regional issue in a comprehensive, coordinated manner. The purpose of the BACCTS was to determine what types of transit investments are necessary and when they are needed while being able to safely and reliably move a growing number of people to and from San Francisco's core job centers.

To answer this question, the BACCTS did the following:

1. Assessed current and future capacity and demand for travel to San Francisco's main job centers, both from within San Francisco and from the East Bay
2. Developed and assessed potential transit investment projects and Bay Bridge pricing proposals to address the challenges facing travelers, including transit congestion, bridge congestion, reliability, and redundancy
3. Identified a recommended set of transit investments, which included high level engineering and cost estimates, to address short- and medium-term challenges and bundled them into packages of investments; all packages considered followed a certain set of criteria, with each package containing certain prerequisite projects necessary to reach the assumed minimum baselines (including the BART TCMP)

4. Proposed potential long-term investment options to improve capacity and system resiliency in the future
5. Recommended a single package of short-and medium- term investment projects for each corridor (Transbay and SF Metro)

Based on the results of the analysis, the BACCTS concluded that any short- and medium-term package recommendation should reflect priorities of more service, supportive infrastructure to improve reliability, and toll increases to help manage queues and improve bus transit reliability, with transit fare adjustments to be considered on an as-needed basis. The proposed long-term investment options, which recommended a new Transbay crossing, were further refined in the *Horizon Crossings* plan, described in the following section.

2.2.2 Crossings: Transformative Investments for an Uncertain Future

The Crossings study, published in 2019, was one in a series of Perspective Papers developed as a part of the Horizon Initiative. Led by the Metropolitan Transportation Commission (MTC) and the Association of Bay Area Governments (ABAG), the Horizon Initiative is a planning effort that comprehensively addresses transportation, housing, economic development, and environmental resilience. Horizon considers three ‘what-if’ scenarios for the future of the nine-county region in order to expand the traditional long-range planning process and incorporate uncertainty from a wide range of external forces. These what-if scenarios include “Rising Tides, Falling Fortunes” in which the population of the Bay Area increases by just 1 million people over the next 30 years; a “Clean and Green Future” in which the region’s population increases by a bit more than 3 million; and “Back to the Future” in which, by 2050, some 6 million more people call the Bay Area home. These scenarios are shown in Table 2-1.

Table 2-1: Horizon Futures Characteristics (Year 2050)

	Rising Tides, Falling Fortunes	Clean and Green	Back to the Future
Immigration and Trade	**Reduced** +20,000 Immigrants Annually	**Similar to Today** +80,000 Immigrants Annually	**Increased** +240,000 Immigrants Annually
National Growth	**Limited** +1.6% Annual Productivity +0.4% Annual U.S. Population	**Similar to Today** +2.8% Annual Productivity +0.7% Annual U.S. Population	**Rapid** +1.1% Annual U.S. Population +1.6% Annual Productivity
National Taxes and Funding	**Lower Funding** Due to Tax Cuts	**Higher Funding** Via Carbon Tax	**Similar to Today**
Land Use Preferences	**Housing More Urban**	**Housing More Urban**	**Housing More Dispersed**
	Jobs Similar to Today	**Jobs More Dispersed**	**Jobs More Urban**
National Environmental Policy	**Relaxed Regulations** +3-feet Sea Level Rise 10% Electric Vehicles	**Stricter Regulations** +1-foot Sea Level Rise 95% Electric Vehicles	**Stricter Regulations** +2-foot Sea Level Rise 75% Electric Vehicles
New Technologies	**More Limited** 10% Autonomous Vehicles 10% Telecommute Share	**Widespread** 95% Autonomous Vehicles 30% Telecommute Share	**Widespread** 75% Autonomous Vehicles 15% Telecommute Share
LEGEND	LOWER	SIMILAR TO TODAY	HIGHER

Source: Crossings: Transformative Investments for an Uncertain Future

The Crossings Perspective Paper was developed to test the extent to which potential new crossings of the San Francisco Bay can be expected to perform in each of these scenarios. The Crossings paper accomplishes this by making observations about the relative merits of seven different potential Transbay crossings with respect to mode and performance under these different scenarios and includes recommendations about which crossings should be analyzed further. The Crossings report does not provide specific conclusions about the selection of any specific crossing but will be used to inform the development of Plan Bay Area 2050, the region's long-term planning document for transportation, housing, the economy, and the environment.

The Crossings report picked up where the BACCTS left off, incorporating a study of a possible new Transbay crossing into the Horizon framework and ultimately informing the inclusion of a potential crossing in Plan Bay Area 2050. Seven crossing concepts were selected for evaluation in the Crossings paper, including two auto-only concepts, two BART-only concepts, one conventional rail concept, one combined auto and BART concept, and one combined BART and conventional rail concept. A map of these concepts can be seen in Figure 2-5.

Figure 2-5: Map of Crossing Concepts

Source: Crossings: Transformative Investments for an Uncertain Future

These 21 “build” models (seven concepts, each with three Horizon futures) were compared against three “no-build” scenarios that simulated the impacts across all three futures of not adding a new crossing. A summary of the seven crossing concepts can be seen in Table 3-3. The Crossings paper recommended that the three transit-only crossing concepts be advanced for further analysis, along with the paired BART/auto and BART/Rail concepts. The Crossings study also concluded that phased delivery of interim capital improvements and service enhancements to the existing corridor, such as the TCMP, could provide near-term mobility upgrades and help lay a foundation for later construction of a new crossing.

3 Plan Comparison

3.1 Corridor Plan Principles

The BACCTS and Crossings paper were both created to align with certain guiding principles that informed the packages and concept development of each plan respectively. The BACCTS principles establish transit as the priority mode for capacity investments into the San Francisco Core while emphasizing cohesive operations, customer convenience and safety, and system resilience to unplanned events. Used as an evaluation criterion in the study, the BACCTS principles can be described by answering the following questions:

- **Capacity**: How many more people can be carried by transit?
- **Utilization**: How much of the capacity offered is expected to be used?
- **Reliability**: To what degree is variability in travel time reduced, in order to make the transit trip more attractive and competitive for users?
- **Efficiency**: How much will it cost?

The Crossings plan is guided by five principles, depicted in Figure 3-1.

Figure 3-1: Horizon Crossings Guiding Principles

AFFORDABLE	All Bay Area residents and workers have sufficient housing options they can afford – households are economically secure.	Does the project increase travel costs for lower-income residents?
CONNECTED	An expanded, well-functioning, safe and multimodal transportation system connects the Bay Area – fast, frequent and efficient intercity trips are complemented by a suite of local transportation options, connecting communities and creating a cohesive region.	Does the project increase travel times or eliminate travel options?
DIVERSE	The Bay Area is an inclusive region where people from all backgrounds, abilities and ages can remain in place – with full access to the region's assets and resources.	Does the project displace lower-income residents or divide communities?
HEALTHY	The region's natural resources, open space, clean water and clean air are conserved – the region actively reduces its environmental footprint and protects residents from environmental impacts.	Does the project significantly increase emissions or collisions?
VIBRANT	The Bay Area is an innovation leader, creating quality job opportunities for all and ample fiscal resources for communities.	Does the project eliminate jobs?

Source: Crossings: Transformative Investments for an Uncertain Future

The following subsections highlight the connections between the guiding principles of both studies.

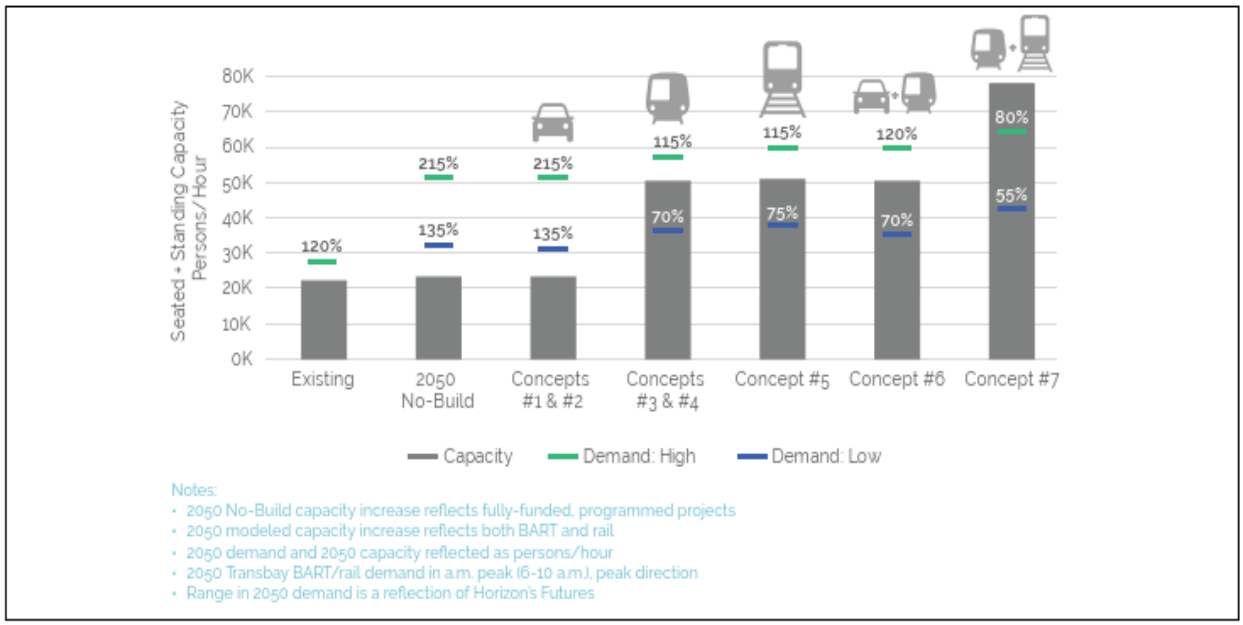
3.1.1 Capacity

The first guiding principle of the BACCTS notes that “transit will be the preferred mode to supply increased capacity for travel between the East Bay and the San Francisco Core, and for trips within San Francisco”.

The BACCTS identified three types of projects that can improve capacity: more transit service, new transit-priority infrastructure, and policy changes. By adding more transit service in the corridor, overall passenger throughput is increased, especially during peak periods when transit carries a significantly higher share of person trips than automobiles on the Bay Bridge. Service can be augmented by increasing vehicle frequencies and fleet size, both of which are accomplished through the TCMP. Investments in transit-priority infrastructure can be implemented to increase speed, improve travel time reliability and ultimately help the system maximize person throughput. Improvements such as adding transit priority to surface streets and adding direct freeway access ramps reduce the impacts of congestion on bus travel and make transit a more appealing competitor to driving. Finally, policy changes that affect automobile tolls and fares can be implemented to influence travel behavior and reduce congestion by encouraging travelers to switch their travel mode or change the time of day when they travel. The BACCTS considered each of these types of projects in order to increase capacity along the Transbay Corridor.

For the Crossings paper, the seven crossing concepts represent both modernization and expansion improvements. Modernization projects involve upgrading existing assets with infrastructure that provides more service or more capacity, while expansion projects involve physically extending a rail line or adding lanes to a roadway. The Crossings paper modeled 2050 Transbay transit capacity versus modeled 2050 transit demand for each of the different crossing concepts. The results, shown in Figure 3-2 below, indicated that in 2050, the two auto-only crossing concepts (#1 and #2) would provide little to no relief for crowding in the existing BART tube, while the transit-only crossing concepts (#3, #4, and #5) would ease transit crowding. Lastly, while Concept #7 reduces crowding, it also may deliver more capacity than needed in 2050 in any of the three Horizon futures.

Figure 3-2: Transbay BART/Conventional Rail - 2050 Modeled Capacity vs. Demand



Source: Crossings: Transformative Investments for an Uncertain Future

The Crossings paper, by addressing capacity as it relates to future transportation needs, accomplishes its guiding principle of “Connected” by prioritizing a transit system that decreases travel times and increases travel options for people traveling through the Transbay Corridor.

Clearly, both studies place a large focus on capacity building, and the need to meet future demand in the Transbay Corridor. The TCMP plays an essential part in this, as it will increase the capacity of BART trains by reducing headways and increasing peak hour train lengths from an average of 8.9 to 10.

3.1.2 Other Corridor Principles

Other than increasing capacity along the Transbay Corridor, the BACCTS and Crossings studies use several other guiding principles to determine the recommended transportation investments for the region.

The BACCTS used utilization, reliability, and efficiency to determine which of the short- and medium-term investment options would be best suited for the corridor. In order to address these objectives, the BACCTS required that each investment package evaluate a combination of additional transit service (new bus and ferry fleet), new infrastructure (new transit priority right-of-way, yards, and terminals), and small to medium toll increases.

The utilization objective was addressed by evaluating current and future demand needs of the Bay Area. Prior to modeling travel demand, MTC conducted a Market Assessment for San Francisco to develop a range of future growth scenarios based on

historical employment, market, and land use trends. These trends were used to inform the analysis conducted on future travel demand in the San Francisco Core. Using MTC's regional travel demand model and a toll bridging queue model, the BACCTS was able to understand the impacts of each package of improvements on travelers' mode and route choices, estimating future regional trips using MTC's 2030 population and employment forecasts, thereby ensuring that any proposed package will be utilized. For the recommended package, the BACCTS noted that in addition to the prerequisite and recommended projects, each operator will need to increase the size of its fleet in order to meet the BACCTS utilization objective.

Every package within the BACCTS addresses reliability in some manner. Package 1, which suggests small, medium, and large peak-period auto toll increases, improves bus service reliability by reducing auto congestion along the toll plaza. Package 2 combines an increase in auto tolls with additional transit; increasing AC Transit Transbay bus service and ferry service from Oakland, Alameda, and Vallejo during the peak hour for more service reliability. Both Packages 3 and 4 increase service reliability in similar ways.

In terms of efficiency, and how much the proposed improvements will cost, the BACCTS evaluates the cost of the recommended improvement, a modified version of Package 3. This analysis also includes evaluation of potential cost of the prerequisite projects, including the TCMP. In total, the proposed packages improvements are $4.8 billion, with annual operating costs of $85 million.

As a part of the Transbay crossing concept evaluation, the Crossings paper scored each concept on its ability to align with each of the Crossings principles using specific project focused criteria, outlined in Figure 3-1. The results are shown in Figure 3-3 below. The two auto-only Concepts (#1 and #2) do not support the Healthy principle due mainly to the added number of vehicle trips induced by a new auto crossing and by the expected increase in emissions and collisions. The transit and conventional rail concepts by contrast are expected to reduce emissions and collisions, while also aligning with the Affordable, Connected, Diverse, and Vibrant principles. The TCMP is an integral part of any crossing concept involving BART, as it will increase capacity and reliability of the existing system in the short- and medium-term, while opening a path for a new Transbay crossing to be built in the long-term.

Figure 3-3: Crossing Concepts: Alignment with the Guiding Principles

Mode	Crossing	Affordable	Connected	Diverse	Healthy	Vibrant
	Concept #1	–	–	–	✗	–
	Concept #2	–	–	–	✗	✗
	Concept #3	–	–	–	–	–
	Concept #4	–	–	–	–	–
	Concept #5	–	–	*	–	*
	Concept #6	–	–	✗	–	–
	Concept #7	–	–	*	–	*

✗ Does not Support Principle

* Impacts to this Guiding Principle occur outside the Transbay corridor due to grade separations on the Peninsula, which are required to maximize frequencies through a conventional rail crossing.

Source: Crossings: Transformative Investments for an Uncertain Future

3.2 Planning Horizons

3.2.1 Short- and Medium-Term

The BACCTS placed a considerable amount of focus on the prerequisite, short-, and medium-term needs of the region by developing packages of projects that have the potential to address the gap in demand in the short- and medium-term. The analysis concluded with the identification of a recommended package.

Each package uses a different combination of projects to address capacity shortfalls in a distinct way, with the major types of projects being service, infrastructure, tolling, and transit fare adjustments. The packages are focused on improving transit capacity in the short term (within five years) and medium term (within 15 years). The packages consist of three types of projects:

1. **Prerequisite projects:** Planned projects in the corridor with full or partial funding commitments identified by operators and the plan as necessary to be fully funded and implemented. This category includes BART's TCMP.
2. **Projects common to all packages:** Projects identified by the Project Management Team (PMT) as important to include in every package under consideration
3. **Package-specific projects:** The headline projects that define the package theme and differentiate the corridor packages from one another

Certain improvement projects are classified as both prerequisites and common projects because they are critical to the Transbay Corridor no matter which package is recommended. In particular, the BACCTS noted that it is essential that the following projects be fully funded as a basis for moving forward:

- New and replacement BART cars
- New train control (TCMP) and power system
- New and expanded maintenance facility

The prioritization of the TCMP in the BACCTS further highlights the essential nature of this project to increasing capacity along the Transbay Tube. Once these prerequisite projects had been identified, the different investment packages were created, summarized in Table 3-1.

Table 3-1: Summary of BACCTS Short- and Medium-Term Investment Packages

#	Package	Summary	Key features
1	Tolls only	Manage Bay Bridge travel demand with increased peak-period auto tolls	• Raise tolls to reduce queues during peak commute periods • Reduce queues enough to ensure buses can access the high-occupancy vehicle (HOV) lanes leading to the bridge
2	Transit and tolls	Add new bus and ferry service and improve Transbay bus service reliability by raising Bay Bridge automobile tolls to reduce toll plaza queues	• Package 1 elements • Add 50 peak-hour bus trips • Increase ferry frequencies to 15- and 30-minute headways • If needed, adjust transit fares to balance passenger loads
3	Infrastructure, transit, and tolls	Add new transit infrastructure to the toll plaza to improve service reliability, implement additional bus and ferry service, and improve Transbay bus service reliability by raising Bay Bridge automobile tolls	• Package 1 and 2 elements (raise tolls, increase bus and ferry service) • Refurbish an old Key System tunnel to create a separate, dedicated bus access route to toll plaza • Make surface street improvements (such as bus lanes and priority features) to reduce bus travel time
4a	Contraflow lane, infrastructure, transit, and tolls	Provide a dedicated bus lane on the lower deck of the bridge in the morning, add new transit infrastructure to the toll plaza to improve service reliability, implement additional bus and ferry service, and improve Transbay bus service reliability by raising Bay Bridge automobile tolls	• Package 1, 2, and 3 elements (raise tolls, increase bus and ferry service, provide dedicated bus access route to toll plaza, improve surface streets to reduce bus travel time) • Raise tolls to reduce queues and increase bus and ferry service as above • Convert one lane of the Bay Bridge lower deck for morning westbound Transbay bus traffic
4b	Bus-only / bus + HOV lane, infrastructure, transit, and tolls	Provide a dedicated bus or bus + HOV lane on the upper deck of the bridge, add new transit infrastructure to the toll plaza to improve service reliability, implement additional bus and ferry service, and improve Transbay bus service reliability by raising Bay Bridge automobile tolls	• Package 1, 2, and 3 elements (raise tolls, increase bus and ferry service, provide dedicated bus access route to toll plaza, improve surface streets to reduce bus travel time) • Raise tolls to reduce queues and increase bus and ferry service as above • Convert one lane of the Bay Bridge upper deck for westbound Transbay buses or bus + HOVs

Source: Bay Area Core Capacity Transit Study

The Crossings paper does not include any detailed analysis on short- and medium-term investments for the Transbay Corridor, but rather highlights the importance of the investments outlined in the BACCTS. The short- and medium-term investments, including the TCMP, are considered a critical step towards long-term investments in the Transbay Corridor, discussed further in the next section.

3.2.2 Long-Term

In addition to developing packages of projects to increase transit capacity to the San Francisco Core over the short and medium term, the BACCTS also developed options

to address potential capacity shortfalls over the long term for the Transbay Corridor. In order to address opportunities in the long term, the BACCTS considered a different set of issues and concerns compared with the short and medium term. The study focused on several topic areas in developing the long-term options, including new transit markets, system redundancy, technical and operational considerations, and issues of governance and ownership. The long-term options were designed to be large-scale in nature, reflecting the continued need to provide additional transit capacity into the long term. Four long-term options were developed, summarized in Table 3-2.

Table 3-2: BACCTS Long-Term Transbay Corridor Options

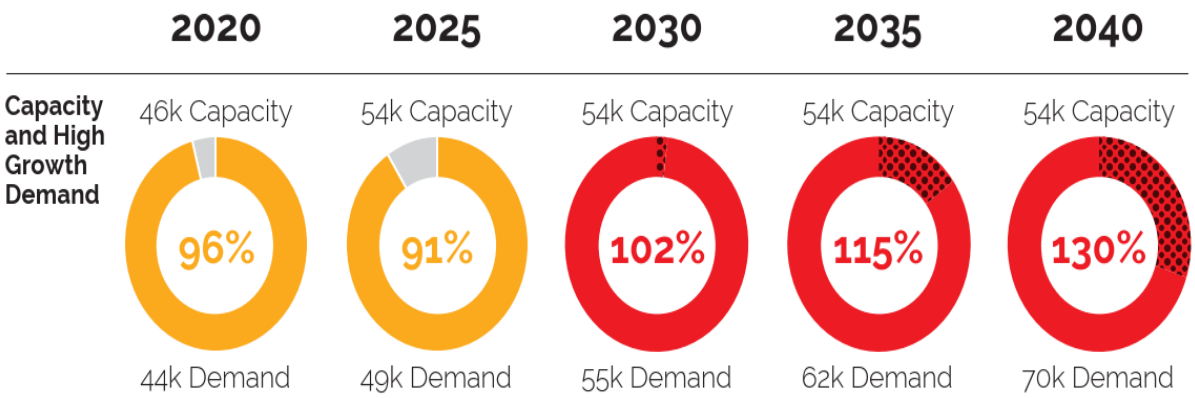
#	Option	Summary	Key features	Key opportunities and challenges
1	Maximize existing assets	Maximize and/or improve the Transbay Corridor's existing infrastructure assets, including maximizing utilization of the Transbay Transit Center capacity, increasing BART station capacity at Embarcadero and Montgomery Stations, and creating a more robust ferry network	• More Transbay bus service • More transit-priority infrastructure • More ferry service • BART side platforms* at Embarcadero and Montgomery stations	Opportunities: • Maximizes use of Transbay Transit Center • Maximizes existing bus and ferry services • Less capital cost compared to other long-term options Challenges: • Requires additional fleet and infrastructure to maintain reliability and new service levels • Amount of estimated new capacity may be fully utilized by opening day
2	BART Market Street redundancy	Provide redundancy for BART in the Market Street corridor serving the Financial District, providing BART with similar access and service to the Core's most job-dense subarea, and capacity relief to existing stations	Third Street suboption: • Serves new markets in SoMa • Station connection feasibility at Powell Station • Independent line • Utilizes either I-980 or Broadway corridor option in East Bay	Opportunities: • Creates transfer opportunity to Market Street corridor • Provides new East Bay access to Mission Bay/SoMa • Provides highest estimated capacity of all long-term options • Potential to serve major new corridor in San Francisco Challenges: • Lengthy connection to Montgomery Station • May not relieve crowding at Embarcadero and Montgomery stations as much as the Mission Street suboption
			Mission Street suboption: • Could serve Transbay Transit Center • Independent line • Utilizes either I-980 or Broadway corridor option in East Bay • Could serve new markets outside of downtown	Opportunities: • Creates redundant Market Street corridor service and transfer opportunity to Transbay Transit Center • Provides highest estimated capacity of all long-term options Challenges: • Does not open to new markets in downtown San Francisco
3	BART new markets	Provide new regional transit access to areas of the Core not currently served by BART	Brannan Street suboption: • Includes merge/breakout concept • Potential need for side platforms at Embarcadero and Montgomery • Utilizes either I-980 or Broadway corridor option in East Bay	Opportunities: • Provides direct connection to Market Street • Provides new East Bay access to Mission Bay/SoMa Challenges: • Breakout option reduces overall capacity through the Market Street corridor and provides less new capacity when compared to the independent line • Breakout option creates significant capacity constraints and potentially unacceptable operational constraints
			Mission Bay suboption: • Includes merge/breakout concept • Potential need for side platforms at Embarcadero and Montgomery • Utilizes either I-980 or Broadway corridor option in East Bay	
4	Greater regional rail connection	Provide a conventional rail crossing centered on the new Transbay Transit Center, transitioning it to a run-through terminal and connecting Peninsula rail to East-Bay-and-beyond rail service	• In San Francisco, connects to Caltrain corridor via planned Downtown Extension • In the East Bay, utilizes the I-980 corridor and connects to BART service at MacArthur Station and Amtrak/Capitol Corridor service in Emeryville	Opportunities: • Increases rail capacity of Transbay Transit Center • Connects to proposed Downtown Extension connection through SoMa and Mission Bay Challenges: • Complex governance and ownership issues • Amount of estimated new capacity may be fully utilized by opening day if implemented without BART improvements • Significant operational (slot) challenges on both Peninsula and Capitol Corridor, no right-of-way, and requirement for completely new station on the East Bay side

Source: Bay Area Core Capacity Transit Study

Prior to developing potential alignments and station locations in the long term, the BACCTS advanced specific engineering studies and market assessments in order to identify and address any fatal flaws in the early stages of option development. This provided needed information at the onset while also reducing future analysis efforts during later stages of the study.

The primary focus of the Crossings Perspective Paper is to develop a set of options for a new Transbay crossing in order to meet future demand in the region. The study notes that even though BARTS near-term improvements, such as the TCMP, will provide some relief to the system, it will only help the region buy some time, as shown in Figure 3-4.

Figure 3-4: Transbay Corridor Capacity and Demand with Short- and Medium-Term Improvements recommended in the BACCTS



Source: Crossings: Transformative Investments for an Uncertain Future

Development of the Crossings study began with a long list of concepts based on several sources including the BACCTS, followed by BART, Caltrans and other transportation agency refinement to a shorter list of those concepts that best demonstrated benefits in relieving congestion and increasing accessibility in the Transbay Corridor while also providing a diversity of travel modes and geographic spread. The Crossings analysis intentionally excluded concepts focused on ferry service and/or bus expansion, given that those improvements were already reflected in the short- and medium-term investment priority list from the BACCTS (more in Section 3.3).

The Crossings paper evaluation included a performance assessment under each of the three future scenarios envisioned under the Horizon initiative. Each of these futures have certain characteristics, seen in Table 2-1, that are meant to expand the traditional long-range planning process and incorporate uncertainty from a wide range of external forces.

The first Horizon future scenario “Rising Tides, Falling Fortunes” describes a 2050 in which immigration is reduced from 80,000 to 20,000 people annually, and annual

productivity and national population growth are reduced to 1.6% and 0.4% respectively. This future also envisions lowered national funding availability, more urban housing, increased sea level rise and less than expected prevalence of electronic and autonomous vehicles. This future addresses the scenario in which the federal government cuts spending and reduces regulations, leaving more policy decisions up to states and regions.

The second Horizon future scenario “Clean and Green” addresses a future in which new technologies and a national carbon tax enable greater telecommuting and distributed job centers. In this future, immigrants to the country remain similar to today at 80,000 people annually, along with annual productivity and annual nationwide population growth. A carbon tax implemented at the national level leads to higher funding, while housing becomes more urban, but jobs are more dispersed. In this future, stricter environmental relations limit sea level rise to 1 foot, and the electrification and automation of vehicles becomes almost universal.

In the final Horizon future, “Back to the Future,” an economic boom and new transportation options spur a new wave of development. In this future, immigration, annual nationwide population growth, and annual productivity all increase significantly by 2050. National taxes and funding remain similar to today, but housing becomes more dispersed while jobs become more urban. Strict environmental regulations limit sea level rise to 1 foot, and electric and autonomous vehicle use becomes widespread.

Each of the crossing concepts (Table 3-3) developed were run in each of these future scenarios, with 21 total model runs (seven concepts multiplied by three Horizon futures) compared against three more “no-build” runs that simulated the impacts across all three futures of not adding a new Transbay crossing. Rather than envisioning new development plans, the Crossings evaluation assumed a continuation of the region’s existing focused growth strategy, adopted in both the original Plan Bay Area (2013) and Plan Bay Area 2040 (2017). This strategy encourages infill growth in Priority Development Areas (PDAs) – locations supported by high quality transit and identified by city or county governments as preferred locations for new housing and commercial construction.

The BACCTS and Crossings studies evaluated long-term investments needed for the Transbay Corridor, with both studies concluding the need for a new Transbay crossing in order to adequately meet future demand. Both studies came to similar conclusions; that this proposed new Transbay crossing would need to include expansion to the BART system. In order for BART to meet a standard that will allow the agency to expand capacity in the long-term, it must first meet the needs of the short- and medium-term, further emphasizing the importance of the TCMP to achieving capacity goals for the region now and in the future.

Table 3-3: Horizon Crossings Transbay Crossing Concepts

#	Concept Name	SUMMARY	KEY FEATURES IN 2050	CAPITAL COST RANGE ESTIMATES (2019 DOLLARS)
1	New San Mateo-Hayward Bridge	The San Mateo-Hayward Bridge is rebuilt, increasing the number of auto travel lanes in each direction from three to four. The CA-92/US-101 freeway interchange is rebuilt, along with expansion of CA-92 in Foster City and in Hayward.	• 4 general purpose lanes in each direction • Bridge toll assumptions align with Bay Bridge in RM3 ($9 peak hour toll)	$10-$15B • Crossing: 95% • Landside Projects: 5%
2	Mid-Bay Bridge	New auto bridge connects I-380 in San Bruno to I-880 and I-238 in San Lorenzo. I-880/I-238 interchange is rebuilt to accommodate new connection point, and North Access Road near San Francisco International Airport ("SFO") is redesigned to accommodate a new connection to US-101/I-380.	• 2 general purpose lanes in each direction • HOV lane (3+) in each direction • Bridge toll assumptions align with Bay Bridge in RM3 ($9 peak hour toll)	$15-$20B • Crossing: 87% • Landside Projects: 13%
3	BART Market Street Redundancy	New BART crossing connects Oakland and other East Bay cities with San Francisco. New Franklin Street tunnel serves downtown Oakland and Jack London Square, converging in Alameda with a new tunnel from the San Antonio district before crossing to San Francisco. Downtown San Francisco is served by a new Mission Street tunnel. New service extends into western San Francisco and connects to existing BART mainline at Daly City.	• 15 new stations (5 East Bay, 10 San Francisco) • 8-minute headways in peak/15-minute off peak	$32B-$48B • Crossing: 17% • Foundational Projects: 5% • Landside Projects: 64% • Vehicles: 14%
4	BART New Markets	New BART crossing connects Oakland and other East Bay cities with San Francisco. New Franklin Street tunnel serves downtown Oakland and Jack London Square, converging in Alameda with a second tunnel from the San Antonio district before crossing to San Francisco and a new Third Street tunnel serving Mission Bay, South Beach and Downtown San Francisco. New service extends into western San Francisco and connects to existing BART mainline at Daly City.	• 16 new stations (5 East Bay, 11 San Francisco) • 8-minute headways in peak/15-minuteoff peak	$33B-$49B • Crossing: 16% • Foundational Projects: 5% • Landside Projects: 65% • Vehicles: 14%
5	Greater Regional Rail	New conventional rail crossing connects Oakland and other East Bay cities with San Francisco and Peninsula/South Bay cities by integrating Caltrain and Capitol Corridor service through the Salesforce Transit Center. Integrated service includes a standardized and reduced fare structure. Caltrain service is extended to Salesforce Transit Center and improvements are made along existing corridor to accommodate more frequent service. Frequent service extends north to Richmond and south to a new East Bay Hub near Fremont, providing a one-seat ride from South Bay/Peninsula to East Bay. Additions include new multimodal stations at Jack London Square and at East Bay Hub, plus infrastructure improvements at Salesforce Transit Center.	• 16 Peninsula trains per hour from San Jose to Salesforce Transit Center • 12 Transbay trains per hour from Salesforce Transit Center to Jack London Square • 4-minute headways in peak at Salesforce Transit Center	$43B-$49B • Crossing: 12% • Foundational Projects: 73% • Landside Projects: 13% • Vehicles: 2%
6	BART + Auto ("Southern Crossing")	New paired BART and auto crossing connects Oakland and other East Bay cities with San Francisco. New BART and auto tunnels connect the East Bay to India Basin, Mission Bay and South of Market. New BART service extends into western San Francisco and connects to existing BART mainline at Daly City. New auto tunnel connects I-880 and I-980 in Oakland to I-280 in San Francisco, requiring new interchanges at both connection points.	• Auto: 2 lanes in each direction • BART: 17 new stations (5 East Bay, 12 San Francisco) • BART: 8-minute headways in peak/15-minute off peak	$39B-$53B • Crossing: 27% • Foundational Projects: 4% • Landside Projects: 58% • Vehicles: 11%
7	BART New Markets plus Regional Rail	A new paired BART and conventional rail crossing connects Oakland and other East Bay cities with San Francisco and Peninsula/South Bay cities. The crossing combines the alignments from Concept 4 (BART New Markets) and Concept 5 (Greater Regional Rail).	• BART: 16 new stations (5 East Bay, 11 San Francisco) • BART: 8-minute headways in peak/15-minute off peak • Rail: 4-minute headways in peak at Salesforce Transit Center	$76B-$98B • Crossing: 14% • Foundational Projects: 41% • Landside Projects: 38% • Vehicles: 8%

Source: Crossings: Transformative Investments for an Uncertain Future

3.3 Multimodal Considerations and Approach

The Transbay Corridor is multimodal in nature (Figure 2-1) and is served by a variety of transportation options including conventional automobiles traveling on the Bay Bridge, the BART Transbay Tube, AC Transit and WestCat buses, suburban buses, and WETA ferries. In order to bridge the gap in the bike network, BART, Transbay buses and ferry boats all provide bike accommodation. In addition, Caltrans also provides a peak-hour bike shuttle across the Bay Bridge between BART's MacArthur Station and downtown San Francisco. The following subsections detail the approaches and considerations the BACCTS and Crossings studies had when evaluating these different modes. The multimodal impacts of the studies are described in Section 4.1 of this plan. As mentioned earlier, the Crossings study intentionally excluded concepts focused on ferry service and/or bus service expansion, given that those improvements were already reflected in the short- and medium-term investment priority list from the BACCTS.

3.3.1 Personal Vehicles

In the Transbay Corridor, the Bay Bridge crossing is at capacity saturated with vehicles, leaving it highly constrained and making transit projects the preferred options for increasing capacity in the corridor. As can be seen in Figure 2-3, in 2014, auto travel in the corridor accounted for 58 percent of person trips on an average weekday. One of the BACCTS considerations to improve capacity along the corridor was to look at policy changes that would affect automobile tolls to influence travel behavior and reduce congestion. Adjusting tolls can achieve multiple outcomes, including shifting demand from automobiles to transit and high-occupancy vehicles (HOVs), influencing the time of day people travel, and reducing queues and travel time variability. The BACCTS analyzed several levels of toll adjustments to forecast drivers' sensitivity to price, based on 2030 conditions. The analysis tested how driver behavior—in terms of shifting peak travel demand to other times and modes—would change at various levels of toll increases.

In addition to including toll increases as a part of each investment package, the BACCTS included the Bay Bridge Forward program as a prerequisite project for the investment packages. This program includes several investments on the Bay Bridge, including adding an HOV/Bus only lane, integrating and optimizing traffic management systems, and commuter parking to name a few.

Of the seven crossing concepts evaluated in the Crossings paper, the first two were auto only concepts, and the sixth concept paired auto with changes to the BART system. These considered auto crossings included a rebuilt San Mateo-Hayward Bridge, a new Mid-Bay auto bridge, and a Transbay auto tunnel. The paper also analyzed the extent to which any of the crossing concepts would relieve auto congestion in the San Francisco-Oakland Bay Bridge Corridor in 2050.

3.3.2 Rail

When considering different modes of transit, both studies distinguished between the BART system and conventional rail. Conventional rail is defined as a standard-gauge, heavy-rail system, such as Amtrak and Caltrain, that is not compatible with the BART system and operates on the national rail network. In developing its suite of short- and medium-term investment options, the BACCTS did not include conventional rail, but did include the mode in one of its long-term options for the corridor.

When considering which types of projects would increase capacity in the short- and medium-term, the BACCTS prioritized adding more transit service in the corridor. Adding more service increases overall passenger throughput capacity and can be further augmented by increasing vehicle frequencies and fleet size. The BACCTS also considered transit fare adjustments to help distribute demand among modes, transit operators, and times of day. The goal would be to shift demand from overburdened operators such as BART to those with more availability or more ability to increase service such as bus and ferry services.

All the recommended changes to BART in the BACCTS are contained in the suite of prerequisite projects that are common to every investment package. These improvement projects are classified as such because they are considered critical to the Transbay Corridor no matter which package was recommended by the BACCTS. These projects include new and replacement BART cars, the TCMP, a new power system, and a new and expanded maintenance facility. The study noted that once these projects are complete, BART will have very little ability to add more peak-hour capacity in the Transbay Corridor because it will reach the maximum throughput of the Transbay Tube, after which a second Transbay crossing will be necessary to increase BART capacity.

Three out of the four long-term options evaluated in the BACCTS include improvements to rail, including BART Market Street redundancy, new markets for BART, and greater regional rail connection. There is no hybrid conventional rail and BART option evaluated in the BACCTS; that option is evaluated further in the Crossings paper.

Five out of the seven crossing concepts evaluated in the Crossings Perspective Paper include some form of rail (Table 3-3). Transbay rail transit use was evaluated for each of the crossing concepts using modeled Transbay rail transit use in 2050 (Figure 3-2). To further assess the benefits of each crossing, the benefits of each option were monetized and measured for their impacts on accessibility, transit-crowding, freeway reliability, vehicle ownership, health, safety, and the environment. Because each Horizon future makes different assumptions about overall growth rates and other key factors, which in turn would create different levels of demand on the transportation system, the Crossings paper analysis measured the per-capita benefit of each crossing concept across the three Horizon futures to assess the effects of these external forces. To better measure the relationship between transit ridership and development patterns and density, the Crossings study analyzed whether ridership demand would rise or fall if new rail stations

were in PDAs, or if the stations were in areas that do not carry a PDA designation. The proposed crossings were also evaluated using the Horizon initiatives equity-scoring methodology (described in Appendix B of the Crossings study) to determine the crossing concepts' impact on lower-income communities' ability to reach their destinations compared to higher-income communities. Finally, the Crossings study evaluated benefit-cost ratios for each of the concepts over the 2025 to 2080 time period using the benefit and cost methodologies discussed earlier. Projects with expected benefit/cost ratios of 1.0 or greater were considered especially strong, while those with ratios below 0.5 ranked at the lower end of the scale.

Using these approaches and considerations, the BACCTS and Crossings study were able to determine the recommended set of strategies for both conventional rail and BART in order to improve capacity throughout the Transbay Corridor. These approaches further emphasize the importance of the TCMP to increasing capacity in the corridor; as a prerequisite project, the TCMP is an essential first step to accomplishing regional transportation goals. Any future transportation investments are reliant on BART reaching its limits on capacity, which cannot be accomplished without a modernized train control system.

3.3.3 Bus

Although the Crossings study does not address bus transit in its evaluation framework, bus investments are an integral part of the BACCTS. Three types of projects related to buses were included in the approach for determining short- and medium-term investments to improve capacity; increased transit service, new transit priority infrastructure, and transit fare adjustments.

The BACCTS noted that adding more transit service in the corridor increases overall passenger throughput capacity. Service can also be augmented by changing vehicle frequencies and fleet size. However, the roadway infrastructure must be able to accommodate such service increases in order to reap the full benefits of investment in service. For instance, simply adding more vehicles to an already congested roadway will result in less realized capacity per hour due to delays. In order to accommodate this, the study evaluated transit priority infrastructure. These investments can be implemented to increase speed, improve travel time reliability, and ultimately help the system maximize person throughput. Improvements such as adding transit priority to surface streets and adding direct freeway access ramps were considered to reduce the impacts of congestion on bus travel and make transit a more appealing competitor to driving. In addition to more transit service and transit-priority infrastructure, adjusting the relative cost of transit was a tool considered to help distribute demand among modes, transit operators, and times of day. Changing fares can help shift demand from overburdened operators to those with more availability or more ability to increase service—such as from BART to bus and ferry services.

In crafting the Transbay Corridor packages, the BACCTS focused on the following strategies to improve capacity and service reliability as it related to bus transit:

- Increasing transit capacity by augmenting bus service, including expanded fleets and the necessary infrastructure to support the service
- Improving service reliability with new bus-priority infrastructure to the toll plaza and on surface streets leading up to it
- Improving service reliability to the Core with new bus-priority infrastructure on the Bay Bridge
- Managing travel demand on the Bay Bridge by adjusting Bay Bridge tolls
- Managing transit demand across transit modes by adjusting transit fares

Every package developed in the BACCTS includes investments related to bus expansion because of the following prerequisite bus projects:

- AC Transit Bus Ramp to Transbay Transit Center
- AC Transit Fleet Expansion (40 buses)
- AC Transit Richmond Facility Reopening
- AC Transit New Bus Facility
- Bay Bridge Forward
- I-80 Integrated Corridor Mobility

Most of the bus improvements in the investment packages were focused on reducing vehicle queues at the toll plaza to help provide more reliable transit service, including the addition of bus only lanes across the Bay Bridge.

3.3.4 Ferry

Although the Crossings study does not address ferries in its analysis, the BACCTS includes many investment options for ferries in the Transbay Corridor. Using a similar strategy to buses (more service, expanded fleets, and transit fare adjustments), the BACCTS was able to develop investment options that would increase ferry capacity and incentivize use of the mode. These options are simple and aim to increase capacity in the short- and medium-term. The following list includes all ferry investments considered to be prerequisite projects:

- WETA Maintenance Facilities Alameda, Vallejo
- WETA Richmond–SF Ferry Service
- WETA SF Ferry Terminal Expansion
- WETA SF Fleet Replacement & Expansion

Beyond those prerequisite projects, the BACCTS included more ferry service, new ferry routes, terminals, and feeder service in three of the four investment packages. All strategies are aimed at increasing capacity across the Bay and relieving some of the demand placed on the BART system.

3.4 Stakeholders and Community Outreach

The BACCTS and Horizon Crossings study were widely collaborative efforts, engaging transportation stakeholders in the region as well as the public whenever possible. The following subsections detail stakeholders for both plans, as well as overall steps for community outreach taken when conducting both studies.

3.4.1 Stakeholders and Partners

The development of the BACCTS involved direct participation of seven state, regional, and local agencies, with a Project Management Team (PMT) made of members from each of these agencies. The PMT guided the study's day-to-day development through regular meetings and review of the studies work products. Executives from each study partner formed an Executive Team (ET) to provide direction and guidance to the PMT. The study partners were led by the Metropolitan Transportation Commission (MTC) and included the following agencies:

- Alameda-Contra Costa Transit District (AC Transit)
- Bay Area Rapid Transit District (BART)
- Caltrain
- San Francisco Bay Area Water Emergency Transportation Authority (WETA), operator of the San Francisco Bay Ferry
- San Francisco Municipal Transportation Agency (SFMTA)
- San Francisco County Transportation Authority (SFCTA, funding and planning partner)

The BACCTS also formed a Technical Advisory Committee (TAC) with a wider group of 18 stakeholders (including Caltrans and the City of Oakland) to advise the PMT and offer diverse perspectives and insights on the study's development. The BACCTS was the first study in the region to bring together the relevant operating, planning, and funding partners to study this topic and identify challenges and solutions from a regional perspective, rather than leaving operators to work individually. The Transbay Corridor is served by multiple operators, so a joint study was necessary in order to produce comprehensive recommendations that reflect the needs and priorities of all the operators.

The development of the Crossings study was led by the MTC and ABAG as a part of the Horizons initiative. These regional agencies created the Horizon Initiative as the first planning effort in the Bay Area to comprehensively address transportation, housing, economic development, and environmental resilience. This was done to expand the traditional long-range planning process and incorporate uncertainty from a wide range of external forces in order to better serve people and stakeholders in the region.

3.4.2 Community Outreach

In February 2017, the MTC's BACCTS PMT hosted two public workshops to discuss the study's evaluation criteria and project packages with project stakeholders including BART, Muni, AC Transit, Caltrain, and WETA. The workshops were held at the San Francisco Bay Area Planning and Urban Research Association (SPUR) offices in San Francisco and Oakland, and between 30 and 50 people attended each event. The purpose of the public meetings was to provide participants an overview of the BACCTS background and obtain feedback on short, medium and long-term transit enhancement concepts. Breakout groups allowed participants to share their thoughts on, concerns with, and suggestions for the various evaluation criteria and project packages.

The development of the Crossings paper included extensive outreach and coordination events with local communities and agencies. Public outreach for the Crossings paper was done through the Horizon Initiative; MTC staff members visited all nine Bay Area counties to get community input for the initiative, stopping at farmers markets, flea markets, libraries, shopping centers, schools, conferences, festivals and transit hubs. Concept development and refinement began with an interagency workshop with 12 regional agencies, followed by an update given to the staffs of U.S. Senator Feinstein and Congressman DeSaulnier. Several lunchtime forums were conducted throughout the development period with SPUR. The MTC Commission and Policy Advisory Council, Bay Area Partnership Board, and the MTC/ABAG Regional Advisory Working Group conducted several workshops with the study team as well. Through these outreach activities, the Crossings paper was able to address a diverse set of needs from various parts of the community.

3.5 Funding and Timeline

When determining a recommended set of investments, understanding the funding needs and timeline for implementation are essential factors that need to be considered. The following sections detail the funding prioritizations and timeline for implementations considered in the two studies for the recommended sets of projects and investments. More detail on the recommended suite of investments can be found in Section 6 of this plan.

3.5.1 Funding Prioritizations

As mentioned previously, the BACCTS prerequisite projects are considered critical to operators' ability to increase transit capacity in the Transbay Corridor, but not all projects are fully funded. However, the TCMP, upon receipt of SCCP funds, will be fully funded and moved to be implemented in the Transbay Tube. More information on this can be found in the SCCP grant narrative, attached to this document. The BACCTS package analysis concluded that any short- and medium-term package recommendation should reflect priorities of more service, supportive infrastructure to improve reliability, and toll increases to help manage queues and improve transit

reliability. A modified version of Package 3 (Infrastructure, Transit, and Tolls) was chosen as the recommended package of investments. The BACCTS then determined the total capital and operating costs of the proposed package, including prerequisite projects, displayed in Table 3-4 and Table 3-5.

Table 3-4: Transbay Corridor Recommended Package Capital Improvement Cost

Projects by operator		Unfunded cost
AC Transit		
1	Fleet: 110 buses	$90m
2	New Bus Facility	$100m
3	Infrastructure: • Park-and-ride, bus transitway, surface-street transit priority, bus tunnel	$240m
4	Ferry feeder service fleet	$15m
	Subtotal AC Transit	$445m
WETA		
1	WETA 15-30 Plan • Fleet: 11 vessels • Enhanced terminals: Alameda Main Street, Harbor Bay, Oakland • New terminals: Berkeley, Downtown North Basin, Mission Bay, Seaplane Lagoon	 $206m $46m $122m
	Subtotal WETA	$374m
BART		
1	Transbay Core Capacity Project* • Fleet: 306 railcars • Train control, traction power, Hayward Maintenance Complex Phase 2	$3.5bn
2	BART Metro*	$362m
3	Other supportive projects • Montgomery and Embarcadero platform screen doors, vertical circulation • Glen Park pocket track	$180m
	Subtotal BART	$4.0bn
Total recommended package		**$4.8bn**

Source: Bay Area Core Capacity Transit Study

Table 3-5: Transbay Corridor Recommended Package Annual Operating Costs

Improvements	Unfunded cost†
Bus: Transbay service	$33m/yr
Bus: Ferry feeder service	$13m/yr
Ferry: WETA 15-30 Plan service	$23m/yr
BART: Additional Transbay service	$16m/yr
Total annual operating costs	**$85m/yr**

Source: Bay Area Core Capacity Transit Study

The BACCTS noted that the necessary immediate action is to advance the recommended package toward implementation, including programming them into

regional and state funding plans for prioritization. In particular, the BACCTS noted that it is critical that unfunded prerequisite projects are prioritized for funding, and suggested funding plans that included Plan Bay Area 2040, future bridge toll increases, and California SB-1.

While the Crossings study does not conduct specific analysis on funding prioritizations for any specific project, the benefit/cost analysis discussed in Section 4.3.2 can be considered a starting point for determining which crossing to incorporate into future planning and funding processes.

3.5.2 Timeline

As discussed in Section 3.2, the BACCTS primary focus was on improving transit capacity for the short- and medium-term. The short-term in the context of the study was considered to be within five years, while medium-term was considered to be within 15 years. Any projects recommended through the BACCTS short- and medium-term packages, including prerequisite projects, would need to be implemented before 2030.

The Crossings study expands the traditional long-term planning process by considering several different futures, but primarily uses 2050 as a horizon year for when the recommended crossing concepts should be implemented. However, as can be seen in Figure 4-3 and other instances in the Crossings study, analyses are also conducted for years far beyond 2050.

4 Performance Impacts and Metrics

4.1 Multimodal Impacts

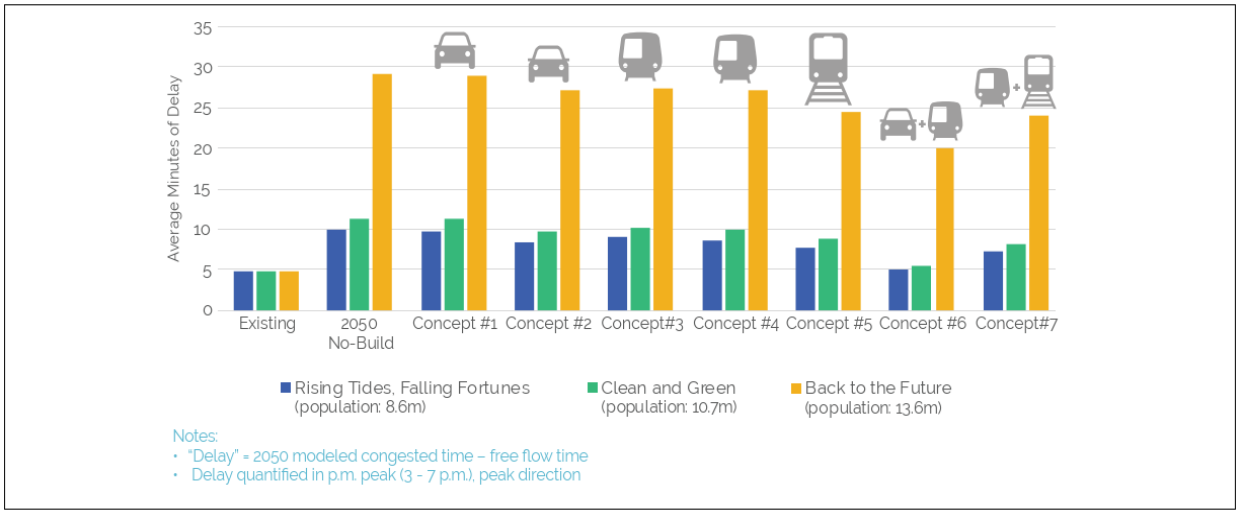
The Transbay Corridor is multimodal in nature and is served by a variety of transit operators. As discussed in Section 3.3, each of these modes are widely considered by both the BACCTS and Crossings paper for opportunities to increase capacity along the corridor. The following subsections detail the multimodal impacts of each of the investments considered in the studies; note the Crossings Perspective Paper does not consider investments related to buses and ferries.

4.1.1 Personal Vehicles

Each of the short- and medium-term investment packages considered by the BACCTS included some form of toll increases in the Transbay Corridor (Section 3.3.1). The primary impact on personal vehicles would be a reduction in vehicle queues at the toll plaza, while also service as an incentive for carpooling. Package 4b in the BACCTS proposes the largest impact to vehicles in the form of a bus plus HOV lane across the Bay Bridge in addition to a toll increases and a bus park-and-ride, intended to further incentivize carpooling.

Three of the seven crossing concepts presented in Horizon Crossings include impacts related to automobiles. The first two Concepts presented are auto-only concepts (Table 3-3), while Concept #6 is paired with a new BART crossing. Concept #1 proposes a new San Mateo-Hayward bridge which would increase the number of auto travel lanes in each direction from three to four. This concept would also rebuild the CA-92/US-101 freeway interchange and expand CA-92 in Foster City and in Hayward. Concept #2 proposes a new auto bridge that connects I-380 in San Bruno to I-880 and I-238 in San Lorenzo. The I-880/I-238 interchange would be rebuilt to accommodate the new connection point, and North Access Road near San Francisco International Airport (SFO) would be redesigned to accommodate a new connection to US-101/I-380. Major impacts of this crossing would be two general purpose lanes and an HOV (3+) lane in each direction. Finally, in crossing Concept #6, a new paired BART and auto crossing would be built connecting Oakland and other East Bay cities with San Francisco. New BART and auto tunnels would connect the East Bay to India Basin, Mission Bay and South of Market, with the new auto tunnel connecting I-880 and I-980 in Oakland to I-280 in San Francisco. Out of the three crossing concepts involving automobiles, Concept #6 provides the greatest reduction in Bay Bridge vehicle delay in each of the 2050 scenarios, displayed in Figure 4-1.

Figure 4-1: Bay Bridge Vehicle Delay - US-101 northbound and I-80 eastbound from Cesar Chavez to Treasure Island Tunnel



Source: Crossings: Transformative Investments for an Uncertain Future

Although Concept #6 is best suited to relieve congestion-related delays through the Bay Bridge Corridor in 2050, the results also highlight the impact of latent demand for limited roadway space. When compared to current conditions, any new crossing may be unable to deliver meaningful congestion relief under any of the Horizon futures. The most effective way to relieve congestion-related delays would be a combination of a new crossing and more aggressive complementary transportation-demand strategies.

4.1.2 Rail

Many of the substantive impacts to both BART and conventional rail systems in the short- and medium-term are contained in the BACCTS prerequisite projects. These projects include the following:

- BART Additional Railcars – Core Capacity
- BART Additional Railcars – Fleet Transition
- BART Hayward Maintenance Complex Phases 1 and 2
- BART Metro Program
- BART Traction Power System
- BART Train Control Modernization Program (TCMP) Projects

These projects are meant to increase capacity and reliability on the BART system, allowing the system to meet Transbay Corridor demand up to 2025 (Figure 3-4). Impacts related to conventional rail in the BACCTS are only considered in regard to long-term investments and are discussed in more detail in the Crossings study.

Five of the seven crossing concepts discussed in the Crossings study involve some form of rail. Concepts #3 and #4 are BART only concepts, Concept #5 is a conventional

rail concept, Concept #6 is a BART and auto concept, and Concept #7 is a paired conventional rail and BART concept.

Concept #3 proposes a new BART crossing connecting Oakland and other East Bay cities with San Francisco. A new Franklin Street tunnel serving downtown Oakland and Jack London Square would converge in Alameda with a new tunnel from the San Antonio district before crossing to San Francisco. Downtown San Francisco would be served by a new Mission Street tunnel, with new service extending into western San Francisco and connecting to the existing BART mainline at Daly City. This overall concept would include 15 new stations and 8-minute headways in peak and 15-minute headways off peak.

Concept #4 proposes a similar crossing to #3, with a new Franklin Street tunnel serving downtown Oakland and Jack London Square and converging in Alameda with a second tunnel from the San Antonio district before crossing to San Francisco and a new Third street tunnel serving Mission Bay, South Beach and Downtown San Francisco. New service would extend into Western San Francisco and would connect to the existing BART mainline at Daly City. Overall, this concept would include 16 new stations and 8-minute headways in peak and 15-minute headways off peak.

Concept #5 proposes a new conventional rail crossing connecting Oakland and other East Bay cities with San Francisco and Peninsula/South Bay cities by integrating Caltrain and Capitol Corridor service through the Salesforce Transit Center. Integrated service would include a standardized and reduced fare structure. Caltrain service would be extended to the Salesforce Transit Center and improvements would be made along the existing corridor to accommodate more frequent service. Frequent service would extend north to Richmond and south to a new East Bay Hub near Fremont, providing a one-seat ride from South Bay/Peninsula to East Bay. Additions would include new multimodal stations at Jack London Square and at East Bay Hub, plus infrastructure improvements at Salesforce Transit Center. Overall, Concept #5 would include 16 Peninsula trains per hour from San Jose to Salesforce Transit Center, 12 Transbay trains per hour from Salesforce to Jack London Square, and 4-minute headways in peak hours at Salesforce Transit Center.

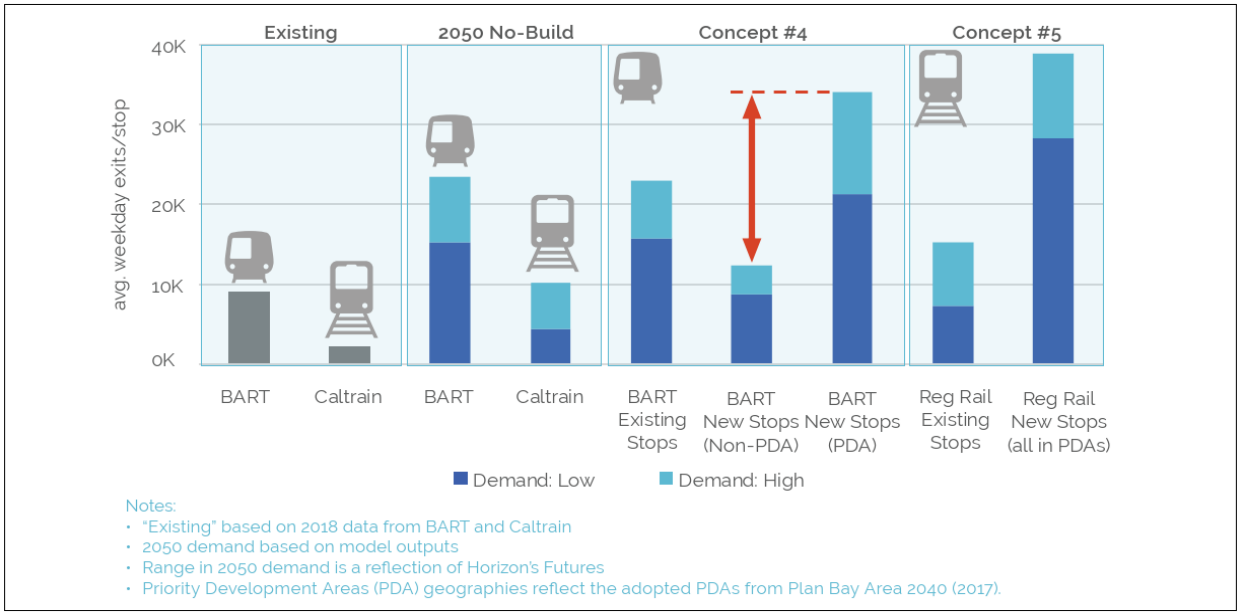
Concept #6 proposes a combined auto and BART crossing. The BART additions would include an extension of service into western San Francisco and a connection to the existing BART mainline at Daly City. Overall, this concept includes 17 new BART stations and 8-minute headways in peak and 15-minute headways off peak.

Lastly, Concept #7, a paired BART and conventional rail concept, would connect Oakland and other East Bay cities with San Francisco and Peninsula/South Bay cities. The crossing would combine the alignments from Concept #4 and Concept #5. For BART, this concept includes 16 new stations and 8-minute headways in peak and 15-minute headways off peak. For conventional rail, this crossing includes 4-minute headways in peak hours at Salesforce Transit Center.

For all the concepts described above, the impacts on Transbay Corridor rail transit use can be seen in Figure 3-2. These results indicate that in 2050, Concepts #3, #4, #5, and #6 would be able ease to transit-crowding and meet the lower end of expected demand. While Concept #7 also reduces crowding, it may also deliver more capacity than needed in 2050 in any of the three Horizon futures.

The rail crossing concepts evaluated in the Crossings paper all include increases to BART and conventional rail stations. The Crossings study evaluated station locations' impacts on ridership in order to better understand how transit ridership is influenced by the proposed investments (more information in Section 3.3.2). The results are displayed in Figure 4-2 compares Concept #4 (BART) with new stations in both all-PDA and non-PDA locations, and an all-PDA configuration of Concept #5 (conventional rail). The figure illustrates that locating stations in areas that are likely to see new development will be critical to attracting higher ridership across all three of the Horizon futures.

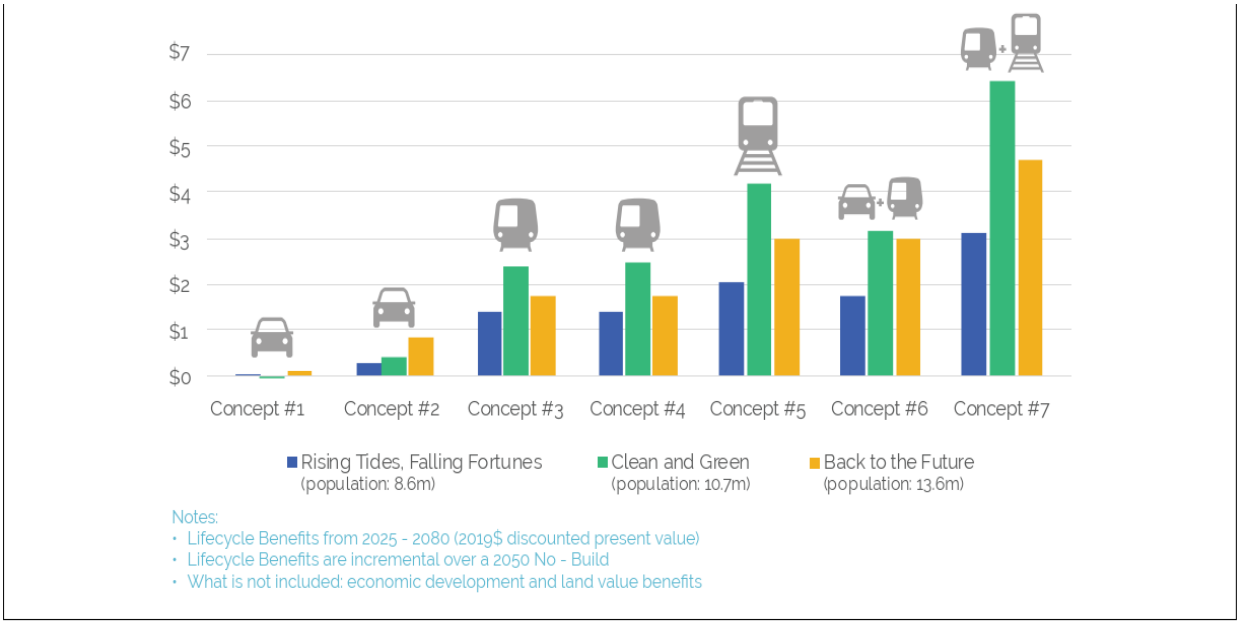
Figure 4-2: Stop Location Impacts on Ridership - Demand at Non-PDA vs. PDA Stops



Source: Crossings: Transformative Investments for an Uncertain Future

The Crossings study also evaluated the per capita benefits of each of the crossing concepts, the results of which are presented in Figure 4-3 below. The findings show that rail only crossings (Concepts #3, #4, #5, and #7) in the "Clean and Green" future deliver the highest per-capita benefits, due in part to the higher auto operating costs associated with a national carbon tax that increases the cost of driving.

Figure 4-3: Per-Capita Benefits ($000s) across Horizon Futures



Source: Crossings: Transformative Investments for an Uncertain Future

The Crossings paper used the Horizon initiatives equity-scoring methodology to assess the seven crossing concepts' impact on lower-income communities' ability to get to destinations as opposed to higher-income communities. Figure 4-4 displays the results of this analysis and shows that while none of the proposed concepts make the transportation system more equitable, Concepts #3 through #7 would provide benefits evenly to all population groups across the three Horizon futures.

Figure 4-4: Impacts of Project Level Accessibility Benefits Across Income Groups

Mode	Crossing	Rising Tides, Falling Fortunes	Clean and Green	Back to the Future
	Concept #1	Challenges	Challenges	Even
	Concept #2	Even	Challenges	Even
	Concept #3	Even	Even	Even
	Concept #4	Even	Even	Even
	Concept #5	Even	Even	Even
	Concept #6	Even	Even	Even
	Concept #7	Even	Even	Even

Equity Score: Challenges Equity: <40% | Even Distribution: 40-60% | Advances Equity: >60%

Source: Crossings: Transformative Investments for an Uncertain Future

4.1.3 Bus

Every package for short- and medium-term investment considered in the BACCTS places a focus on reducing queues at the toll plaza on the Bay Bridge during peak periods in order to ensure buses can quickly access HOV lanes with minimal delay, leading to more reliable transit service. Because of the limited ability to increase capacity on the BART system, the BACCTS focused many of its transit-oriented impacts on buses in the region. The following projects were prerequisite bus projects for all the packages in the BACCTS:

- AC Transit Bus Ramp to Transbay transit Center
- AC Transit Fleet Expansion (40 buses)
- AC Transit Richmond Facility Reopening
- AC Transit New Bus Facility

The following bus projects were considered common to Packages 2-4:

- Increase Transbay Bus Service
- I-580 Bus Transitway
- Transbay Bus Park-and-ride facilities

Package 2 proposed increasing transit service and tolls in addition to the above common and prerequisite projects. The main impacts of this package would include increased AC Transit Transbay bus service during the peak hour for more service reliability, and reduced vehicle queues at the toll plaza allowing buses to quickly access

HOV lanes with minimal delay. Package 3 is similar to Package 2 but includes implementation of new surface-street transit-priority lanes to the bridge and the refurbishment of the old Key System tunnel to provide direct bus access to the toll plaza; all of which would increase capacity through the Transbay Corridor. Finally, Package 4 proposes providing continual direct bus right-of-way across the Bay Bridge, with a bus-only or bus plus HOV lane, a refurbished bus tunnel, and new surface-street transit-priority lanes from the East Bay to Transbay Transit Center.

4.1.4 Ferry

Similar to buses, in order to increase capacity in the Transbay Corridor, the BACCTS proposed increasing transit capacity by augmenting ferry service, including expanded fleets. The following are prerequisite and common ferry projects for the BACCTS packages:

- Ferry Feeder Bus Services
- WETA Maintenance Facilities Alameda, Vallejo
- WETA Richmond-SF Ferry Service
- WETA SF Ferry Terminal Expansion
- WETA SF Fleet Replacement and Expansion
- Implement WETA 15-30-minute plan

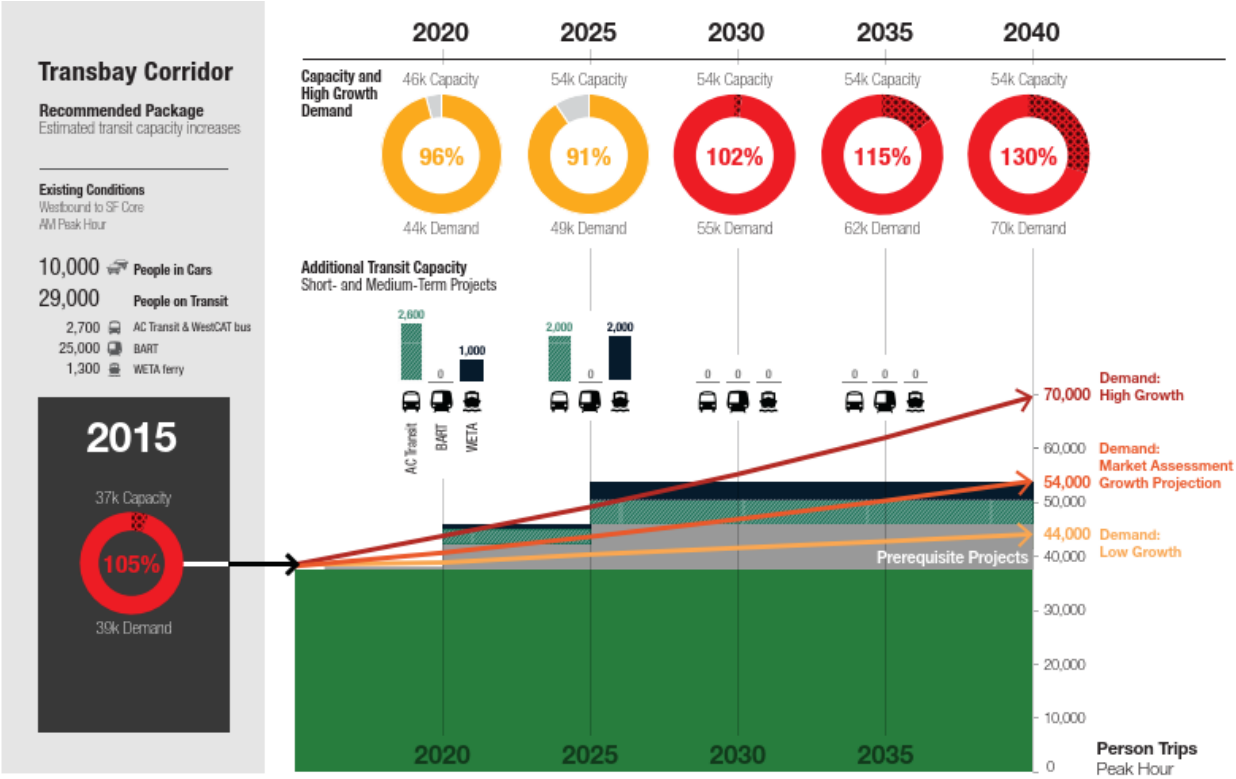
Packages 2-4 all propose increasing ferry service during the peak hour from Oakland, Alameda, and Vallejo, while adding new ferry terminals in Alameda and new routes from Berkeley and Mission Bay. Increasing ferry service and adding new ferry routes was a relatively simple way for the BACCTS to increase capacity along the Transbay Corridor without the need for significant investment, such as that required for a new Transbay crossing.

4.2 Demand Impacts

The impacts of both the BACCTS and Crossings study are centered on meeting demand in the Transbay Corridor by increasing capacity, either through short-and medium-term investment strategies, such as those found in the BACCTS, or long-term strategies, such as those outlined in the Horizon Crossings Perspective Paper.

If the BACCTS recommended short- and medium-term package improvements (modified Package 3) are taken, Transbay Corridor capacity will be able to meet demand up until 2030, as shown in Figure 4-5.

Figure 4-5: Transbay Corridor Capacity and Demand in 2050 with Recommended Package



Source: Bay Area Core Capacity Transit Study

Even with the new capacity gained from the short- and medium-term improvements shown in Figure 4-5, a gap between travel demand and capacity will remain if the corridor demand grows faster than the market assessment forecast. Additionally, by 2030, these short- and medium-term investments will be unable to meet increasing demand in the region, further emphasizing the need for a new Transbay crossing, such as those outlined in the Crossings paper.

The demand impacts of the Crossing concepts are displayed in Figure 3-2 and Figure 4-1. These figures show that certain Crossing concepts will be able to meet demand in the future by increasing capacity and reducing congestion in the Transbay Corridor.

4.2.1 Induced Demand Analysis

MTC's Activity-Based Travel Model One is used in both the BACCTS and Crossings paper to analyze induced demand, with Travel Model 1.5 (a major update to Travel Model One) being used for the entire Horizon initiative. Induced demand, or induced traffic, is demand that exists but is suppressed by the inability of the existing system to handle it. Once additional capacity is added to a network, that potential demand materializes as actual used.

For the Crossings paper, induced demand is reflected in Travel Model 1.5 in both short- and long-term effects. Short-term decision based-based induced demand is generally captured from changes in transportation supply, in that residents may choose to change their travel destinations, amount of travel, mode of travel, travel route, or time of travel based on accessibility changes from the project. For example, adding travel lanes to a highway corridor adds road capacity ("supply"). The increase in supply does not simply have the effect of alleviating congestion for existing road users in that corridor, but transit users and/or road users of other corridors may alter their mode or route to take advantage of the new capacity. The increase of road capacity improves accessibility making that travel choice a more attractive option compared to a "no build" condition. Increasing supply of a mode generally results in increase usage of that mode, more vehicular travel or more transit riders.

Long-term decision based-based induced demand is generally captured from changes in household/job locations. Households may "choose" or change their auto ownership decisions and work locations based on accessibility changes from increases in supply. Therefore, some long-term decision-based induced demand is captured, in that more residents may prefer to change their job locations if that improves their travel outcomes. This is reflected in the two auto-only crossing concepts which both result in higher VMT for the region. Note that the transit-only concepts modeled in the Crossings paper do not result in higher VMT for the corridor. Other long-term effects are related to changes in household/job locations resulting from the project (e.g. new rail station may spur more housing construction in station areas). These effects are captured through feedback loops between the land use model and travel model.

4.3 Performance Metrics

Measuring the performance for a set of recommended projects is essential in determining whether these projects will benefit the transportation system. Both the BACCTS and Crossings paper focus on increasing capacity of the transit system in order to meet current and future demand in the Transbay Corridor. The following performance metrics have been chosen to highlight how the recommended projects and strategies in these two plans will increase capacity along the corridor.

4.3.1 Service Availability and Delivery

Measuring service availability and delivery means measuring the ease of transit access based on where (service coverage and/or stop accessibility) and how often (frequency and reliability) service is provided, while also considering passenger loads on different travel modes.

One of the primary methods in which the BACCTS addresses capacity deficiencies is by increasing the frequency of service provided by a variety of transit operators in the region. Each package is built on prerequisite projects that are focused on increasing the

fleet size of buses and ferries in the corridor, as well as BART projects like those in the TCMP that are intended to reduce headways.

The BACCTS recommends, that in order to adequately offer expanded service under the recommended packages, AC Transit would need to increase fleet size by 110 buses, WETA would need to expand their fleet by 11 vessels, and BART would need to add 306 railcars to its fleet. The expansion of the WETA and AC Transit fleets, in addition to new routes and transit-priority infrastructure, will reduce congestion along the Bay Bridge, leading to reductions in travel times for travelers in the corridor.

The TCMP, in conjunction with five new traction power substations and an increased fleet, will allow the number of trains operating through the Transbay Tube to increase from 23 to 30 per hour, and peak hour train lengths to be increased from an average of 8.9 cars to 10, maximizing person throughput capacity in the corridor. In addition, the TCMP is expected to improve system reliability. BART estimates that up to 40 percent of current system delays are due to train control issues. Better reliability results in enhanced confidence in the system which leads to increased ridership. Research has shown that travelers are more sensitive to travel time reliability than they are to travel time itself.

The Crossings paper, in each of the crossing concepts that involve BART, has a large effect on service coverage. In Concepts #3, #4, #6, and #7, at least 15 new transit stations will be added, distributed between the East Bay and San Francisco. Additionally, these concepts will provide 8-minute headways in peak and 15-minute headways off peak thorough the corridor.

4.3.2 Multimodal Metrics

Both studies note the growing demand for transit within the Transbay Corridor as congestion on the Bay Bridge further increases auto travel times. However, passenger loads on the transit system, specifically the BART system, are very high. In order to address this, the BACCTS considered and recommended adjusting transit fares across different modes (train, bus, ferry) to better balance passenger loads. Additionally, the study recommended increasing ferry frequencies to 15- and 30-minute headways to increase the competitiveness of the mode in relation to bus and train transit.

The BACCTS selected travel demand model findings for the recommended package are displayed in Table 4-1 below. According to these findings, the intended effects of the recommended package will be realized in terms of change in commute mode. Carpooling, bus, and ferry use will all increase as transit priority lanes are added to the Bay Bridge and tolls and transit fares are modified to encourage this behavior. Further, the strain on the BART system will be reduced slightly as travelers choose to use other transit modes.

Table 4-1: Package 3 Increase in Travel Demand by Mode

	2030 Baseline Peak-Hour Trips	2030 Peak-Hour Trips with Infrastructure, Transit and Tolls	% Change
Non-HOV	10,855	10,178	-6%
HOVs	10,567	11,286	7%
BART	31,679	30,632	-3%
Bus	3,845	7,678	100%
Ferry	1,871	4,175	123%
Total	58,817	63,949	9%

Source: Bay Area Core Capacity Transit Study

As described earlier in this plan, the Crossings paper evaluated the benefit cost ratios of each of its proposed crossing concepts to help determine which crossing to recommend. The Crossings study calculated per capita benefits by monetizing social benefit categories like transit crowding, freeway reliability, access to mobility, auto ownership, health, safety and the environment. Projects with expected benefit/cost ratios of 1.0 or greater are considered especially strong while those with ratios below 0.5 rank at the low end of the benefit/cost scale. Results shown in Figure 4-2 below display the results of this analysis for each of the Horizon futures.

Table 4-2: Crossing Concepts Benefit Cost Ratios over 2025-2080

Mode	Crossing	Rising Tides, Falling Fortunes	Clean and Green	Back to the Future
	Concept #1	●○○○	●○○○	●○○○
	Concept #2	●○○○	●○○○	●●●○
	Concept #3	●●○○	●●●○	●●●○
	Concept #4	●●○○	●●●○	●●●○
	Concept #5	●●○○	●●●○	●●●●
	Concept #6	●●○○	●●●○	●●●○
	Concept #7	●●○○	●●●○	●●●○

Color Range: < 0.5 | 0.5–0.9 | 1.0–1.9 | > 1.9

Notes:
- Benefit-Cost ratios over the time period: 2025-2080
- Discount rate: 3%. Time to Implement: 10 years
- Costs include a residual value of investment at 2080

Source: Crossings: Transformative Investments for an Uncertain Future

5 Connection to Other Planning Activities

As multimodal and collaborative studies, the BACCTS and Horizon Crossings Perspective Paper contain many similarities in approach and principles of many other federal, state, and local planning activities. As described in Section 3.1, the guiding principles of both studies cover a wide array of areas including increasing capacity, multimodal corridor demand, transit utilization, environmental resiliency, and economic prosperity. These principles are not unique to the BACCTS and Crossings study; rather they are consistent with the goals and principles of many other federal, state, and local planning activities. The following subsections summarize several different plans and programs which align with the goals and principles of the BACCTS and Crossings paper.

5.1 Federal

The **Congestion Mitigation and Air Quality Improvement** (CMAQ) Program provides federal funds to States for transportation projects designed to reduce traffic congestion and improve air quality, particularly in areas of the country that do not attain national air quality standards. Both the BACCTS and Crossings studies placed a focus on reducing traffic congestion and considering environmental effects of the proposed strategies. The BACCTS, in each package of short- and medium-term investments, considered toll increases in order to reduce congestion on the Bay Bridge. The Horizon Crossings Healthy guiding principle placed a focus on decreasing emissions in order to ensure that the region's natural resources, open space, clean water and clean are conserved.

The **ITS Strategic Plan 2020–2025**, developed by the USDOT ITS Joint Program Office (JPO), includes in-depth discussion of the ITS JPO's strategic goals, related research areas, and four technology transfer programs, which together work to accelerate deployment:

- Emerging and Enabling Technologies
- Data Access and Exchanges
- Cybersecurity for ITS
- Automation
- Complete Trip – ITS4US
- Accelerating ITS Deployment through:
    - ITS Evaluation
    - ITS Professional Capacity Building
    - ITS Architecture and Standards
    - ITS Communications

The BACCTS prerequisite projects include one major ITS deployment in the form of the communications-based train control project, a major component of the TCMP. This project, and its inclusion in the BACCTS, aligns with the ITS strategies outlines in the ITS JPO strategic plan.

5.2 State

The **California Transportation Plan 2040** (CTP) is the state's long-range transportation plan that establishes an aspirational vision that articulates strategic goals, policies, and recommendations to improve multimodal mobility and accessibility while reducing greenhouse gas emissions. The purpose of the plan is to present innovative, sustainable, and integrated multimodal mobility solutions.

The **Interregional Transportation Strategic Plan** (ITSP) is the long-range planning document that helps prioritize transportation projects across the state and supports Caltrans' role in improving the interregional movement of people, vehicles, and goods. The ITSP guides Interregional Transportation Improvement Program (ITIP) funds towards intercity rail corridors and a subset of routes identified in California's legislatively designated Interregional Road System (IRRS). BART connects Capitol Corridor intercity rail service at Richmond and Oakland Coliseum as well as Amtrak Thruway service at the Salesforce Transit Center.

Smart Mobility 2010: A Call to Action for the New Decade, also known as The Smart Mobility Framework (SMF), is a planning guide that furthers integration of smart growth concepts into transportation planning in California. Smart Mobility moves people and freight while enhancing California's economic, environmental and human resources by emphasizing:

- Convenient and safe multimodal travel
- Speed suitability
- Accessibility
- Management of the circulation network
- Efficient use of land

Smart Mobility responds to the transportation needs of the State's people and businesses, addresses climate change, advances social equity and environmental Justice, supports economic and community development, and reduces per capita vehicle miles traveled.

The **Scoping Plan for Achieving California's 2030 Greenhouse Gas Target** (California Climate Change Scoping Plan) identifies how California can reach their 2030 climate target to reduce greenhouse gas (GHG) emissions by 40 percent from 1990 levels, and substantially advance toward our 2050 climate goal to reduce GHG emissions by 80 percent below 1990 levels.

The **California State Rail Plan** (CSRP) is a strategic plan with operating and capital investment strategies that will lead to a coordinated, statewide travel system. The Rail Plan is an important element in the comprehensive planning and analysis of statewide transportation investment strategies detailed in the CTP. In concert with CTP 2040 and other plans, the Rail Plan will help clear the air, invigorate cities, and provide the mobility that Californians will need in the future. This Rail Plan is more ambitious than

previous rail plans. In compliance with federal and state laws, it proposes a unified statewide rail network that better integrates passenger and freight service, connects passenger rail to other transportation modes, and supports smart mobility. The CSRP also contains specific mention of the TCMP as a part of its plan to meet demand in the Bay Area.

The California **Congestion Management Program** (CMP) is a state-wide transportation funding proposal that requires local governments to implement mitigation measures to offset the impacts from new development on the regional transportation system. The goal is to link land use, transportation, and air quality decisions at the regional and local level.

5.3 Regional

Plan Bay Area 2050 is a long-range plan charting the course for the future of the nine-county San Francisco Bay Area and serves as a continuation to Plan Bay Area 2040. Plan Bay Area 2050 will focus on four key issues—the economy, the environment, housing and transportation—and will identify a path to make the Bay Area more equitable for all residents and more resilient in the face of unexpected challenges. Building on the work of the Horizon initiative, this new regional plan will outline strategies for growth and investment through the year 2050, while simultaneously striving to meet and exceed federal and state requirements. The TCMP is a key component of this regional plan. Plan Bay Area 2050 also plans growth around PDAs, in accordance with California's Sustainable Communities Strategy.

Plan Bay Area 2040 was adopted in July 2017 and is the predecessor plan to Plan Bay Area 2050, which is now under development. PBA 2040 discusses how the Bay Area will grow over the next two decades and identifies transportation and land use strategies to enable a more sustainable, equitable and economically vibrant future. The plan includes discussion of transit modernization and efficiency as well as associated discussions around equity and disadvantaged communities that will benefit from the project.

The **Bay Area Regional Rail Plan,** developed by the MTC in partnership with the California Heed Rail Authority, BART and Caltrain outlines near-, intermediate- and long-term strategies to:

- Incorporate more passenger trains into existing rail systems
- Expand the regional rail service network
- Improve connections between high-speed rail and other transit services
- Coordinate rail investment around transit-oriented neighborhoods – or TODs – and business districts

The Regional Rail Plan proposed the idea of creating a higher frequency, higher capacity BART system to support the urban core of the Bay Area. This is a concept that will be effectuated by the TCMP.

The **Alameda Countywide Transit Plan**, developed by the Alameda County Transportation Commission in close coordination with local jurisdictions and transit providers identifies near- and long-term transit capital and operating priorities aimed to creating a transit system that is dependable, easy-to-use, safe, affordable, and competitive with travel by other modes while aligning with land use and economic development goals across the county. The plan addresses American's with Disabilities Act paratransit, potential for public and private shuttles in the transit network, and solicited input from private industry groups, community groups and the public. The plan links BART, AC Transit, and WETA service to other regional providers like the Altamont Corridor Express (ACE) and Capital Corridor intercity train services.

The **San Francisco Transportation Plan** is the citywide, long-range investment and policy blueprint for San Francisco's transportation system. The plan analyzes every transportation mode, every transit operator, and all streets and freeways every four years. The San Francisco Transportation Plan process coincides with the development of Plan Bay Area 2050 and incorporates input from all transportation providers within San Francisco including BART. The plan also highlights the delays related to an outdated train control system on the BART line as well as other plans to increase capacity and reliability throughout the city, which includes portions of the Transbay Corridor.

6 Outcomes

6.1 BACCTS Outcomes

To assess how well each package addressed the capacity and performance issues facing the Transbay Corridor, the BACCTS identified priority evaluation criteria based on the study's guiding principles (Section 3.1). The criteria aim to answer key questions, including how well demand is served, how the appeal of transit improves, and how efficient and reliable the system is. The criteria are as follows:

- **Capacity**: How many more people can be carried by transit?
- **Utilization**: How much of the capacity offered is expected to be used?
- **Reliability**: To what degree is variability in travel time reduced, in order to make the transit trip more attractive and competitive for users?
- **Resiliency**: Does the package improve the transit network's ability to recover from or adjust to routine delays or extraordinary events?
- **Efficiency**: How much will it cost?

Based on the results of the analysis, the BACCTS recommended advancing a modified version of Package 3 (Infrastructure, Transit, and Tolls), which includes the pre-requisite projects outlined in Section 4.1. This package adds additional bus and ferry transit service with increased bus and ferry fleets, new bus-priority infrastructure to ensure buses can travel quickly through the bridge toll plaza, surface street improvements to improve travel times leading up to the bridge in Oakland and Emeryville, and a small increase of Bay Bridge auto tolls. The elements of the recommended package are detailed in Table 3-4. Improvements include Transbay Corridor prerequisite projects that are not yet fully funded, in addition to the short- and medium-term project recommendations. Estimated annual operating costs are shown in Table 3-5. Figure 4-5 illustrates the impact of the recommended package on corridor capacity and demand over time. The primary benefits of the recommended package are as follows:

- **Benefits for buses:** Implement new surface-street transit-priority lanes to the bridge and refurbish an old Key System tunnel to provide direct bus access to the toll plaza. Increase AC Transit Transbay bus service during the peak hour for more service reliability. Reduce vehicle queues at the toll plaza to help provide more reliable transit service, allowing buses to quickly access HOV lanes with minimal delay.
- **Benefits for ferries:** Increase ferry service during the peak hour from Oakland, Alameda, and Vallejo. Add new ferry terminals in Alameda and new routes from Berkeley and to Mission Bay.
- **Incentivizing carpools and transit:** Incentivize people to make their commute by transit or carpool, or during another time of the day.

Key components of the recommended package include:

- BART Train Control Modernization Program
- BART Traction Power System
- WETA maintenance facilities and terminal expansion
- BART Hayward Maintenance Complex Phases 1 and 2
- AC Transit new bus ramp to Salesforce Transit Center and new bus facility
- AC Transit, BART, and WETA fleet expansion
- New bus tunnel to Bay Bridge toll plaza
- New surface-street transit priority
- lanes connecting to I-80, I-580
- More Transbay bus service
- More ferry services
- New ferry routes
- New bus park-and-ride lots
- New ferry terminals
- New ferry feeder service
- Small, medium, or large automobile toll increase

Other key findings in the BACCTS include:

- **Each package performed differently in the toll plaza queuing analysis** with respect to the level of toll increase needed to provide buses free-flow access to the HOV access points at the plaza. Table 3 documents which level of toll increase is needed for each package.
    - Adding new transit-priority infrastructure would reduce the need for a high toll increase as new infrastructure allows buses to bypass some queues. However, new infrastructure alone is not sufficient to create transit free-flow conditions.
    - Without new transit-priority infrastructure, high toll increases are needed to incentivize changes in travel behavior to create transit free-flow conditions.
- **Transit fare adjustments are an effective tool** to manage demand but are not essential for meeting study objectives.
- **Neither a contraflow or bus-only / bus + HOV lane will fulfill the study's objectives when implemented alone,** but either could be considered as additional service reliability is needed after necessary tolling, service, and infrastructure improvements have been delivered.
- **A contraflow lane would improve transit reliability and is operationally viable** but would require additional infrastructure, conversion of a travel lane on the bridge's lower deck, and an education process to alert drivers to oncoming bus traffic.
- **A bus-only / bus + HOV lane would improve transit reliability but poses vehicle-weaving challenges** and would create longer auto queues behind the toll plaza due to the dedicated lane on the bridge.

The BACCTS is a highly detailed study that analyzes many ways transit operators can increase capacity within the Transbay Corridor. However, before any of these steps can be taken, certain prerequisite and common projects must be funded and implemented in order for these operators to adequately increase capacity to meet ever-growing demand in the corridor. The Train Control Modernization Program projects are included in the prerequisite projects list in the BACCTS packages; projects that are a part of the Bay Area's transportation plan but lack the necessary funding necessary to implement. Funding is needed to advance the recommended package toward implementation; the TCMP has been partially programmed in both regional and state funding plans.

6.2 Horizon Crossings Outcomes

The Horizon Crossings Perspective Paper contributes to the Bay Area's continuing regional dialogue about the pros and cons of constructing an additional crossing of San Francisco Bay. Five key questions were posed at the beginning of the study:

1. Do the crossings adequately accommodate Transbay travel demand?
2. Are the crossings resilient enough to deliver benefits under uncertain future conditions?
3. Do the crossings align with Horizon's guiding principles?
4. Do the crossings improve accessibility for low-income populations?
5. Do the crossings' benefits outweigh their costs?

Table 6-1 summarizes how the seven Crossings concepts would address these key questions and identifies whether these concepts would result in an increase or decrease in overall vehicle-miles traveled, and an increase or decrease in transit ridership. The study recommends the following:

- **Do not advance the two auto-only crossing concepts (#1 New San Mateo-Hayward Bridge and #2 Mid-Bay Bridge)** for further analysis during the Horizon/Plan Bay Area 3050 process or in other future Transbay crossing efforts
- **Advance the three transit-only crossing concepts (#3 BART Market Street Redundancy, #4 BART New Markets and #5 Greater Regional Rail)** as Priority 1 concepts for further analysis in Horizon and contemplated for inclusion in Plan Bay Area 2050. These concepts should be advanced for further analysis in future Transbay crossing efforts.
- **Advance Concept #6 (Paired BART + Auto)** as a Priority 2 concept and considered for further advancement only after additional analysis of equity impacts
- **Advance Concept #7 (Paired BAART + Rail)** as a Priority 2 concept and advanced for further discussions with partner agencies focusing on whether the concept's high cost is a barrier to its inclusion in further studies and whether its components should be evaluated separately.

Table 6-1: Crossings Finding Summary

MODE	CROSSING #	KEY QUESTIONS					REGIONAL VEHICLE MILES TRAVELED	REGIONAL TRANSIT RIDERSHIP
		Q1	Q2	Q3	Q4	Q5		
	Concept 1	○	✔	○	○	○	INCREASE	DECREASE
	Concept 2	○	✔	○	○	○	INCREASE	DECREASE
	Concept 3	✔	✔	✔	✔	✔	DECREASE	INCREASE
	Concept 4	✔	✔	✔	✔	✔	DECREASE	INCREASE
	Concept 5	✔	✔	✔	✔	✔	DECREASE	INCREASE
	Concept 6	✔	✔	✔	✔	✔	DECREASE	INCREASE
	Concept 7	✔	✔	✔	✔	✔	DECREASE	INCREASE

Source: Crossings: Transformative Investments for an Uncertain Future

Transit-only concepts performed very well in the Crossings analysis, highlighting the importance of BART and conventional rail to transit demand in the region. The Crossings paper is a long-term planning document and is meant as a continuation of the short- and medium-term analysis conducted in the BACCTS. This indicates that the need for, and the success of a new crossing is predicated on successful implementation of the BACCTS short-term improvements, which include the TCMP. Without timely implementation of the TCMP, the ability of Transbay Corridor transit to meet growing demand now and in the future will be affected.

7 Conclusion

This Hybrid Summary Comprehensive Multimodal Corridor Plan summarizes the regional need to reduce congestion and improve system reliability in the Transbay Corridor. An essential part of accomplishing this goal is the implementation of the Train Control Modernization Program, considered an essential program by both the Bay Area Core Capacity Transit Study and Horizon Crossings Perspective Paper, as well as other transportation plans including the California State Rail Plan and Plan Bay Area 2050. These studies have shown the ability for the TCMP, implemented in conjunction with other transit prioritization projects, to significantly increase capacity and reduce congestion throughout the Transbay Corridor.

APPENDIX B

Project Evaluation

Table B-1. Goal 1: Connected & Multimodal

#	PROJECT NAME	ESTIMATED COST ($M)*	INCREASE NUMBER OF MULTIMODAL OPTIONS IN THE CORRIDOR	REDUCE MULTIMODAL GAPS IN THE CORRIDOR	IMPROVE TRAVEL TIMES AND TRAVEL TIME RELIABILITY FOR CURRENT AND FUTURE USERS OF THE CORRIDOR	SUPPORT SYSTEM AND LAND USE EFFICIENCY	GOAL 1 TOTAL
1	Bay Skyway Phase 1	$170	M The project would accommodate one new travel mode (frequent ferry) and facilitate trips using active modes.	M Would create connections between active transportation and ferry and create a new way to travel from Oakland to San Francisco.	M Frequent ferry service to SF would increase travel time reliability. Active transportation would provide more reliability for users.	L Small impact on person throughput.	**M**
2	Bay Skyway Phase 2	$500	H The project would accommodate ferry, bicycle, pedestrian, and micromobility options in the complete transbay corridor.	H Would fill major gaps in the active transportation network. West Span would provide 24/7 active transportation travel across the corridor and late-running ferry would connect people during more hours of the day.	H Frequent ferry service to SF would increase travel time reliability. Active transportation options would provide travel time reliability and would be available 24/7.	M Would moderately increase person throughput through the corridor.	**H**
3	Treasure Island Ferry	$10	M The project would provide a new mode in the corridor	M Would close a gap in ferry access between TI and SF and offer more service throughout the day	M Frequent ferry service to SF would increase travel time reliability and decrease travel time for people traveling between SF and TI only.	L Ferry service between SF & TI would increase person throughout for this segment of the corridor	**M**
4	Expanded Muni service to Treasure Island	$19	L The project would expand an existing mode but not accommodate any additional modes.	M Would enhance the connection between bus service between SF and TI, including a new destination in San Francisco.	M Exclusive westbound Bay Bridge on-ramp access would increase reliability for people traveling between SF and TI.	M More buses between SF & TI would increase person throughput for this segment of the corridor	**M**
5	AC Transit service to Treasure Island	$8	M The project would provide a new mode in the corridor	M Would close a gap in access between TI and Oakland and offer more service throughout the day	M A reduction in SOV use resulting from new bus service could ease congestion and increase travel time reliability for this segment of the corridor	M More buses between the East Bay & TI would increase person throughput for this segment of the corridor	**M**
6	West Oakland Industrial Streets	$40	L Would increase accommodations for active transportation in Oakland only.	M Would increase availability of continuous active transportation facilities in Oakland only.	L Would only have potential to shorten transbay travel times in conjunction with other projects.	L Would have no effect on person throughput without other projects.	**L**
7	Grand Avenue Mobility Plan Implementation	$118	L Would increase accommodations for active transportation and transit in Oakland only.	M Would increase availability of continuous active transportation facilities in Oakland only.	L Would only have potential to shorten transbay travel times in conjunction with other projects.	L Would have no effect on person throughput without other projects.	**L**
8	Richmond Ferry Frequency Increase	$20	L Would not increase the number of multimodal options	M Would increase ferry availability for people traveling between the East Bay and SF.	M Would improve travel time reliability for people traveling between the East Bay and SF	M Would moderately increase person throughput through the corridor.	**M**
9	Redwood City-San Francisco-Oakland Ferry	$60	M Would increase multimodal options for people traveling between Oakland and the Peninsula	H Would close a gap in ferry availability for people traveling between the Peninsula and Oakland	H Would improve travel time reliability for people traveling between the Peninsula and Oakland compared. A bigger impact would be expected compared to Richmond Ferry Increase because this is a new service.	M Would moderately increase person throughput through the corridor.	**H**
10	BART Transbay Corridor Capacity and Station Access Supportive Improvements	$1,200	L Would not increase multimodal options	L Would not reduce multimodal gaps	L Access-related improvements may improve travel time reliability for users	M Access-related improvements could increase person throughput systemwide. Other improvements would potentially increase transit utilization	**L**

*Cost in 2022 dollars

Table B-2. Goal 2: Safe & Well

#	PROJECT NAME	ESTIMATED COST ($M)*	REDUCE COLLISIONS		INCREASE POSITIVE PUBLIC HEALTH OUTCOMES THROUGH ACTIVE TRANSPORTATION		GOAL 2 TOTAL
1	Bay Skyway Phase 1	$170	M	Would reduce collisions through a reduction in VMT and the addition of a separated path on YBI	M	Would result in a shift towards active transportation mode share through walking, biking, and micromobility. This would be limited to East Bay-TI trips.	**M**
2	Bay Skyway Phase 2	$500	H	Would reduce collisions through a reduction in VMT (higher than phase 1) and the addition of a separated path on YBI	H	Would result in an increased active transportation mode share through walking, biking, and micromobility to cross the Bay.	**H**
3	Treasure Island Ferry	$10	M	Would reduce collisions through a reduction in VMT.	L	An increase in people using the ferry would lead to a slight increase in first/last mile active transportation.	**M**
4	Expanded Muni service to Treasure Island	$19	M	Would reduce collisions through a reduction in VMT.	L	An increase in people using transit would lead to a slight increase in first/last mile active transportation.	**M**
5	AC Transit service to Treasure Island	$8	M	Would reduce collisions through a reduction in VMT.	L	An increase in people using transit would lead to a slight increase in first/last mile active transportation	**M**
6	West Oakland Industrial Streets	$40	M	Would reduce collisions through improved active transportation infrastructure.	M	Would result in a shift towards active transportation modes for Oakland only but could encourage more people to use AT for local trips.	**M**
7	Grand Avenue Mobility Plan Implementation	$118	M	Would reduce collisions through improved active transportation infrastructure and VMT reduction	M	An increase in people using transit would lead to a slight increase in first/last mile active transportation. Would result in a shift towards active transportation modes for Oakland only but could encourage more people to use AT for local trips.	**M**
8	Richmond Ferry Frequency Increase	$20	H	Would reduce collisions by reducing VMT through shift to a non-driving option	L	An increase in people using transit would lead to a slight increase in first/last mile active transportation	**M**
9	Redwood City-San Francisco-Oakland Ferry	$60	H	Would reduce collisions by reducing VMT through shift to a non-driving option	L	An increase in people using transit would lead to a slight increase in first/last mile active transportation	**M**
10	BART Transbay Corridor Capacity and Station Access Supportive Improvements	$1,200	M	Increased transit utilization could reduce collisions by reducing VMT	L	An increase in people using transit would lead to a slight increase in first/last mile active transportation	**M**

*Cost in 2022 dollars

Table B-3. Goal 3: Equitable

#	PROJECT NAME	ESTIMATED COST ($M)*	INCREASE TRANSPORTATION OPTIONS FOR EQUITY PRIORITY COMMUNITIES		INCREASE TRANSPORTATION BENEFITS FOR PEOPLE WITH DISABILITIES		GOAL 3 TOTAL
1	Bay Skyway Phase 1	$170	M	Would give West Oakland and SF / Treasure Island EPC residents a low-cost option for travel to SF. (There are no bike tolls, and ferry rides will be subsidized for low-income TI residents.)	M	The project would give people with disabilities one additional option for travel across the Bay but would require a transfer. Ferry would benefit TI residents with disabilities traveling to SF and the multi-use paths would benefit TI residents traveling to the East Bay.	**M**
2	Bay Skyway Phase 2	$500	H	Would give West Oakland and SF / Treasure Island EPC residents multiple low-cost options for travel to SF. (There are no bike tolls, and ferry rides will be subsidized for low-income TI residents.)	M	The project would give people with disabilities additional direct options for travel across the corridor.	**H**
3	Treasure Island Ferry	$10	M	Would give TI EPC residents additional options for travel to SF	M	Would give TI residents with disabilities additional options for travel to SF but would not benefit travel to / residents of the East Bay.	**M**
4	Expanded Muni service to Treasure Island	$19	M	Would give TI EPC residents additional options for travel to SF	M	Would give TI residents with disabilities additional options for travel to SF but would not benefit travel to / residents of the East Bay.	**M**
5	AC Transit service to Treasure Island	$8	M	Would give TI EPC residents additional options for travel to Oakland	M	Would give TI residents with disabilities additional options for travel to the East Bay but would not benefit travel to / residents of SF.	**M**
6	West Oakland Industrial Streets	$40	M	Would increase transportation options for West Oakland residents, but only for local trips without other projects.	L	Would increase mobility options for local trips for West Oakland residents with disabilities.	**M**
7	Grand Avenue Mobility Plan Implementation	$118	M	Would increase transportation options for West Oakland residents, but only for local trips without other projects.	M	Would increase mobility options for local trips for West Oakland residents with disabilities. Transit improvements would have more of an impact than active transportation improvements.	**M**
8	Richmond Ferry Frequency Increase	$20	M	Would improve connections between equity priority communities in Richmond and those in SF	M	Would improve East Bay-SF transportation options for people with disabilities	**M**
9	Redwood City-San Francisco-Oakland Ferry	$60	M	Would improve connections between equity priority communities in Redwood City and those in Oakland	M	Would improve East Bay-SF transportation options for people with disabilities	**M**
10	BART Transbay Corridor Capacity and Station Access Supportive Improvements	$1,200	M	Could make transit a more viable option for users in EPCs on both sides of the Bay	H	Systemwide ADA access improvements at BART stations	**H**

*Cost in 2022 dollars

Table B-4. Goal 4: Affordable & Vibrant

#	PROJECT NAME	ESTIMATED COST ($M)*	INCREASE ACCESS TO JOBS	REDUCE TRANSPORTATION COSTS	CREATE JOBS	GOAL 4 TOTAL
1	Bay Skyway Phase 1	$170	M Project would increase the number of households with non-driving access to jobs across the Bay, but by relatively low amounts	H $5 ferry between TI and SF would be subsidized for low-income TI residents as part of the TIMMA affordability program.	M A small number of construction and ferry-related jobs would be created. Ferry jobs would be ongoing.	**M**
2	Bay Skyway Phase 2	$500	H Project would allow active transportation access for East Bay residents who work in San Francisco and live within a 60-minute bike ride of SF	H Free travel between East Bay and SF	M Many construction jobs and a small number of ferry-related jobs would be created. Ferry jobs would be ongoing.	**H**
3	Treasure Island Ferry	$10	M Project would increase the number of TI households with non-driving access to jobs in SF but would not benefit travel to / residents of the East Bay	M Reduced TI transit pass for residents and workers would reduce costs compared to driving, but no effect on East Bay-SF trip costs	L A small number of ferry-related jobs would be created. Ferry jobs would be ongoing.	**M**
4	Expanded Muni service to Treasure Island	$19	M Project would increase the number of TI households with non-driving access to jobs in SF but would not benefit travel to / residents of the East Bay	M Reduced TI transit pass for residents and workers would reduce costs compared to driving, but no effect on East Bay-SF trip or TI-East Bay costs	M Some ongoing transit jobs would be created.	**M**
5	AC Transit service to Treasure Island	$8	M Project would increase the number of TI households with non-driving access to jobs in the East Bay but would not benefit travel to / residents of SF	M Bus option would reduce costs compared to driving, but no effect on East Bay-SF or TI-SF trip costs	M Some ongoing transit jobs would be created.	**M**
6	West Oakland Industrial Streets	$40	L Would not impact West Oakland residents' access to major employment centers.	L Would reduce local transportation costs for West Oakland residents.	L A small number of temporary construction jobs would be created.	**L**
7	Grand Avenue Mobility Plan Implementation	$118	L Could improve West Oakland residents' access to jobs in Downtown Oakland	L Would reduce local transportation costs for West Oakland residents.	L A small number of temporary construction jobs would be created.	**L**
8	Richmond Ferry Frequency Increase	$20	M Would increase East Bay residents' access to jobs in SF	M $4.50 ferry from Richmond to SF would reduce costs from driving	L A small number of additional ferry jobs would be created (one new vessel)	**M**
9	Redwood City-San Francisco-Oakland Ferry	$60	H Would increase access to jobs in the Peninsula and East Bay	M Estimated $6.75 ferry would reduce costs from driving across the Bay	M A number of short-term construction and permanent ferry jobs would be created (3 new vessels)	**M**
10	BART Transbay Corridor Capacity and Station Access Supportive Improvements	$1.2	L Would not increase the number of households within reach of major employment centers via transit	L Could reduce transit costs for some users by making BART a more appealing option than driving	L Short-term construction jobs would be created. Unclear if the project would create more permanent maintenance or security-related jobs	**L**

*Cost in 2022 dollars

Table B-5. Goal 5: Sustainable

#	PROJECT NAME	ESTIMATED COST ($M)*	PROVIDE ALTERNATIVES TO DRIVING ALONE		DECREASE VMT		DECREASE EXPOSURE TO CRITERIA POLLUTANTS AND GHG EMISSIONS		GOAL 5 TOTAL
1	Bay Skyway Phase 1	$170	M	Active transportation + ferry would be a viable alternative for some to driving alone	M	Some mode shift away from SOVs would be expected.	M	Mode shift away from SOVs would be expected, resulting in a reduction of pollutants. However, an increase in active transportation could increase individuals' exposures to ambient air pollution.	**M**
2	Bay Skyway Phase 2	$500	H	A direct active transportation route would be a viable alternative for some to driving alone	M	It is estimated that around 10 percent of person trips made via auto from the East Bay to the San Francisco core can be shifted to bike trips in the peak hour (MTC & Arup 2020, p. 14)	H	Mode shift away from SOVs would results in a reduction of pollutants. A greater shift would be expected compared to Phase 1 given the direct connection between the East Bay and SF. Air pollution exposure wouldn't be as much of a concern on the bridge	**H**
3	Treasure Island Ferry	$10	M	New ferry options would reduce the need for SOVs between SF and TI, but would not benefit travel to / residents of the East Bay	M	New ferry options would reduce the need for SOVs between SF and TI, but would not benefit travel to / residents of the East Bay	M	Mode shift away from SOVs would be expected, resulting in a reduction of pollutants.	**M**
4	Expanded Muni service to Treasure Island	$19	M	Expanded transit options would reduce the need for SOVs between SF and TI, but would not benefit travel to / residents of the East Bay	M	Expanded transit options would reduce the need for SOVs between SF and TI, but would not benefit travel to / residents of the East Bay	M	Mode shift away from SOVs would be expected, resulting in a reduction of pollutants.	**M**
5	AC Transit service to Treasure Island	$8	M	New transit options would reduce the need for SOVs between the East Bay and TI, but would not benefit travel to / residents of SF	M	Expanded transit options would reduce the need for SOVs between the East Bay and TI, but would not benefit travel to / residents of SF	M	Mode shift away from SOVs would be expected, resulting in a reduction of pollutants.	**M**
6	West Oakland Industrial Streets	$40	L	Would only provide transbay alternatives to driving alone together with other projects	L	Minor VMT reduction from local West Oakland trips.	L	Limited mode shift away from SOVs would be expected, resulting in a reduction of pollutants. However, an increase in active transportation could increase individuals' exposures to ambient air pollution.	**L**
7	Grand Avenue Mobility Plan Implementation	$118	L	Would only provide transbay alternatives to driving alone together with other projects	L	Minor VMT reduction from local West Oakland trips.	L	Limited mode shift away from SOVs would be expected, resulting in a reduction of pollutants. However, an increase in active transportation could increase individuals' exposures to ambient air pollution.	**L**
8	Richmond Ferry Frequency Increase	$20	M	Potential to increase non-SOV modeshare for East Bay-SF trips	M	Moderate VMT reduction from reduction in East Bay-SF SOV trips	M	Mode shift away from SOVs would be expected, resulting in a reduction of pollutants.	**M**
9	Redwood City-San Francisco-Oakland Ferry	$60	M	Potential to increase non-SOV modeshare for Peninsula-East Bay trips	M	Moderate VMT reduction from reduction in Peninsula-East Bay SOV trips	M	Mode shift away from SOVs would be expected, resulting in a reduction of pollutants.	**M**
10	BART Transbay Corridor Capacity and Station Access Supportive Improvements	$1.2	M	Potential to increase transit ridership systemwide	M	Moderate VMT reduction from shift away from transbay vehicle trips	M	Mode shift away from SOVs would be expected, resulting in a reduction of pollutants.	**M**

*Cost in 2022 dollars