North Alameda County
Core Connections
Comprehensive Multimodal Corridor Plan

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North Alameda County Core Connections Plan

A Comprehensive Multimodal Corridor Plan

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ALAMEDA
County Transportation Commission

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Executive Summary

The North Alameda County Core Connections Plan (NACCCP) is a Comprehensive Multimodal Corridor Plan (CMCP) for North Alameda County and presents a holistic approach for managing congestion, improving safety, expanding access and equity, and advancing climate adaptation and mitigation. Key strategies include managed/express lanes to maximize the efficient use of the existing freeways for motorists and transit riders, the development of express bus services, rail, and local transit improvements, and high-quality bicycle and pedestrian facilities.

The NACCCP was developed 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.

To align with state and regional policy, the NACCCP has the following six goals that form the foundation of the Plan's Evaluation Framework used to evaluate and recommend projects:

1. Improve Safety
2. Advance Access and Equity
3. Enhance Travel Reliability and Efficiency
4. Support Efficient Land Use
5. Improve Health and Sustainability
6. Strengthen Economic & Community Vitality

The NACCCP Study Area, shown in **Figure ES-1,** includes West Berkeley, Emeryville, West and Downtown Oakland, and the City of Alameda where it borders the estuary. The four interstate freeways in the Study Area—I-80, I-580, I-880, and I-980—provide major connections between the San Francisco Bay Area, Silicon Valley, Sacramento metropolitan regions, and the Central Valley and Sierra Nevada Mountains in the east. Major parallel and connecting state routes (SR) within the Study Area include San Pablo Avenue (SR 123), Ashby Avenue (SR 13), and the Webster/Posey Tubes (SR-260).

Given the convergence of I-80, I-580, and I-880 (known as the MacArthur Maze) and the proximity to the Port of Oakland, the San Francisco-Oakland Bay Bridge, and dense commercial and mixed land uses, the Study Area sees a high concentration of local, regional, and interregional movement of people and goods. As a result, Study Area freeways and arterials experience significant traffic congestion during weekday peak periods despite the existing offering of multimodal options.

To capture the multimodal nature of the Study Area, the NACCCP describes existing public transit services, park-and-ride facilities, shuttle services, and bicycle and pedestrian facilities. The Plan also includes a summary of the Transportation Systems Management and Operations

(TSMO) strategies and equipment that are currently deployed within the Study Area, the expansion of the broadband infrastructure, and existing freight facilities.

The existing and future condition performance assessment conducted for the NACCCP utilizes an integration of existing plans and studies with limited new analysis. Data is largely derived from the MTC Plan Bay Area (PBA) 2050 Model and the Alameda CTC Multimodal Monitoring Report (2018). Guided by the CMCP goals, the analysis focuses on five profiles: Mobility, Reliability, Safety, Sustainability, and Equity. Generally, the Study Area freeways perform poorly in metrics related to Mobility, Reliability, Safety, and Sustainability. Given the density of land uses and multimodal options within and near MTC Equity Priority Communities, the Study Area performs well in terms of equitable access. Regardless, any improvements to support the travel of low-income people and people of color are considered a high priority.

Although a great deal of community engagement in the Study Area has been conducted through recent transportation planning efforts, additional engagement was conducted through the NACCCP process to verify support for planned projects. Feedback through an interactive webmap and from discussions with key community-based organizations confirmed needs and priorities in the Study Area, including improving pedestrian and bicyclist safety, increasing the speed and reliability of transit service along congested corridors, and alleviating truck traffic impacts.

The COVID-19 pandemic affected Alameda County's health, economy, and travel patterns in 2020 and 2021. While long-term impacts are uncertain, the needs identified in this Plan are likely to be broadly relevant as Alameda County emerges from the crisis. Pandemic impacts highlight the importance of a resilient multimodal transportation system that meets all resident and worker needs, especially those of the most vulnerable.

This Plan recommends strategies that meet the needs identified in the Study Area and support NACCCP goals. The recommended strategies consist of a range of active transportation, environmental, goods movement, multimodal, rail safety, technology, and transit projects. Included in this multimodal package of strategies, among others, are projects to implement managed lanes and express bus lanes, high-quality bicycle and pedestrian facilities, and rail transit capacity and service enhancements. A qualitative and location-based evaluation of the projects reveals that each project scores highly against at least one of the six NACCCP goals and that, collectively, the projects would advance all the goals of the Plan.

Table ES-1 lists the recommended projects and **Figure ES-1** shows the mapped projects by project type.

Table ES-1: Recommended Projects

ID #	Project Type	Title	Description	Cost Estimate ($M)	Time Frame	Source
1	Transit	Shattuck Ave./Martin Luther King Jr. Way Corridor	Install and operate an enhanced bus service with signal priority and improved bus stops, along either Shattuck Avenue or Martin Luther King Jr. Way between Albany, Berkeley, and Downtown Oakland.	$57	Near-Term (≤10 years)	CTP ID #5
2	Multimodal	West Grand Ave. Corridor	Install protected bike lanes and a dedicated bus lane for both local and Transbay buses.	$93	Near-Term (≤10 years)	CTP ID #6A and 6B
3	Active Transportation	Oakland-Alameda Bicycle/Pedestrian Bridge	Complete feasibility studies and all pre-construction phases, and then construct an estuary crossing serving people walking and biking between Oakland near Jack London Square and the west end of Alameda via a bridge that is compliant with all Coast Guard navigational requirements.	$150	Medium-Term (10-20 years)	CTP ID #14
4	Multimodal	Transforming Oakland's Waterfront Neighborhoods (TOWN)	Construct 1.4 miles of new transit-only lanes, 10 miles of new sidewalks, and protected bike lanes to improve safety and connections between West Oakland, Chinatown, Downtown Oakland and the Waterfront. Implement rail safety, goods movement, and parking management improvements.	$75	Near-Term (≤10 years)	CTP ID #257
5	Multimodal	I-80/Ashby Ave. Interchange Modernization	Reconstruct interchange to build a new bike/ped bridge, increase vertical clearance, and include two roundabouts.	$157	Near-Term (≤10 years)	CTP ID #22

ID #	Project Type	Title	Description	Cost Estimate ($M)	Time Frame	Source
6	Multimodal	Oakland/Alameda Access Project	Between Oak Street and Union Street: reconfigure the interchange and intersections to improve connections between I-880, the Posey and Webster tubes, and downtown Oakland. Implement bicycle and pedestrian safety improvements.	$130	Near-Term (≤10 years)	CTP ID #26
7	Rail Safety	Rail Safety Enhancement Program	Implement a countywide grade crossing program and high priority grade separations as well as rail connectivity and efficiency improvements. Grade crossings in the study area include those located in Jack London Square (which are also part of the TOWN Project), and West Berkeley.	$29 (Est. cost of program in Study Area)	Near-Term (≤10 years)	CTP ID #27
8	Multimodal	San Pablo Ave. Corridor Near-Term Improvements	Implement multimodal upgrades along San Pablo Avenue in Alameda and Contra Costa counties. This includes dedicated transit infrastructure and safety improvements for bicycle and pedestrians.	$312	Near-Term (≤10 years)	CTP ID #28
9	Multimodal	19th Street Bike Station Plaza	Construct a BART-owned and operated bike station at 2029 Broadway (corner of 21st Street) with capacity for 400+ bicycles to support active access to BART. The bike station will have an attended area, as well as a self-service area. The latter will better serve cyclists who need to drop off or pick up their bikes outside of the attended area hours of operation. The bike	$6	Near-Term (≤10 years)	CTP ID #31

ID #	Project Type	Title	Description	Cost Estimate ($M)	Time Frame	Source
			station will be open to the general public and support bike trips to Uptown and Downtown Oakland.			
10	Transit	19th Street/Oakland BART Station Street Elevator	Construct a new street to concourse level elevator for the 19th Street/Oakland BART Station to improve access to/from the station.	$12	Near-Term (≤10 years)	CTP ID #32
11	Transit	BART Core Capacity	Program elements include train control modernization, rail car procurement, necessary traction power upgrades, and Transbay Corridor Core Capacity Program.	$1,587	Near-Term (≤10 years)	CTP ID #34
12	Transit	BART Next Generation Fare Gates	Implementation of fare gate replacement with next generation technology to reduce fare evasion.	$35	Near-Term (≤10 years)	CTP ID #35
13	Transit	Transit Operations Facility (TOF)	Design and construct a new Transit Operations Facility (TOF) to modernize the current operations-control infrastructure and upgrade technology to support system expansion and handle increases to transit service. The new TOF will support robust operations now, and 40 years into the future. The facility will consist of approximately 40,000-square-feet and include the elements critical to regional rail service.	$60	Near-Term (≤10 years)	CTP ID #41
14	Multimodal	West Oakland TOD	Implement a mixed-use, Transit-Oriented Development (TOD) at the West Oakland BART Station to improve access to/from the West Oakland BART Station.	$30	Near-Term (≤10 years)	CTP ID #42

ID #	Project Type	Title	Description	Cost Estimate ($M)	Time Frame	Source
15	Transit	BART Station Modernization and Access Improvements	Invest in stations and surrounding areas to advance transit ridership, improve safe access to/from stations, and enhance quality of life. Make investments in BART stations to improve the passenger experience and transform BART into a world-class transit system, including comprehensive and coordinated investments in station design, wayfinding, and passenger flow.	$2,273	Near-Term (≤10 years)	CTP ID #288
16	Multimodal	Lake Merritt TOD	Implement infrastructure to support the community and transportation hub at the Lake Merritt BART Station, supportive of new Transit-Oriented Development and active community spaces consistent with the vision identified in the Lake Merritt Station Area Plan.	$60	Near-Term (≤10 years)	CTP ID #39
17	Active Transportation	Bay Skyway (formerly West Oakland Link)	Construct an elevated pedestrian and bicycle path connecting the West Oakland community to Gateway Park and the Bay Bridge East Span bike path.	$63	Near-Term (≤10 years)	CTP ID #62
18	Active Transportation	I-80/Powell St Bike Improvements	Improve striping and signage, and potentially install a bicycle signal for crossings of the I-80 on and off-ramps.	$1	Near-Term (≤10 years)	Caltrans D4 Bicycle Plan ID #Ala-80-X02
19	Multimodal	40th Street Transit-Only Lanes and Multimodal Enhancements	Install bus-only lanes, a two-way separated bikeway on north side, bicycle-pedestrian intersection improvements, and streetscape improvements with opportunities for green infrastructure and art	$16	Near-Term (≤10 years)	CTP ID #49

ID #	Project Type	Title	Description	Cost Estimate ($M)	Time Frame	Source
			opportunities. The project is projected to result in a 1.5-minute reduction in WB PM peak bus travel time.			
20	Active Transportation	Greenway and Mandela Connector	Create a bicycle connection from Sherwin Avenue to Halleck, Beach, and Wood Streets, ultimately connecting to the Mandela Parkway. Provide an extension of the bicycle system and dramatically improve connections to existing Greenways and the Bay Trail.	$3	Near-Term (≤10 years)	CTP ID #50
22	Active Transportation	San Francisco Bay Trail and Bay Trail Connectors (Phase 1)	Complete the design, environmental review, and construction of the remaining 53 miles of San Francisco Bay Trail through Alameda County. This includes 20 miles in North County.	$115[1]	Near-Term (≤10 years)	CTP ID #63
23	Multimodal	I-580 Design Alternatives Assessments (DAAs) Implementation (Phase 1)	Implement recommendations from the I-580 DAA on the segments from Bay Bridge to I-238 and from I-238 to the I-580/I-680 interchange. The project includes managed lanes, express bus service, park, and ride lots, and potential bus on shoulder.	$128	Near-Term (≤10 years)	CTP ID #64
24	Multimodal	Bay Bridge Forward	Implement a suite of projects to improve transit travel time and reliability entering and traveling on the Bay Bridge, such as dynamic bridge operations, high-occupancy vehicle lane extensions, and express bus service.	$73	Near-Term (≤10 years)	CTP ID #62

ID #	Project Type	Title	Description	Cost Estimate ($M)	Time Frame	Source
25	Multimodal	I-80 Design Alternatives Assessments (DAAs) Implementation	Implement a range of strategies to address corridor congestion and prioritize transit and high-occupancy vehicles. Strategies could include changes to interchange ramps, express lanes, and/or additional lanes dedicated to transit or HOVs.	TBD	Near-Term (≤10 years)	I-80 DAA
26	Environmental	Norcal Drayage Hydrogen Fuel Truck Pilot	Implement a pilot program for cleaner, hydrogen fuel cell drayage trucks serving the Port of Oakland.	$23	Near-Term (≤10 years)	N/A
27	Environmental	Prescott Greening	Implement a pilot program to support green landscaping in Prescott neighborhood along Frontage Road.	$1	Near-Term (≤10 years)	N/A
28	Transit	Broadway Transit Corridor	Implement dedicated transit only lanes on outside traffic lanes along Broadway.	$22	Near-Term (≤10 years)	CTP ID #71
29	Multimodal	Downtown Oakland East-West Safe Streets	Implement transit, bicycle, and pedestrian improvements on 14th St and 20th St, including bicycle lanes, transit-boarding islands, pedestrian refuges, marked crossings, retimed signals, and sidewalk widening.	$20	Near-Term (≤10 years)	CTP ID #72A and 72B
30	Goods Movement	Oakland Army Base Infrastructure Improvements	Implement the Infrastructure Master Plan within the former Oakland Army Base, including Outer Harbor Intermodal Terminal improvements funded by the Trade and Corridor Improvement Fund. Improve trade, logistics and ancillary maritime services that promote cleaner modes of	$34	Near-Term (≤10 years)	CTP ID #75

ID #	Project Type	Title	Description	Cost Estimate ($M)	Time Frame	Source
			transportation, efficient goods movement, congestion relief on countywide freight corridors, new jobs, and fulfill a mandate to reduce truck trips through the West Oakland community. The work includes surface roadways and truck parking (complete), rail spurs and wharf facilities serving the logistics center (incomplete).			
32	Multimodal	West Oakland Industrial Streets	Improve industrial streets in West Oakland by removing defunct rail spurs and incorporating full curb/gutter, sidewalks, drainage, streetlights, pedestrian crossing improvements and bike infrastructure in street reconstruction.	$31	Near-Term (≤10 years)	CTP ID #78A and 78B
33	Environmental	Near and Mid-Term Port Operations and Emission Reductions	Develop freight electric vehicle charging standards, including the design and construction of infrastructure necessary to establish a permanent electric vehicle/equipment charging facility.	$120	Near-Term (≤10 years)	CTP ID #82A, 82B, 82C, and 82D
34	Environmental	Shoreline Overtopping Near Webster and Posey Tubes	Address shoreline overtopping to prevent flooding and inundation of this critical roadway facilities above the Webster/Posey Tubes (Caltrans property (State Route 260)) with a combination of seawall, levee, pumping system and best practice stormwater improvements.	$30	Near-Term (≤10 years)	CTP ID #13

ID #	Project Type	Title	Description	Cost Estimate ($M)	Time Frame	Source
35	Technology	Broadband Middle Mile Network (Oakland Flats)	Install Fiber Optic cable along Route 80, 980, 880, 77, and 185 corridors in Oakland Flats area	$0.1	Near-Term (≤10 years)	Caltrans State Highway Operation and Protection Program 2022
36	Multimodal	Link 21	The full project is not yet defined, though it will likely include construction of a new Transbay passenger rail crossing between Oakland and San Francisco.	N/A	Long-Term (20-30 years)	N/A
37	Multimodal	Vision 980	The Vision 980 Study will explore alternatives for reconnecting communities along the I-980 corridor, with a focus on environmental justice.	N/A	Long-Term (20-30 years)	N/A

Notes:

1. Excludes cost for miles outside of North County.

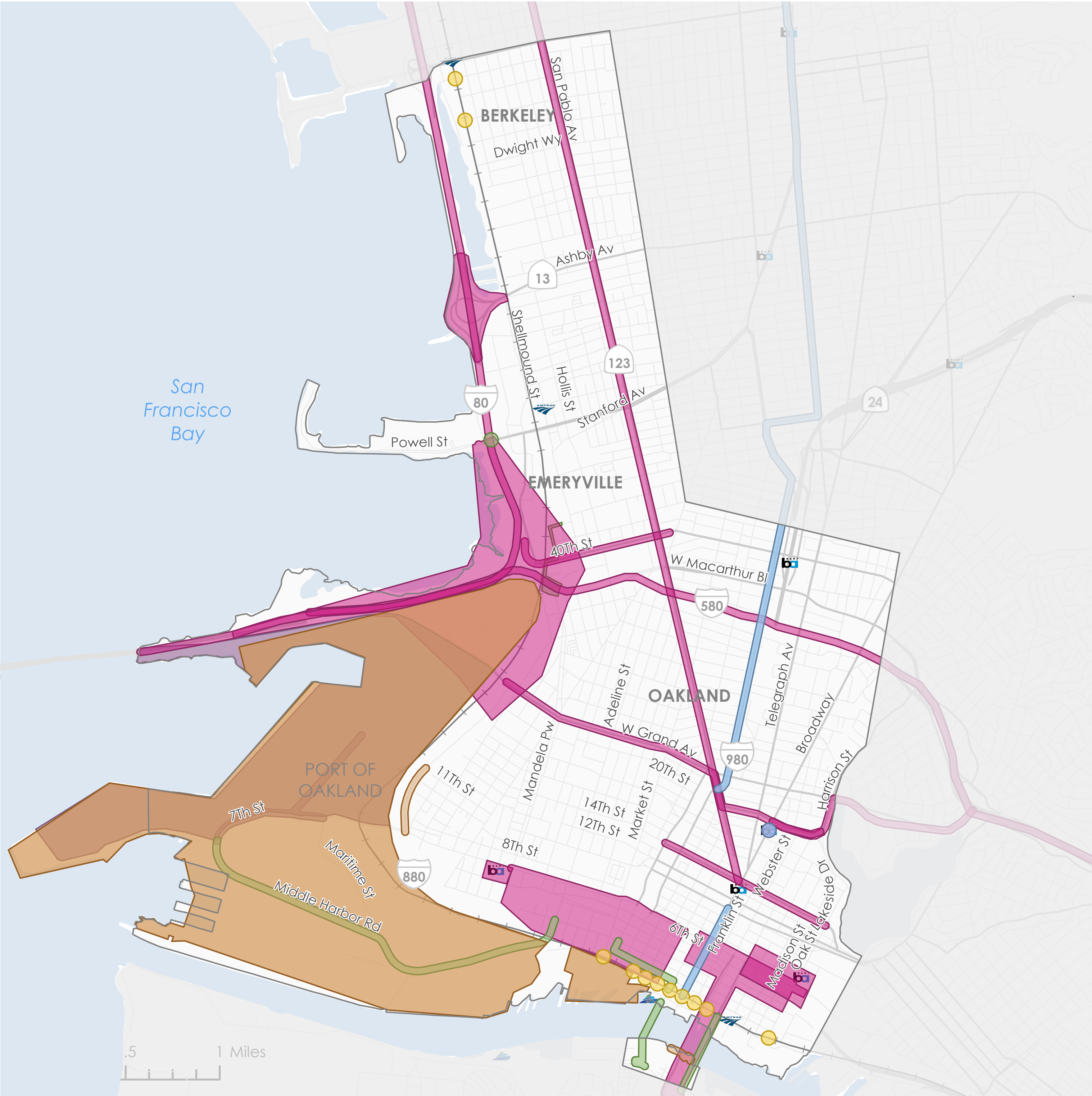

Figure ES-1

RECOMMENDED PROJECTS

Project Type

- Active Transportation
- Environmental
- Goods Movement
- Multimodal
- Rail Safety
- Transit

- Study Area
- BART Station
- Amtrak Station
- Amtrak Rail

*Only evaluated and mappable near-term and medium-term projects are included in this map.

1. Introduction

The North Alameda County Core Connections Plan (NACCCP) is a Comprehensive Multimodal Corridor Plan (CMCP) for North Alameda County. The NACCCP builds on regional and state policies and presents a holistic approach for managing congestion, improving safety, expanding access and equity, and advancing climate adaptation and mitigation in North Alameda County.

The NACCCP includes an assessment of existing facilities and performance in the Study Area, particularly on I-80, I-880, I-580, and I-980. Together, these freeways represent not only crucial components of the interstate system, but regional and state connections from the East Bay to San Francisco, Silicon Valley and Sacramento metropolitan regions, and the Central Valley and Sierra Nevada Mountains. To meet existing and future needs, the NACCCP recommends strategies that improve multimodal connectivity and safety for all users of the transportation system in North Alameda County.

The pandemic affected Alameda County's health, economy, and travel patterns in 2020 and 2021. While the long-term impacts are uncertain, the needs identified in this Plan are likely to be broadly relevant as Alameda County emerges from the crisis. Pandemic impacts highlight the importance of a resilient multimodal transportation system that meets all resident and worker needs, especially those of the most vulnerable.

1.1 Document Structure

The NACCCP includes the following chapters:

- Chapter 1 – Introduction
- Chapter 2 – Evaluation Framework
- Chapter 3 – Study Area Overview
- Chapter 4 – Multimodal Facilities, Services, and Programs
- Chapter 5 – Performance & Needs Assessment
- Chapter 6 – Stakeholder and Community Engagement
- Chapter 7 – Recommended Strategies

1.2 Partner Agencies

The development of the NACCCP relied on the participation and cooperation of all major agencies and cities in the Study Area. Alameda CTC led the development of the Plan in close coordination with Caltrans through monthly meetings. A Technical Advisory Committee (TAC) was also formed to collaborate on the document development and provided strategic guidance at key decision points. A detailed description of the stakeholder engagement process is described in Chapter 6. The TAC included representatives from the following agencies:

- Caltrans District 4
- Metropolitan Transportation Commission (MTC)
- Bay Area Air Quality Management District (BAAQMD)
- Bay Area Rapid Transit (BART)
- Alameda – Contra Costa Transit District (AC Transit)
- City of Alameda
- City of Berkeley
- City of Emeryville
- City of Oakland

2. Evaluation Framework

The goals, objectives, and performance measures for the NACCCP form the basis of an evaluation framework that lays the groundwork for project evaluation and prioritization in the Study Area. The NACCCP's goals and objectives are directly informed by existing state, regional, and county policies and plans. This chapter provides an overview of those policies and plans followed by the NACCCP evaluation framework.

2.1 State Policy

Several key state plans, policies, and guidelines relevant to multimodal infrastructure development provide a foundation for the NACCCP evaluation framework. These include California Transportation Commission (CTC) guidelines and Caltrans plans and policies.

CTC Guidelines

The NACCCP serves as a CMCP, which ensures that included projects are eligible for Solutions for Congested Corridors Program (SCCP) funding. The following CTC publications provide guidance on how to meet SCCP requirements and develop a needs-driven CMCP.

Solutions for Congested Corridors Program Guidelines, 2020

The SCCP was created by the Road Repair and Accountability Act of 2017, or Senate Bill 1 (SB 1).[1,2] The Program provides funding to projects designed to reduce congestion in highly traveled and congested corridors through performance improvements that balance environmental, transportation, and community benefits. Eligible projects can include improvements made to the state highway system, local streets and roads, public transit, and rail facilities, cycling and pedestrian facilities, required mitigation or restoration, or some combination thereof.

The SCCP Guidelines, originally published in 2018 and updated in 2022, establish technical requirements that projects must meet in order to be eligible for program funding (such as being included in a CMCP), and include evaluation criteria which are used to prioritize projects for funding based on how well they meet program objectives. Primary evaluation criteria include a project's impact on congestion relief, the incorporation of a variety of modes, minimization of vehicle miles traveled (VMT), and maximization of throughput. The secondary criteria by which projects are evaluated relate to qualitative and quantitative measures of a project's co-benefits, including benefits to safety, accessibility, economic development (i.e., job creation and retention), air quality and greenhouse gases, and efficient land use.

Comprehensive Multimodal Corridor Plan Guidelines, 2018

The CMCP Guidelines, adopted by the CTC in 2018, are intended to serve as a companion document to the SCCP Guidelines described above. The guidelines primarily provide direction to program applicants regarding the statutory requirements for comprehensive corridor plans

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[1] California Transportation Commission, Solutions for Congested Corridors Program Guidelines, https://catc.ca.gov/programs/sb1/solutions-for-congested-corridors-program, accessed March 1, 2022.

[2] California Senate Bill 1, Beall, Chapter 5, Statutes of 2017

utilized by agencies to apply for funding through the SCCP. A broader goal of the guidelines is to promote a holistic and multimodal planning process that achieves a balanced transportation system consistent with the intent of the program established by SB 1.

The CMCP Guidelines provide several frames of reference to help agencies developing CMCPs focus on appropriate goals and objectives. First, the Guidelines enumerate 17 sample state policies and goals that agencies should consider when drafting CMCPs. Transportation planning priorities of import to the NACCCP include increasing transportation safety for all users, preserving and enhancing existing infrastructure, improving multimodal mobility and accessibility, prioritizing transportation sustainability, and supporting economic development and the efficient movement of freight.[3] Second, the guidelines specify that goals and objectives from the applicable Regional Transportation Plan must be accounted for in CMCP development. Finally, the guidelines highlight six overarching objectives of the corridor planning process that agencies should prioritize in their work:

1. Defining multimodal transportation deficiencies and opportunities for optimizing system operations;
2. Identifying the types of projects necessary to reduce congestion, improve mobility, and optimize multimodal system operations along highly traveled corridors;
3. Identifying funding needs;
4. Furthering state and federal ambient air standards and greenhouse gas (GHG) emission reduction standards pursuant to the California Global Warming Solutions Act of 2006[4] and Senate Bill 375;[5]
5. Preserving the character of local communities and creating opportunities for neighborhood enhancement; and
6. Identifying projects that achieve a balanced set of transportation, environmental, and community access improvements.

The Guidelines also detail five statutory requirements that all CMCPs must meet:

1. Be 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;
2. Reflect a comprehensive approach to addressing congestion and quality of life issues within the affected corridor through investment in transportation and related environmental solutions;
3. Be developed in collaboration with state, regional, and local partners;

[3] California Transportation Commission, Comprehensive Multimodal Corridor Plan Guidelines, https://catc.ca.gov/programs/sb1/solutions-for-congested-corridors-program/comprehensive-multimodal-corridor-plan-guidelines, accessed on March 1, 2022.

[4] California Legislative Information, Health and Safety Code, Division 25.5. California Global Warming Solutions Act of 2006, Part 3. Statewide Greenhouse Gas Emissions Limit, https://leginfo.legislature.ca.gov/faces/codes_displayText.xhtml?lawCode=HSC&division=25.5.&title=&part=3.&chapter=&article=, accessed on April 1, 2022.

[5] California Legislative Information, SB-375 Transportation Planning: Travel Demand Models: Sustainable Communities Strategy: Environmental Review (2007-2008), https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=200720080SB375, accessed on April 1, 2022.

4. Evaluate the following criteria, as applicable - safety, congestion, accessibility, economic development and job creation and retention, air quality and greenhouse gas emissions reduction, and efficient Land Use; and
5. Be consistent with the goals and objectives of the Regional Transportation Plan.

Climate Action Plan for Transportation Infrastructure, 2021

California's Climate Action Plan for Transportation Infrastructure (CAPTI), adopted in 2021, details how California recommends investing billions of discretionary transportation dollars annually to 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 (EO N-19-19) and 2020 (EO N-79-20) which target reducing GHG emissions from the transportation sector. More than 40 percent of California's GHG emissions are produced by the transportation system. CAPTI provides a holistic framework for how to curb these emissions and reach the State's ambitious climate goals. The plan also includes a statement of intent to align state transportation infrastructure investments with the eight climate, health, and social equity goals described in the Caltrans CTP 2050.

The overarching investment strategy laid out in this plan is the "fix-it-first" approach established in SB1, which prioritizes maintenance of existing assets over the development of new costly, and resource intense facilities.[6] Within that approach, there are ten guiding principles, paraphrased below, which steer investment strategies:

1. Build toward an integrated, statewide rail and transit network
2. Invest in networks of safe and accessible bicycle and pedestrian infrastructure
3. Invest in light, medium, and heavy-duty zero-emission vehicle (ZEV) infrastructure
4. Strengthen the state's commitment to social and racial equity by reducing public health and economic harms and maximizing community benefits
5. Make safety improvements to reduce fatalities and severe injuries of all users towards zero
6. Assess physical climate risk
7. Promote projects that do not significantly increase passenger vehicle travel
8. Promote compact infill development while protecting residents and businesses from displacement
9. Develop a zero-emission freight transportation system
10. Protect natural and working lands.[7]

Caltrans Plans and Policies

The following Caltrans plans and policies provide guidance on transportation planning priorities at the state level which inform the NACCCP evaluation framework.

[6] California Legislative Information, SB-1 Transportation Funding, https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201720180SB1, accessed February 28, 2022.

[7] California State Transportation Agency, Climate Action Plan for Transportation Infrastructure, https://calsta.ca.gov/subject-areas/climate-action-plan, accessed March 1, 2022.

California Transportation Plan 2050, 2021

The Caltrans California Transportation Plan 2050 (Caltrans CTP 2050), last updated in 2021, provides a blueprint for developing transportation infrastructure that prioritizes equity, safety, environmental sustainability, multimodal integration, and efficiency. The Caltrans CTP focuses on people-focused policies, strategies, and investments that help create a safe, resilient, and universally accessible transportation system supportive of vibrant communities, racial and economic justice, and improved public and environmental health. In addition to providing this broad framework for what multimodal transportation system planning should strive to achieve, the Caltrans CTP highlights key trends, challenges, and opportunities facing the state, as well as eight goals for the statewide transportation system. These goals are:

1. Safety – provide a safe and secure transportation system
2. Climate – achieve statewide GHG emissions reduction targets and increase resilience to climate change
3. Equity – eliminate transportation burdens for low-income communities, communities of color, people with disabilities, and other disadvantaged groups
4. Accessibility – improve multimodal mobility access to destinations for all users
5. Quality of life and public health – enable vibrant, healthy communities
6. Economy – support a vibrant, resilient economy
7. Environment – enhance environmental health and reduce negative transportation impacts
8. Infrastructure – maintain a high-quality, resilient transportation system[8]

Toward an Active California, State Bicycle & Pedestrian Plan, 2017

Caltrans' first ever statewide active transportation policy-plan, adopted in 2017, set the ambitious target of providing robust multimodal transportation options to people of all ages and abilities with the goal of doubling walking, tripling bicycling, and doubling transit use in the state between 2010 and 2020.[9] This plan sought to achieve this target by establishing six goals for Caltrans planning:

1. Improve multimodal mobility and accessibility for all people;
2. Preserve the multimodal transportation system;
3. Support a vibrant economy;
4. Improve public safety and security;
5. Foster livable and healthy communities and promote social equity; and
6. Practice environmental stewardship.

[8] California State Transportation Agency, California Transportation Plan 2050, https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwjy89Sfhqb2AhWWJEQIHe9QAWEQFnoECAwQAQ&url=https%3A%2F%2Fdot.ca.gov%2F-%2Fmedia%2Fdot-media%2Fprograms%2Ftransportation-planning%2Fdocuments%2Fctp-2050-v3-a11y.pdf&usg=AOvVaw2zJSgozX8BAVOrnC6IvLFL, accessed March 1, 2022.

[9] Caltrans, Toward an Active California, State Bicycle + Pedestrian Plan (2017), https://www.google.com/url?client=internal-element-cse&cx=001779225245372747843:uh1ozfcfcdu&q=https://dot.ca.gov/-/media/dot-media/programs/transportation-planning/documents/f0020350-activeca-final-plan-2017-05-18-a11y.pdf&sa=U&ved=2ahUKEwiB0Pv2z_P2AhW9IUQIHReEAIsQFnoECAQQAQ&usg=AOvVaw1jL8qJsyhKsxKQrVJVqTmO, accessed on April 1, 2022.

Each goal is accompanied by two-to-three supporting policies which serve to achieve four objectives:

1. Safety – reduce the number, rate, and severity of bicycle and pedestrian-involved collisions
2. Mobility – increase walking and bicycling in California
3. Preservation – maintain a high-quality active transportation system
4. Social Equity – invest resources in communities that are most dependent on active transportation and transit

The intention of *Toward an Active California* is to integrate multimodal transportation planning into all statewide planning and project implementation efforts so active transportation gains are made throughout the transportation system. It is appropriate, therefore, that NACCCP projects align with *Toward an Active California* goals and objectives.

Complete Streets Policy, 2021

Caltrans Complete Streets Policy, adopted in 2014 and updated in 2021, recognizes that walking, biking, transit, and passenger rail are integral to the state's vision of delivering a world-class transportation network and acknowledges that streets are not only used for transportation but are also valuable community spaces.[10] Accordingly, in locations with current and/or future pedestrian, bicycle, or transit needs, all transportation projects funded or overseen by Caltrans shall provide comfortable, convenient, and connected complete streets facilities for people walking, biking, or taking transit or passenger rail unless an exception is documented and approved.

The policy requires complete streets approaches to be considered in all phases of planning and development and calls on Caltrans to prioritize underserved communities, people of all ages and abilities, and those who have been historically harmed and segmented by the transportation network. Lastly, the policy commits Caltrans to reducing policy and procedural barriers to implementing complete streets policies and calls for the agency to partner with communities and other agencies to ensure projects on local and state transportation systems improve the connectivity to existing and planned pedestrian, bicycle, and transit facilities, and accessibility to existing and planned destinations, where possible.

Given Caltrans' directive, there is a need and opportunity for NACCCP projects to align with the state's complete streets policy and provide opportunities for collaboration between local and regional partners and Caltrans in the planning and implementation of those multimodal projects.

Smart Mobility Framework, 2020

The Caltrans Smart Mobility Framework (SMF) lays out a vision for how to achieve widely accessible multimodal travel choices, livable communities, and a robust and sustainable economy. The SMF guides implementation of multimodal transportation strategies in a manner that supports development of compact and sustainable communities. It does so by linking development policies to transportation systems and housing choices. Caltrans' Smart Mobility

[10] Caltrans, Director's Policy DD-64-R2 – Complete Streets (December 7, 2021), https://dot.ca.gov/-/media/dot-media/programs/sustainability/documents/dp-37-complete-streets-a11y.pdf, accessed on April 1, 2022.

2010: A Call to Action for the New Decade,[11] which was 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, provides concepts and tools that jurisdictions can use to incorporate smart mobility principles into all phases of transportation decision-making.

Caltrans Smart Mobility Framework Guide 2020, an update to Smart Mobility 2010, introduced revised strategies, performance measures, and analytical methods for implementing smart mobility. These are organized around five themes: network management, multimodal choices, speed suitability, accessibility and connectivity, and equity.[12] The guide also describes the application of five "place types" based on location, land use, density, and other characteristics to identify transportation planning and project development priorities across the state. These place types include:

1. Central Cities
2. Urban Communities
3. Suburban Communities
4. Rural Areas
5. Protected Lands and Special Use Areas

Each of the place types corresponds to transportation planning priorities and serves as a guide, not a rule, for development of recommendations. Planners should consider the specific characteristics of a given planning area in addition to local, regional, and state plans when recommending strategic transportation system investments. In a similar fashion, the NACCCP evaluation framework should include smart mobility considerations and projects' place type contexts.

2.2 Regional Policy

Transportation plans and policies focused on the San Francisco Bay Area region and Alameda County provide additional direction for NACCCP project evaluation. Though developed by a combination of state and regional agencies, all of the plans described below are specific to the transportation landscape surrounding the Study Area.

Bay Area Plans and Policies

The following plans led by MTC, the Association of Bay Area Governments (ABAG), and Caltrans District 4 set transportation goals for the nine-county Bay Area.

[11] Caltrans, Smart Mobility 2010, https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwjlpIGi0qP2AhV-IkQIHfrCAH4QFnoECAYQAQ&url=https%3A%2F%2Fdot.ca.gov%2F-%2Fmedia%2Fdot-media%2Fprograms%2Ftransportation-planning%2Fdocuments%2Foffice-of-smart-mobility-and-climate-change%2Fsmf-handbook-062210-a-a11y.pdf&usg=AOvVaw3suxmGD8gmP3OEfral-cEY, accessed on February 28, 2022.

[12] Caltrans, Smart Mobility Framework Guide, https://www.localassistanceblog.com/2021/11/22/caltrans-smart-mobility-framework-guide/, accessed February 28, 2022.

Plan Bay Area 2050, 2021

Plan Bay Area 2050 (PBA 2050), adopted in 2021, is a long-range (30-year) $1.4 trillion plan developed by MTC and ABAG focused on creating a more affordable, connected, diverse, healthy, and vibrant Bay Area. This plan is founded on five guiding principles that provide a framework for its policies and implementation strategies:

1. Affordable – Ensure all Bay Area residents and workers have sufficient access to housing options they can afford and that households are economically secure
2. Connected – provide an expanded, well-functioning, safe and multimodal transportation system that connects the Bay Area and provide infrastructure supporting fast, frequent, and efficient intercity trips, complemented by a suite of local transportation options, connecting communities and creating a cohesive region
3. Diverse – ensure the Bay Area is an inclusive region where people from all backgrounds, abilities and ages can remain in place with access to the region's assets and resources
4. Healthy – ensure the region's natural resources, open space, clean water, and clean air are conserved and that the region actively reduces its environmental footprint and protects residents from environmental impacts
5. Vibrant – ensure the Bay Area region is an innovation leader by creating job opportunities for all and ample fiscal resources for communities

A core set of 35 strategies translate these plan principles into actionable steps that can be employed throughout the Bay Area's nine counties to support sustainable housing, economic, transportation and environmental planning. To best align with regional long-range transportation planning goals and objectives, the NACCCP evaluation framework should include consideration of these strategies.

MTC Complete Streets Policy, 2022

MTC's Complete Streets Policy, adopted in 2014 and updated in 2022, provides guidance for enhancing safe access to bicycle and pedestrian facilities in order to support local compliance with applicable standards, laws, and regional policies regarding mode shift, safety, equity, and emissions reductions goals.[13] The policy requires that any projects receiving regional funds (i.e., funds from federal sources, the State Transportation Improvement Program, MTC's One Bay Area Grant, bridge tolls, etc.) consider accommodations for "people who walk, bike, and roll" during project planning, design, construction and maintenance phases. In practice, MTC's recommendations do not replace locally adopted transportation planning, design, and construction policies, but facilitate the accommodation of pedestrians, which include wheelchair users, and bicyclist needs into all eligible projects. The NACCCP project goals and objectives should therefore align with MTC's complete streets policies, to conform with best practices and regional funding eligibility requirements.

MTC Transit-Oriented Communities Policy, 2022

MTC adopted a new Transit-Oriented Communities (TOC) Policy in September 2022 to replace the Transit-Oriented Development Policy originally adopted in 2005. The new TOC Policy aims to increase housing supply in the Bay Area, increase residential and commercial densities in transit-

[13] MTC, Complete Streets – Resolution No. 3765, https://mtc.ca.gov/planning/transportation/complete-streets, accessed on April 1, 2022.

rich areas, and support multimodal access to Equity Priority Communities. In addition to establishing new density requirements in transit-rich areas, the TOC Policy requires compliance with a subset of affordable housing policies, eliminates minimum parking requirements, and mandates secure bicycle parking for new developments. The NACCCP project goals and objectives should align with the TOC policy to ensure compliance with potential associated changes to regional funding requirements.

Alameda County Plans

The following programs and plans led by the Alameda County Transportation Commission (Alameda CTC) sets countywide transportation goals, which inform the NACCCP evaluation framework.

Alameda County Congestion Management Program, 2021

The NACCCP adheres to the federal Congestion Management Process principles and standards through the Alameda County Management Program (CMP). As the Congestion Management Agency (CMA) for Alameda County, Alameda CTC prepares the CMP and coordinates with MTC, transit agencies, local governments, and Caltrans to manage and update the CMP by measuring the performance of the county's multimodal transportation system, addressing roadway congestion, and connecting transportation and land use.

Alameda CTC last updated the Congestion Management Program in 2021 and is required to update the CMP every two years, pursuant to state legislation. The CMP is aligned with other long-range planning efforts including the Countywide Transportation Plan and the most recent Regional Transportation Plan and Sustainable Communities Strategy (Plan Bay Area 2040). The CMP specifically describes strategies to monitor and improve the performance of every mode of travel in Alameda County. This includes monitoring congestion, transit performance, and bicycle and pedestrian activity throughout the county, and major new land use developments which follows the process model stated in the federal Congestion Management Process guidebook.

Countywide Transportation Plan, 2020

The Countywide Transportation Plan (CTP), adopted by Alameda CTC in 2020, establishes near-term projects, programs, and strategic priorities for the area. The CTP also details a 30-year transportation vision for Alameda CTC which is to serve county residents, businesses, and visitors by a premier transportation system that supports a vibrant and livable Alameda County through a connected and integrated multimodal transportation system promoting sustainability, access, transit operations, public health, and economic opportunities.

The CTP development process builds on modal Countywide Plans that ultimately serve as components to the CTP, such as the Countywide Active Transportation Plan (2020), Goods Movement Plan (2016), and Transit Plan (2016). The Countywide Community-Based Transportation Plan (2020) also sets equity-focused priorities for the County, which are incorporated into the CTP. The countywide needs identified throughout these planning efforts led to the development of four overarching CTP goals:

1. Accessible, affordable, and equitable – improve and expand connected multimodal choices that are available for people of all abilities, affordable to all income levels and equitable

2. Safe, healthy, and sustainable – create safe multimodal facilities to walk, bike and access public transportation to promote healthy outcomes and support strategies that reduce reliance on single-occupant vehicles and minimize impacts of pollutants and greenhouse gas emissions
3. High quality and modern infrastructure – deliver a transportation system that is of a high quality, well-maintained, resilient, and maximizes the benefits of new technologies for the public
4. Economic vitality – support the growth of Alameda County's economy and vibrant local communities through a transportation system that is safe, reliable, efficient, cost-effective, high-capacity and integrated with sustainable transit-oriented development facilitating multimodal local, regional, and interregional travel.

All components of the NACCCP evaluation framework align with CTP goals and objectives as presented below.

2.3 Evaluation Framework

The evaluation framework for the NACCCP, shown in **Table 2-1** represents a synthesis of the goals and objectives outlined in the state, regional, and county sources described above. They were developed through a collaborative process with Alameda CTC and the NACCCP TAC. While example quantitative performance measures are presented below, the projects in the NACCCP are qualitatively evaluated. The criteria used to evaluate and score the projects, presented in Chapter 7, align with the Evaluation Framework.

Table 2-1: Evaluation Framework

Goals	Objectives	Example Performance Measures
1. Improve Safety	1.1 Reduce severe and fatal injury collisions	• Expansion of multimodal safety infrastructure on High-Injury Network and rail crossings
	1.2 Provide high-quality active transportation options	• Increase in miles of low stress bikeway network (Class I, IIB, and IV) • Increase in miles of sidewalks • Increase in number of high-visibility crosswalks
2. Advance Access and Equity	2.1 Reduce gaps in the bicycle and pedestrian network	• Expansion of active transportation network
	2.2 Improve connections in Equity Priority Communities (EPCs)	• Increased access for residents in EPCs
3. Enhance Travel Reliability and Efficiency	3.1 Reduce recurring delays	• Decrease in average vehicle delay • Decrease in average person delay • Decrease in peak period vehicle volumes
	3.2 Increase vehicle occupancy	• Increase in vehicle occupancy • Increase in miles of managed lanes (HOV, Express, etc.)

Goals	Objectives	Example Performance Measures
	3.3 Improve transit on-time performance	• Increase in average bus speeds • Decrease in average travel time
4. Support Efficient Land Use	4.1 Promote multimodal travel that supports efficient land use	• Increase in multimodal transportation improvements in Priority Development Areas (PDAs)
5. Improve Health and Sustainability	5.1 Reduce air and noise emissions	• Decrease in vehicle miles traveled • Decrease in $PM_{2.5}$ pollutants • Decrease in GHG emissions • Decrease in noise emissions
	5.2 Support climate adaptation	• Increase resiliency of transportation infrastructure
6. Strengthen Economic & Community Vitality	6.1 Reduce freight delay	• Decrease in rail and truck delay • Increase in freight throughput
	6.2 Support placemaking and existing communities	• Community support • Increase in placemaking improvements

3. Study Area Overview

This chapter presents an overview of roadway facilities, land use, and environmental conditions in the Study Area to provide context for the operational conditions and development of proposed solutions in the chapters that follow. While Chapter 3 provides a general overview, Chapter 4 describes the Study Area multimodal facilities in detail.

3.1 Description

The NACCCP Study Area, located in Caltrans District 4, includes portions of the cities of Oakland, Berkeley, and Emeryville, as well as the City of Alameda where it borders the estuary. The 11 square mile area is bounded by University Avenue/I-80 to the north, Oak Street/I-880 to the south, the I-80 Toll Plaza to the west and the I-580/SR 24 interchange to the east, as shown in **Figure 3-1**. The Study Area includes interstate, state highway, and arterial roadways, a robust transit network inclusive of bus, rail, and ferry services, and extensive bicycling and walking facilities. It also includes the Port of Oakland. The key roadway types are summarized in the following sections, while existing multimodal facilities are described in detail in Chapter 4.

Interstate Freeways

The Study Area includes four interstate freeway corridors – I-80, I-880, I-580, and I-980 – that intersect near the San Francisco-Oakland Bay Bridge (SFOBB) Toll Plaza. Together, these corridors represent not only crucial components of the interstate system, but regional and state connections from the East Bay to San Francisco, Silicon Valley and Sacramento metropolitan regions, and the Central Valley and Sierra Nevada Mountains in the east. **Table 3-1** provides an overview of the postmile (PM) limits and configurations of these facilities.

Table 3-1: Study Area Interstates

Segment #	Location Description	County Route Beg. PM	County Route End. PM	Configuration
1	I-80	ALA 80 1.994	ALA 80 5.829[1]	8-12 lanes, including 2 HOV lanes
2	I-880	ALA 880 30.782	ALA 880 R35.122L	9-10 lanes
3	I-580	ALA 580 44.64[1]	ALA 580 46.946	8-10 lanes
4	I-980	ALA 980 0.00	ALA 980 2.023	6-10 lanes

Notes:

1. The I-580 postmiles represent the section of I-580 extending from the eastern Study Area boundary to the approach to the Macarthur Maze. West of PM 46.946, I-580 shares a facility with I-80 along the San Francisco Bay waterfront until the two freeways split north of the Berkeley border.

Source: Caltrans, Postmile Services, https://postmile.dot.ca.gov/PMQT/PostmileQueryTool.html?#, accessed on December 27, 2021.

I-80 (Segment 1) extends from University Avenue in the City of Berkeley in the north, south along the Emeryville waterfront, to the I-80 Toll Plaza in the west. This segment, also referred to as the Eastshore Freeway, is an eight to twelve-lane facility with one HOV lane in each direction for the majority of its route through the three Study Area cities of Berkeley, Emeryville, and Oakland. HOV lanes on the Eastshore Freeway accommodate carpools (three or more persons), vanpools, buses, motorcycles, and eligible clean air vehicles during designated commute hours. The I-80 freeway expands to approximately 20 westbound lanes and eight eastbound lanes at the SFOBB Toll Plaza. Westbound lanes include fourteen full-time FasTrak lanes, four full-time HOV/Bus Lanes and two peak period only FasTrak lanes.[14]

I-880 (Segment 2), also referred to as the Nimitz Freeway, extends from the Lake Merritt Channel in Oakland, northwest along the Jack London District Waterfront and Port of Oakland Boundary, and north toward Grand Avenue where it splits into two branches leading to the I-80 Toll Plaza at the eastern terminus of the SFOBB and the I-580/I-80 MacArthur Maze. This nine to ten-lane segment is located exclusively in Oakland.

I-580 (Segment 3) extends from Piedmont Avenue in Oakland, west to the I-580/I-80 MacArthur Maze, where it continues north to the Berkeley border as a shared facility with I-80. This segment is an eight to twelve-lane facility traversing portions of north Oakland before turning north and joining I-80 through Emeryville and Berkeley.

I-980 (Segment 4) extends in a southwest-northeast direction for approximately two miles through Oakland. This segment is a six to ten-lane facility which branches off I-880 and extends north between West Oakland and Downtown Oakland to the I-580/SR 24 Interchange near the Oakland-Emeryville border. The route connects with the local street network through a series of braided on and off ramps. At PM 1.36 the Bay Area Rapid Transit District (BART) rail line enters the median to the route's end and continues easterly into Contra Costa County in the contiguous SR 24 median. I-980's route characteristics make it a valuable interstitial connector for commuter traffic, goods movement, and long-range regional travel.

State Highways and Arterials

The Study Area contains several state routes (SR), including SR 13 (Ashby Avenue), SR 123 (San Pablo Avenue north of I-580), and SR 260 (Webster and Posey Tubes). Ashby Avenue extends east-west across Berkeley from I-80 to SR 24. San Pablo Avenue serves as a major north-south arterial running parallel to I-80 in Berkeley, Emeryville, and Oakland. The Webster and Posey Tubes are the two Alameda Access tubes extending from I-880 across the Oakland estuary to Alameda Island where they converge into a surface highway and connect with SR 61.

These local connecting and parallel state highways accommodate shorter trips throughout the Study Area and provide access to freeway interchanges and to multimodal facilities such as transportation centers and park-and-ride lots within the Study Area. Parallel arterials like San Pablo Avenue also must accommodate traffic diverted off freeways during major incidents. These facilities provide important local circulation, including access to job centers and commercial districts, as well as residential neighborhoods.

[14] Caltrans. Transportation Concept Report I-80 San Francisco-Oakland Bay Bridge (SFOBB), District 4, June 2017, p. 8.

Figure 3-1

STUDY AREA

Major Study Corridors

- I-580
- I-80
- I-880
- I-980

- Arterial State Route
- Amtrak Rail
- BART Station
- Amtrak Station
- WETA Terminal

Transit

A robust set of existing transit services and facilities are in the Study Area, including Alameda Contra Costa Transit (AC Transit) local and Transbay bus service, SolTrans and WestCAT's regional bus service, BART, Capitol Corridor commuter rail, and Water Emergency Transit Agency (WETA) ferries. These services are described in Chapter 4.

Active Transportation

The Study Area also includes an extensive bicycle and pedestrian network including multi-use trails such as the San Francisco Bay Trail, on-street bicycle lanes, sidewalks, slow streets, and walking paths. Chapter 4 describes these low-stress active transportation facilities.

3.2 Significance to Local and Regional Travel

Transportation facilities within the Study Area serve local, regional, and interregional movements of people and goods across an urban and suburban landscape. The NACCCP Study Area provides vital connections for freight movement, regional and interregional commutes, and recreational travel throughout the San Francisco Bay Area. Furthermore, the Study Area includes the nexus of these corridors and the unique challenges presented by the convergence of traffic flows.

I-80 serves as one of the primary east-west freight routes for the San Francisco Bay Area, providing direct access to other goods movement corridors via I-580, I-880, and U.S. Route 101 (US 101) South. Beyond the western limit of the Study Area, I-80 continues into the City and County of San Francisco where it provides a connection to US 101 and I-280 into San Mateo County and to the San Francisco International Airport. In the East Bay, I-80 to the north makes a vital connection to SR 4 and continues further north to and through communities in the North Bay and the Sacramento Valley. Connections between I-80, I-880, I-580, and other East Bay freeways link the Study Area to businesses and communities to the east and south including central Contra Costa County, the Central Valley, southeast Alameda County, and Silicon Valley.

I-880 represents a crucial connection for goods movement in the region. Providing northbound and southbound access to the Port of Oakland, Oakland International Airport, and adjacent industrial facilities, I-880 carries the vast majority of freight traffic in the region. Further details about goods movement are included in Chapter 4. I-880 also serves as a major commuting route between the South Bay and East Bay.

I-580 serves as connector between US 101 to the north in San Rafael and I-5 to the east near Tracy, providing an important commute, recreation, and freight route between the San Francisco Bay Area and Southern California. Although I-580 supports heavy goods movement along most of its length, 4.5-ton trucks are prohibited through Oakland between Grand Avenue and the San Leandro border and are routed to I-238 and I-880.

In contrast to the other NACCCP Study Area corridors, I-980 serves as a relatively short link between I-580 and I-880 and provides access from Downtown and West Oakland to local and regional destinations.

3.3 Route Designations

The four freeway segments within the NACCCP Study Area are classified as interstate freeways on the California Road System (CRS) and are part of the California Freeway and Expressway System, the National Highway System (NHS) and the Strategic Highway Network (STRAHNET). Furthermore, all are designated Surface Transportation Assistance Act (STAA) National Network routes for trucking. **Table 3-2** lists route designations for each Study Area segment.

In addition to the designations mentioned above, I-80 is identified as an Interregional Road System (IRRS) route established in 1989 by the Blueprint Legislation (a ten-year transportation funding package created by AB 471, SB 300, and AB 973). As part of the San Jose/San Francisco Bay Area – Sacramento – Northern Nevada Corridor, I-80 provides significant support for business travel, recreational tourism, and freight movement and is expected to be a focus of Interregional Transportation Improvement Program (ITIP) investment in the future. The California Freight Mobility Plan (CFMP) defines I-80 as a multimodal freight route, connecting several maritime ports, airport facilities, and parallel rail lines.

I-580 is also designated a California State Scenic Highway east of the junction with SR 24. Though the segment of I-580 included in the Study Area is designated an STAA National Network route, the portion of I-580 to the east of the Study Area, between Grand Avenue and the western border of the City of San Leandro, is subject to a special route restriction prohibiting travel by trucks over 9,000 pounds, except passenger buses and paratransit vehicles.

Table 3-2: Route Designations

Designation	I-80	I-880	I-580	I-980
California Freeway and Expressway System	Yes	Yes	Yes	Yes
National Highway System	Yes	Yes	Yes	Yes
Primary Highway Freight System	Yes	Yes	Yes	Yes
Strategic Highway Network	Yes	Yes	Yes	Yes
Scenic Highway[1]	No	No	Yes (east of SR 24 junction to San Leandro border)	No
Strategic Interregional Corridor[2]	San Jose/ SF Bay Area-Sacramento-Northern Nevada	No	San Jose/San Francisco Bay Area – Central Valley – Los Angeles Corridor	No
Federal Functional Classification[3]	Interstate			
Truck Designation[4]	National Network Surface Transportation Assistance Act Route			

Designation	I-80	I-880	I-580	I-980
Metropolitan Planning Organization	Metropolitan Transportation Commission			
Congestion Management Agency	Alameda County Transportation Authority			
Air District	Bay Area Air Quality Management District			
Terrain	Rolling to Flat			
Land Use	Urbanized / Industrial	Urbanized / Industrial	Urbanized / Industrial	Urbanized

Sources:

1. Caltrans. California State Scenic Highway System Map, https://www.arcgis.com/apps/webappviewer/index.html?id=465dfd3d807c46cc8e8057116f1aacaa, accessed December 17, 2021.
2. Caltrans. Strategic Interregional Corridors, https://www.caltrans-itsp2021.org/corridor-text, accessed December 17, 2021.
3. Caltrans. California Road System – Functional Classification, https://www.arcgis.com/apps/webappviewer/index.html?id=026e830c914c495797c969a3e5668538, accessed on December 17, 2021.
4. Caltrans. CA Truck Network Maps, https://dot.ca.gov/programs/traffic-operations/legal-truck-access/truck-network-map, accessed on December 17, 2021.

3.4 Demographics

CMCP transportation planning priorities and projects must align with the needs of the resident population and users of the area's transportation services. Alameda County and Study Area demographics are described below and summarized in **Figure 3-2** and **Table 3-3**.

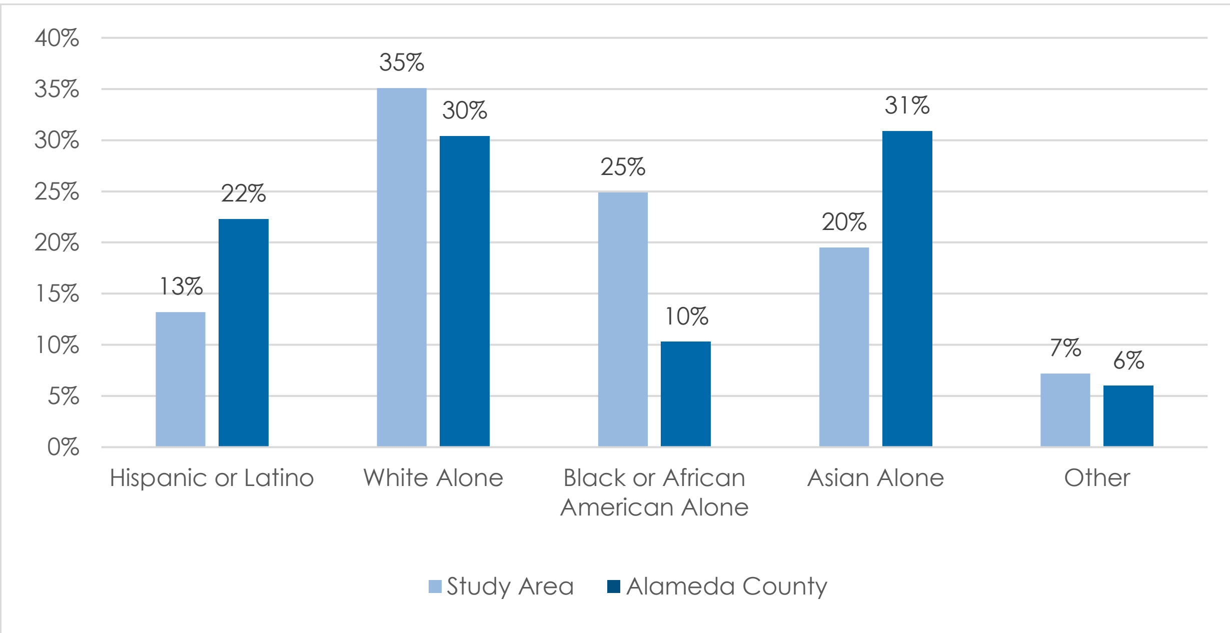
Alameda County

Alameda County has the second largest population among the Bay Area counties, estimated at 1.67 million people in 2019. As shown in **Figure 3-2**, the four largest ethnic groups in Alameda County are Asian (30.9 percent), White (30.4 percent), Hispanic or Latino (22.3 percent), and Black or African American (10.3 percent), with individuals of other or mixed race representing six percent of the population. A large portion of the resident population is foreign-born (32.4 percent), and nearly half of households speak languages other than English at home (45.7 percent). In 2019, the median household income in Alameda County was approximately $108,322 and slightly more than half of households own their own home (53 percent) with an average owner-occupied household size of 2.95 persons.

Study Area

The Study Area represents a small fraction of Alameda County, 11 square miles (1 percent) of the county's 821 square mile footprint but has a disproportionately large portion of the population estimated at 103,284 (6 percent) in 2019. As shown in **Figure 3-2**, the Study Area's four largest ethnic groups by population are White (35.1 percent), Black or African American (24.9 percent), Asian (19.5 percent), and Hispanic or Latino (13.2 percent), with individuals of other or mixed race representing 7.2 percent of the population. Languages other than English are spoken at a smaller portion of households (31.3 percent) relative to the overall county (45.7 percent). In 2019, the median income in the Study Area was lower than that of the county at approximately $71,214, however, more households owned their own home (72.3 percent) with an average owner-occupied household size of 2.29 persons.

Figure 3-2: Study Area and Alameda County Population by Race



Notes:

1. Other: Includes American Indian and Alaska Native alone, Native Hawaiian and Other Pacific Islander alone, some other race alone, two or more races.

Source: Data compiled from the American Community Survey (2019). Accessed December 28, 2021; Fehr & Peers, 2021.

Table 3-3: Study Area and Alameda County Demographics

Demographic	Study Area	Alameda County
Total Population	103,284	1,671,329
Speak Languages Other Than English at Home	31.3%	45.7%
Population Density (people/square mile)[1]	9,390	2,036
Number of Households	47,886	585,632
Average Household Size (Owner)	2.29	2.95
Average Household Size (Renter)	2.15	2.63
Renter-Occupied Housing Units	27.7%	47.0%
Owner-Occupied Housing Units	72.3%	53.0%

Demographic	Study Area	Alameda County
Median Household Income[2]	$71,214	$108,322

Notes:

1. Population density: Calculated from Total Population based on geographies' respective square mileage. Alameda County = 821 square miles. Study Area = 11 square miles.
2. Median Household Income: Calculated for the Study Area as the weighted average (arithmetic mean) of the median household income for area census tracts.

Source: Data compiled from the American Community Survey (2019). Accessed December 28, 2021; Fehr & Peers, 2021.

3.5 Land Use

Land use and transportation system characteristics strongly influence travel behavior. Locations with higher density and mixed-use development patterns coupled with well-connected multimodal transportation systems encourage shorter trips and travel by non-automobile modes, both of which tend to reduce VMT. Land use within the NACCCP Study Area is shown in **Figure 3-3** and summarized below in relation to Caltrans' Smart Mobility Framework (SMF) place types. Together, these provide context crucial to the understanding of existing and future transportation planning priorities for the NACCCP Study Area and provide a guide for the development of recommendations.

Most of the land in the Study Area is used for commercial, mixed-use, and medium-high density residential development. Commercial land use is especially concentrated in and around Downtown Oakland, with additional commercial areas in West Oakland, along the San Pablo Avenue corridor, and along the I-80 corridor in Emeryville. Single-family and low medium density residential uses are limited to the northern end of the Study Area in Berkeley while high density residential uses are distributed throughout the Study Area, especially adjacent the San Pablo Avenue Corridor and in Downtown and West Oakland. Industrial land use is concentrated along the western half of the Study Area adjacent to the Port of Oakland and along the rail mainline running parallel to I-80. Small areas of park and open space are distributed throughout residential areas in Oakland, Emeryville, and Berkeley, while larger open spaces are concentrated along the periphery of the Study Area, adjacent the Oakland Estuary, Lake Merritt, and San Francisco Bay.

Place Types

Caltrans' SMF land use place types are determined based on the use of three metrics: population density, transit mode share, and road density. Population density and transit mode share are defined, respectively, as persons per square mile and the percentage of transportation trips in the Study Area made by transit as compared to other modes. Road density is calculated as the ratio of total length of all roads to the land area within the specified area.

The Caltrans Smart Mobility Framework Guide 2020 specifies Downtown Oakland and the City of Berkeley as examples of Central Cities and Urban Communities, respectively, as seen in **Table**

3-4. [15] Therefore, it is fair to conclude that most of the Study Area is representative of these two place types.

Table 3-4: Place Type Examples within the Study Area

Place Type	Place Type Description	Study Area Location
Central Cities	High density, mixed-use places with well-connected grid street networks, high levels of transit service, and pedestrian supportive environments.	Downtown Oakland
Urban Communities	Moderately dense places, mostly residential but with mixed-use centers. Housing is varied in density and type. Transit is available to connect neighborhoods to multiple destinations. Fine-grained network of streets with good connectivity for pedestrians and bicyclists.	City of Berkeley

[15] Caltrans, 2020, *Smart Mobility Framework Guide*, P. 107.

Figure 3-3

LAND USE

Source: MTC, 2018

3.6 Commute Patterns and Trip Generators

Bay Area residents have numerous options for getting to work ranging from walking or riding bicycles to using transit or carpooling. At scale, population-level commute mode choice has implications for the state of traffic congestion and air pollution as well as the kinds of policies and projects that may mitigate pressure on transportation systems in the Study Area and Northern Alameda County more broadly.

Commute Choice by Mode

As shown in **Table 3-5,** automobile travel is the dominant mode of commuting in the San Francisco Bay Area, accounting for 74 percent of all commute trips. Alameda County shows slightly lower commute automobile travel (70 percent). Within the Study Area, 44 percent of residents travel by car to work, while 34 percent take transit. Residents in the Study Area also tend to walk and use other non-auto modes of transportation for commuting more relative to residents in Alameda County and the Bay Area region. Across all modes, the mean travel time to work in the Study Area is 32.4 minutes compared to 35.6 minutes in Alameda County.[16]

Table 3-5: Commute Choice by Mode

Commute Mode[1]	Study Area	Alameda County	Bay Area
Auto[2]	44%	70%	74%
Transit	34%	16%	12%
Walk	7%	4%	4%
Other[3]	8%	4%	4%
Work from Home	7%	7%	6%

Notes:
1. All statistics presented here are calculated by place of residence.
2. Auto: Includes carpool and drive alone vehicle trips.
3. Other: Includes bicycle, motorcycle, taxicab and other non-auto, non-transit modes.

Source: ACS 5-Year, 2019 for Study Area; MTC Vital Signs, 2018 for County and Bay Area; Fehr & Peers, 2021.

Major Trip Generators

The Study Area encompasses three urban cities home to an array of major trip generators, including medical centers, downtown and commercial districts, regional parks, universities, and major transit stops. There are also several institutions and sports venues located close to the Study Area. Below is a sample of major trip generators in the vicinity of the Study Area:

- Berkeley
  - University of California, Berkeley

[16] American Community Survey, 2019, 1-year Estimates – Means of Transportation to Work by Selected Characteristics, https://data.census.gov/cedsci/table?q=mean%20travel%20time&t=Commuting&tid=ACSST1Y2019.S0802 , accessed on December 28, 2021.

  - Berkeley Marina and Aquatic Park
  - Fourth Street Retail and Dining
  - Bayer Corporation, West Berkeley
  - Downtown Berkeley
  - Alta Bates Summit Medical Center, Berkeley
- Emeryville
  - Bay Street Emeryville
  - Public Market Emeryville
  - East Bay Bridge Center
  - Pixar Headquarters
  - Grifols Pharmaceuticals
- Oakland
  - Laney College
  - Downtown Oakland Central Business District
  - Jack London Square
  - Port of Oakland
  - Oakland Airport
  - Kaiser Permanente Oakland Medical Center
  - Highland Hospital
  - UCSF Benioff Children's Hospital, Oakland
  - Alta Bates Summit Medical Center, Oakland
  - Oakland Coliseum

3.7 Plan Bay Area 2050 Priority Designations

Plan Bay Area 2050 (PBA 2050), adopted in October 2021, is a long-range plan for the future of the nine-county San Francisco Bay Area which focuses on four key issues: the economy, the environment, housing, and transportation.[17] PBA 2050 serves as the Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) for the Bay Area, and responds to Senate Bill 375 (2008), which requires each of the State's 18 metropolitan regions to develop an SCS to accommodate future population growth while reducing greenhouse gas emissions from cars and light trucks. Per the CTC's CMCP requirements, the NACCCP must be consistent with the goals and objectives of PBA 2050, including forecasted development patterns. Therefore, CMCP projects must align with Plan Bay Area goals for reducing per-capita greenhouse gas emissions

[17] Association of Bay Area Governments (ABAG) and Metropolitan Transportation Commission (MTC), Plan Bay Area 2050, https://www.planbayarea.org/finalplan2050, accessed on December 27, 2021, p. vi.

by promoting development of compact, mixed-use residential and commercial neighborhoods near transit.

Priority Development Areas

PBA 2050 updated Priority Development Areas (PDAs) in line with the revised regional growth framework. PDAs are areas within existing communities that local city or county governments have identified and approved for future housing and job growth due to the existence of public transit infrastructure. Development in such areas makes the most of public investments while limiting the impacts of new development on communities and the environment. PBA 2050 includes two PDA designations – Transit-Rich PDAs and Connected Community PDAs. Transit-Rich PDAs have high-quality transportation infrastructure already in place to support additional growth in their communities while Connected Community PDAs offer basic transit services and have committed to policies that increase mobility options and reduce automobile travel. The majority of the NACCCP Study Area reflects a Transit-Rich PDA environment. Below is a list of the Transit-Rich PDAs that are located within or intersect the Study Area, also shown in **Figure 3-4**.

- City of Berkeley
  - San Pablo Avenue
  - University Avenue
- City of Emeryville
  - Mixed Use Core
- City of Oakland
  - North Oakland / Golden Gate
  - MacArthur Transit Village
  - West Oakland
  - Downtown & Jack London Square

Priority Production Areas

PBA 2050 debuted Priority Production Areas (PPA) as a new growth geography.[18] PPAs, also shown in **Figure 3-4**, are clusters of industrial businesses prioritized for economic development investments and protection from competing land uses. These districts are already well-served by the region's goods movement network. Typical businesses in PPAs include manufacturing, distribution, warehousing, and supply chains. PPAs are nominated by local governments and adopted by ABAG. PPAs must be zoned for industrial use or have predominantly industrial uses, be located outside Priority Development Areas and other areas within walking distance of a major rail commute hub and located in jurisdictions with a certified housing element. The Study

[18] MTC, Priority Production Areas, https://mtc.ca.gov/planning/land-use/priority-production-areas-ppas, accessed on January 3, 2022.

Area includes the Port PPA which encompasses the Port of Oakland and industrial areas west of I-880 and south of the SFOBB.[19]

Priority Conservation Areas

PBA 2050 features another growth geography of consequence to the Study Area – Priority Conservation Areas (PCAs). Also shown in **Figure 3-4**, these are regionally significant open spaces which have broad agreement for long-term protection. These are lands that are being pressured by urban development, among other factors, and are determined through local government consensus. There are four different PCA designations an area can have based on its relationship to the Bay Area's natural systems, rural economy, and the health of all residents. These categories include natural landscapes, agricultural lands, urban greening, and regional recreation.[20] The Study Area includes one PCA – the Potential Oakland Gateway Area – located at the eastern end of the SFOBB and designated as a natural landscape/ regional recreation PCA.[21] This PCA is located along Oakland's waterfront, extending from the foot of the eastern span of the SFOBB to the portion I-80 west of the East Bay Municipal Utility District Wastewater Treatment Plant, and includes the 22.47-acre Judge John Sutter Regional Shoreline park and a small portion of Mclaughlin Eastshore State Park.[22]

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[19] MTC, Priority Production Areas (Plan Bay Area 2050), https://opendata.mtc.ca.gov/datasets/MTC::priority-production-areas-plan-bay-area-2050/explore?location=37.810287%2C-122.298036%2C14.23, accessed on January 3, 2022.

[20] MTC, Priority Conservation Areas, https://abag.ca.gov/our-work/land-use/pca-priority-conservation-areas, accessed on January 3, 2022.

[21] MTC, Priority Conservation Areas Points (Plan Bay Area 2050), https://opendata.mtc.ca.gov/datasets/priority-conservation-areas-points-plan-bay-area-2050/explore?location=37.812615%2C-122.272123%2C12.13, accessed on January 3, 2022.

[22] ABAG, Plan Bay Area Priority Conservation Areas in Alameda County, https://abag.ca.gov/sites/default/files/alameda_pcas_11x17.pdf, accessed on January 12, 2022.

- Major Corridor
- Arterial State Route
- Transit-Rich Priority Development Area
- Priority Production Area
- Priority Conservation Area
- Amtrak Rail
- BART Station
- Amtrak Station
- WETA Terminal

Figure 3-4

PRIORITY DEVELOPMENT, CONSERVATION AND PRODUCTION AREAS

Source: Plan Bay Area 2050

Equity Priority Communities

PBA 2050 identifies Equity Priority Communities (EPCs), formerly called "Communities of Concern," which are census tracts that have a significant concentration of underserved populations, such as households with low incomes and people of color. EPCs, shown in **Figure 3-5,** are identified based on the concentration of the census tract population meeting the following demographic factors: [23]

- People of Color (70% threshold)
- Low-Income (28% threshold)
- Limited English Proficiency (12% threshold)
- Seniors 75 Years and Over (8% threshold)
- Zero-Vehicle Households (15% threshold)
- Single Parent Families (18% threshold)
- People with a Disability (12% threshold)
- Rent-Burdened Households (14% threshold)

A tract is identified as an EPC if it exceeds both threshold values for Low-Income and People of Color, or if the tract meets or exceeds the threshold value for Low-Income and exceeds the threshold values for three or more of the remaining factors.

Since 2001, MTC has used data from the American Community Survey to identify communities (census tracts) that may have historically faced disadvantage and underinvestment due to their background or socioeconomic status. MTC then directs funding towards these communities to help ensure that historically underserved communities have equitable access to housing and transportation that is within reach of jobs, services, and amenities. The majority of the Study Area is designated as an EPC, with Alameda, Berkeley, Emeryville, and Oakland each home to at least one EPC that overlaps the Study Area.

[23] MTC, MTC Plan Bay Area 2050 Equity Priority Communities, https://bayareametro.github.io/Spatial-Analysis-Mapping-Projects/Project-Documentation/Equity-Priority-Communities/#equity-priority-communities-framework-plan-bay-area-2050, accessed on December 28, 2021.

Figure 3-5

EQUITY PRIORITY COMMUNITIES

- Major Corridor
- Arterial State Route
- Equity Priority Communities
- BART Station
- Amtrak Station
- WETA Terminal

Source: Plan Bay Area 2050

3.8 Environmental Considerations

Environmental factors, and the effects of climate change in particular, are important considerations in the development of NACCCP projects. This environmental scan provides high-level identification of select environmental considerations present within the Study Area.

Table 3-6 summarizes key environmental considerations for each NACCCP segment categorized on a scale of Low-Medium-High probability that the segment may experience a given issue. Environmental factors may require future analysis in the project development process and significantly affect project cost and schedule. Environmental considerations for NACCCP project funding include mitigation, restoration costs, and protection of critical habitat and open space.

Portions of the I-80, I-580, and I-880 corridors are located within the area where the low-lying tidal lands of Emeryville, Berkeley, and Oakland meet the San Francisco Bay Shoreline. Additionally, portions of I-880 are in the vicinity of the tributaries, marshlands and wetlands leading to Lake Merritt in Oakland, and are adjacent to the Port of Oakland. SR 260 is a key state highway that crosses the Oakland estuary via the Webster and Posey Tubes connecting Downtown Oakland and Alameda. These areas constitute the water- and wetland-adjacent corridors that would be most impacted by a 100-year flood event and are at medium or high risk of being impacted by longer-term climate change and sea level rise.

Section 4(f) properties include Publicly Owned Public Parks, Recreational Areas, Wildlife or Waterfowl Refuges, and historic sites on or eligible for the National Register of Historic Places and archaeological sites on or eligible for the National Register of Historic Places and which warrant preservation in place as determined by USDOT and other officials with jurisdiction. These areas must be accounted for in environmental impact analysis when a project requires federal involvement.[24] Section 4(f) lands in the Study Area include numerous small City-owned public school playgrounds and public parks in the area as well as State-owned parks along the Emeryville and Berkeley shoreline and the special district-owned Middle Harbor Shoreline Park. Given the size and location of properties, as well as their respective owners, this is a relatively low environmental consideration for NACCCP Study Area.

Table 3-6: Environmental Considerations for the Study Area

Environmental Factors	I-80	I-880	I-580	I-980
Farm/Timberland[25]	No	No	No	No
Floodplain[26]	100-year	100-year	100-year	100-year
Climate Change/ Sea Level Rise	High	Low-Med	Low-Med	Low
Waters and Wetlands	Medium	Low	Low-Med	Low
Section 4(f) Land[27]	Low	Low	Low	Low

[24] California Protected Areas Database (CPAD), http://www.calands.org, accessed on December 29, 2021.
[25] California Department of Conservation, California Important Farmland Finder, https://maps.conservation.ca.gov/DLRP/CIFF/, accessed on December 29, 2021.
[26] CDFW, BIOS Viewer – NFHL 1% (100 year) Flood, accessed on December 29, 2021.
[27] California Department of Fish and Wildlife (CDFW), Biogeographic Information and Observation System (BIOS) Viewer – CDFW Owned and Operated Lands and Conservation Easements, https://apps.wildlife.ca.gov/bios/, accessed on December 29, 2021.

Air Quality

In Alameda County, ozone and fine particle pollution, or PM2.5, are the major regional air pollutants of concern. Ozone rarely exceeds health standards in much of the Study Area, as the area is adjacent to San Francisco Bay which keeps temperature levels below those conducive to ozone formation. PM2.5 is a more significant issue in the Study Area due to cool temperatures, industrial activity at and adjacent to the Port of Oakland, and the presence of wood smoke.[28]

In addition to regional pollution concerns, localized emissions from freeway traffic impact the Study Area. Three emissions of particular concern include black carbon, nitric oxide (NO), and nitrogen dioxide (NO_2).[29] Black carbon particles come from burning fuel, especially diesel, wood, and coal, and are associated with heart attacks, stroke, and some forms of cancer. NO is associated with heavy traffic, forms smog and acid rain, and can cause respiratory problems. NO_2, formed when NO mixes with oxygen in the air, is associated with respiratory problems and is regulated by the Environmental Protection Agency. City blocks adjacent to the Study Area freeways and arterials carrying high traffic volumes, particularly in West and Downtown Oakland, experience higher levels of all three pollutants than the surrounding neighborhoods.[30]

The Port of Oakland and adjacent rail operations in the southwestern portion of the NACCCP Study Area contribute to localized emissions of PM2.5 associated with the combustion of diesel fuel.[31] This activity includes operation of cargo equipment, port trucks, locomotives, ocean-going vessels, and harbor craft as well as passenger rail and the Union Pacific Railroad commercial heavy rail. As of 2019, about 33 percent of diesel PM in West Oakland came from ocean-going vessels associated with the Port, while 18 percent came from rail.[32] By 2024, diesel PM from ocean-going vessels is expected to increase due to growth in container shipping unless there is more rapid expansion of the electrification of at-berth vessel operations. In the same timeframe, diesel PM and PM2.5 emissions from rail are expected to decline due to use of newer, cleaner locomotive engines.[33]

Climate Change

The threat of climate change looms large over the region and the Study Area. In particular, the threat of sea level rise, temperature increases, and changes in precipitation patterns will acutely

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[28] Bay Area Air Quality Management District, Alameda County, https://www.baaqmd.gov/about-the-air-district/in-your-community/alameda-county, accessed on December 29, 2021.

[29] Environmental Defense Fund, How pollution impacts health in West Oakland, https://www.edf.org/airqualitymaps/oakland/pollution-and-health-concerns-west-oakland, accessed on February 11, 2022.

[30] Environmental Defense Fund, How pollution impacts health in West Oakland, accessed on February 11, 2022.

[31] Bay Area Air Quality Management District (BAAMQD) and the West Oakland Environmental Indicators Project (WOEIP), Owning Our Air, https://www.baaqmd.gov/~/media/files/ab617-community-health/west-oakland/100219-files/owning-our-air-plan-summary-pdf.pdf, accessed on January 4, 2022, p. 5.

[32] BAAQMD and WOEIP, Owning Our Air, p. 4.

[33] BAAQMD and WOEIP, Owning Our Air, p. 5.

impact assets within the Study Area. These environmental pressures and their anticipated impacts on the NACCCP Study Area are described below.

Sea Level Rise

Portions of Study Area segments, most notably I-80, are vulnerable to the effects of rising sea levels. Current projections published by the Ocean Protection Council in 2018 suggest that sea levels at the San Francisco tide gauge could rise by 1.9 feet by 2050 and 6.9 feet by 2100.[34] Low lying portions of I-80 and I-880 are likely to be impacted by sea level rise of approximately 5.75 feet, while larger segments of these facilities and portions of other segments will be impacted by the combined effects of storm surge and sea level rise.

Additional sea level rise mapping data from the Bay Conservation and Development Commission (BCDC) suggests transportation operations throughout the Study Area, including along adjacent rail facilities,[35] could be impacted by sea level rise by 2050. **Figure 3-6** illustrates the impacts of sea level rise in the Study Area.

Sea level rise is perhaps the best documented and most accepted impact of climate change, which can be directly tied to increased levels of Greenhouse Gas (GHG) emissions, and therefore, transportation operations. The Governor's Executive Order B-30-15 (April 29, 2015) has directed State agencies to reduce GHG emissions forty percent below 1990s levels by 2030, and Caltrans is seeking to partner with local and regional stakeholders to address climate change by adjusting operations on the SHS and local streets and roads to reduce GHG emissions.[36]

Temperature

Temperature rise is an important facet of climate change. Summer temperatures are projected to continue rising, and a reduction of soil moisture and the related moderating effects of evaporation, is projected for much of California. Materials like pavement can be deteriorated by exposure to high temperatures. The Caltrans Vulnerability Assessment Report[37] analyzed change in the average 7-day maximum temperature for the years 2025, 2050, and 2085. The report reflects analysis of the climate impacts of four different greenhouse gas emissions and concentration scenarios, or Representative Concentration Pathways (RCP). These include a stringent mitigation scenario (RCP 2.6) in which greenhouse gas emissions reach their peak in the next few years, two intermediate scenarios (RCP 4.5 and RCP 6.0) in which greenhouse gas emissions reach their peak midcentury, and one high greenhouse gas emission scenario (RCP 8.5) which assumes greenhouse gas emissions continue an upward trend throughout this

[34] California Ocean Protection Council, State of California Sea-Level Rise Guidance, 2018, http://www.opc.ca.gov/webmaster/ftp/pdf/agenda_items/20180314/Item3_Exhibit-A_OPC_SLR_Guidance-rd3.pdf

[35] Capitol Corridor Joint Powers Authority, Sea Level Rise Vulnerability Assessment (2014), http://www.adaptingtorisingtides.org/wp-content/uploads/2015/04/CCJPA-SLR-Vulnerability-Assessment_Final.pdf, accessed on January 13, 2022.

[36] Governor Brown Executive Order Greenhouse Gas Reduction Target, April 29, 2015 https://www.ca.gov/archive/gov39/2015/04/29/news18938/index.html.

[37] Caltrans, & WSP. (2018). *Caltrans Climate Change Vulnerability Assessments: District 4* (pp. 1-73, Tech.). CA: Caltrans. https://dot.ca.gov/-/media/dot-media/programs/transportation-planning/documents/2019-climate-change-vulnerability-assessments/ada-remediated/d4-technical-report-a11y.pdf

century. Report findings speak primarily to impacts anticipated under the high-emissions (RCP 8.5) scenario.

Under the high-emissions scenario (RCP 8.5), Alameda County could see an increase in a 7-day average maximum temperature of at least 2 degrees Fahrenheit between 1995 and 2025 and at least 6 degrees Fahrenheit by 2055. By 2085, Alameda County could see an increase ranging from 10 to 11.9 degrees Fahrenheit. This indicates that increasing temperatures would need to be considered as a part of pavement design for any projects planned for the Study Area, and more frequent maintenance of the existing pavement facilities may be needed.

The consideration of the timing of climate change differs for pavement design when compared to other assets. Many Caltrans assets, including roadways, bridges, and culverts, will likely be in place for many decades or longer, and therefore decisions made today for these types of assets need to incorporate a longer view than is the case for asphalt pavement. Asphalt pavement is replaced approximately every 20-25 years, or sooner if quality degrades more rapidly.

Precipitation

Increasing temperatures are expected to result in changing precipitation events due to an increase in energy and moisture in the atmosphere. Increased precipitation levels, combined with other changes in land use and land cover, can increase the risk of damage or loss from flooding. Transportation assets in California are affected by precipitation in a variety of ways, such as inundation/flooding due to heavy rainfall events, landslides and washouts, or structural damage from heavy rain events. Many of these impacts may lead to disruptions of key transportation infrastructure and services.

The Caltrans District 4 Vulnerability Assessment Report analyzed the potential impact of a 100-year storm rainfall event for the RCP 8.5 scenario. Most of Alameda County would be expected to see a zero to 4.9 percent increase in precipitation between 1995 and 2025. The primary concern with regard to transportation assets is not the overall volume of rainfall observed over an extended period, but rather the expectation of changing future conditions for heavy precipitation and the potential for increasing damage to the State Highway System. The impact of changing precipitation events highlights the need for resilient designs, regular monitoring, and maintenance.

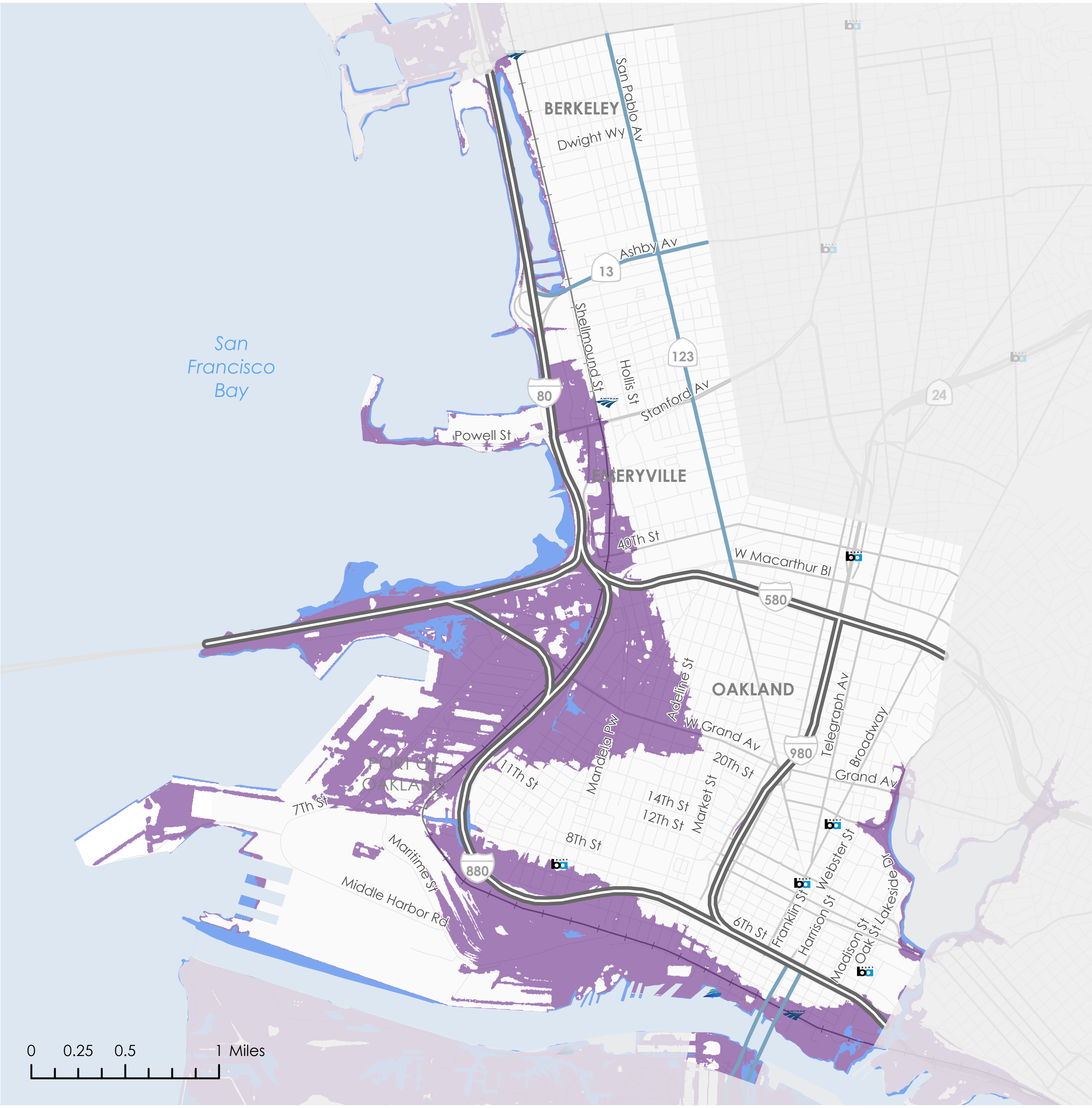

Figure 3-6

POTENTIAL IMPACTS OF SEA LEVEL RISE

- Major Corridor
- Arterial State Route
- BART Station
- Amtrak Station
- WETA Terminal
- Amtrak Rail
- 24 Inches, Year 2050
- 84 Inches, Year 2100

Source: National Oceanic and Atmospheric Administration, 2021 - based on Global Sea Level (GLS) 2017 projections

Environmental Justice

Additional analysis has been conducted to identify disadvantaged communities via CalEnviroScreen 4.0, a mapping resource that analyzes pollution burden and community vulnerability to pollutant exposure.[38] The tool utilizes various sources of data as shown below to determine the level of risk to a community:

- Pollution Burden - Exposure Indicators: presence of ozone, fine particulate matter (PM2.5), diesel emissions, drinking water contaminants, children's lead risk from housing, pesticide use, toxic releases from facilities, and traffic impacts.
- Pollution Burden - Environmental Effects Indicators: presence of environmental cleanup sites, groundwater quality threats, hazardous waste generators and facilities, pollution-impaired water bodies, and solid waste sites and facilities.
- Population Characteristics - Sensitive Population Indicators: asthma, cardiovascular disease, and low birth weight infants.
- Population Characteristics - Socioeconomic Factor Indicators: educational attainment, housing-burdened low-income households, linguistic isolation, poverty, and unemployment.

EPCs and Pollution Burden in the Study Area are displayed in **Figure 3-7,** which shows significant overlap of high pollution burden in EPCs.

[38] California Office of Environmental Health Hazard Assessment, CalEnviroScreen, https://oehha.ca.gov/calenviroscreen, accessed on December 28, 2021.

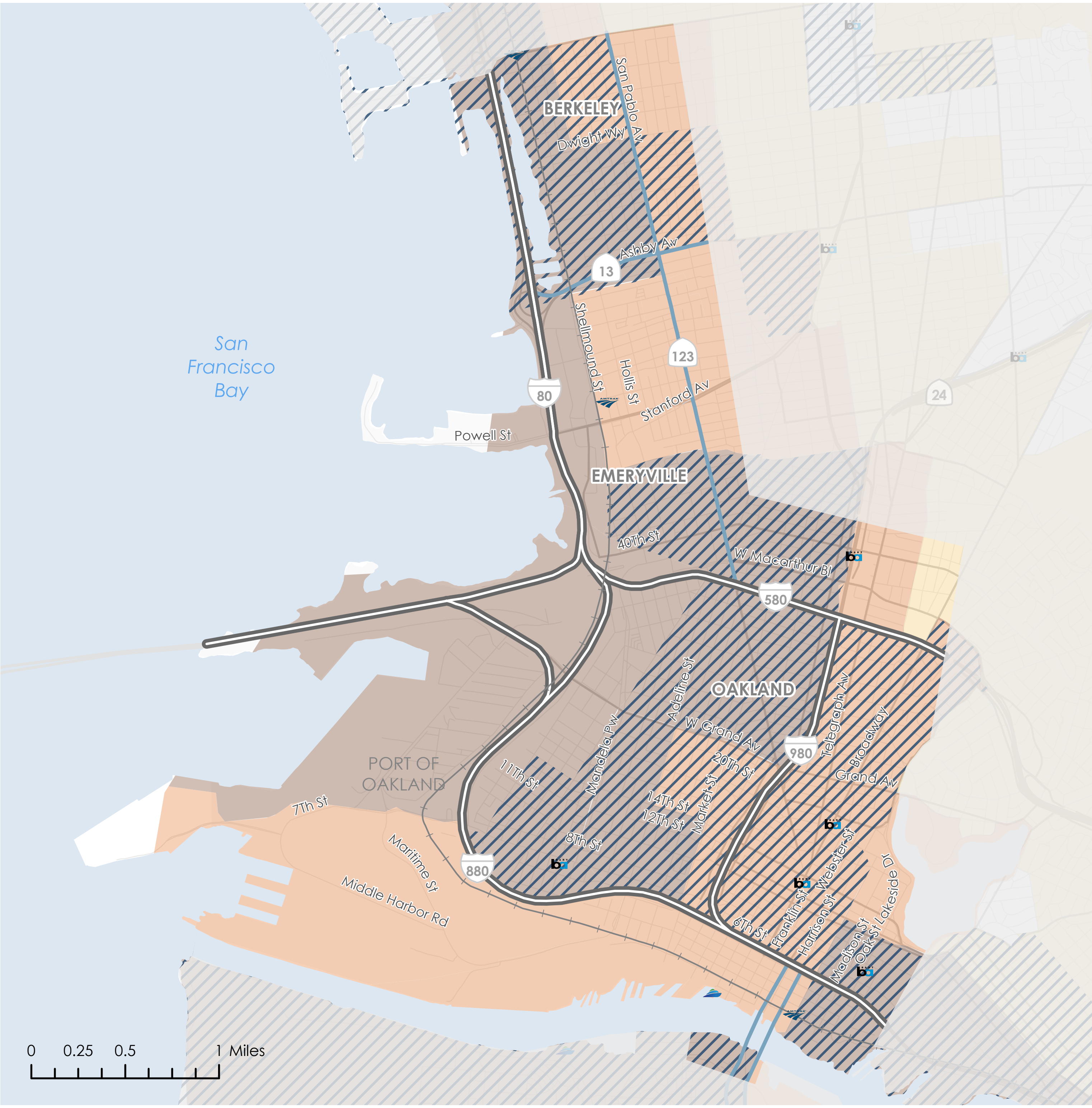

Figure 3-7

EQUITY PRIORITY COMMUNITIES AND POLLUTION BURDEN PERCENTILE

- Major Corridor
- Arterial State Route
- Amtrak Rail
- BART Station
- Amtrak Station
- WETA Terminal

Equity Priority Communities (2050)

Pollution Burden Percentile

- 0-25%
- 26-50%
- 51-75%
- 75-100%

Source: Plan Bay Area, 2050; California Office of Environmental Health Hazard Assessment

Caltrans High-Priority Assets

Given the anticipated impacts of climate change, Caltrans has developed adaptation strategies to protect its assets throughout the region. The 2020 Caltrans District 4 Adaptation Priorities Report includes a list of high-priority assets such as culverts, bridges, and road segments, which should be prioritized for receipt of special protection from, or adaptation to, climate change conditions. The priority bridges and road segments within the Study Area are shown in **Table 3-7** and **Table 3-8**, respectively.

Table 3-7: Caltrans D4 Adaptation Priority Assets – Bridges

Priority Ranking	Bridge Number	Route	Feature Crossed	Post Mile
1	330609R	880 NB	7th Street Undercrossing	R33.5
1	33 0609L	880 SB	7th Street Undercrossing	R33.5
1	33 0612E	80/880 CONN	Port Of Oakland Connector Viaduct	2.44
2	33 0611R	880 NB	East Bay Viaduct	R34R
2	33 0611L	880 SB	East Bay Viaduct	R34.5L
2	33 0616L	880 SB	5th & 6th Street Viaduct	R32.2
2	33 0061R	W580-E&W80	Connector Distribution Structure	46.5R
2	33 0285	580	Broadway-Richmond Blvd UC	44.51
2	33 0061L	W580-E&W80	Connector Distribution Structure	46.5L
3	33 0616R	880 NB	5th & 6th Street Viaduct	R32.2

Source: Adapted from Caltrans D4 Adaptation Priorities Report, 2020; Fehr & Peers, 2022.

Table 3-8: Caltrans D4 Adaptation Priority Assets – Road Segments

Priority Ranking	Carriage Way	Route	Road Segments – Post Miles
1	S	580	46.946L - 46.52L
1	P	580	46.946R - 46.617R
1	S	880	R34.04L - R34.423L
1	S	80	2.521 - 3.241
1	P	80	2.535 - 3.181
2	P	13	13.785R - 13.708
2	P	13	13.906R - 13.905R
2	P	80	2.445 - 2.535
2	P	80	3.181 - 3.186
2	S	80	2.438 - 2.521
3	S	880	R33.522 - R34.04L
3	P	13	13.905R - 13.785R
3	S	13	13.77L - 13.708
3	P	80	3.186 - 3.286
3	S	80	4.452 - 5.833

Priority Ranking	Carriage Way	Route	Road Segments – Post Miles
4	P	80	4.452 - 4.754
4	P	880	30.596 - 31.089

Notes:
P = divided northbound or eastbound roadway, or an undivided roadway
S = divided southbound or westbound roadway
Source: Adapted from Caltrans D4 Adaptation Priorities Report, 2020; Fehr & Peers, 2022.

4. Multimodal Facilities, Services, and Programs

This chapter describes a range of existing facilities, services, and programs related to public transit, commuter shuttles, active transportation, and freight within the Study Area. In addition, the chapter summarizes the Transportation Systems Management and Operations (TSMO) strategies and equipment that are currently deployed within the Study Area.

The COVID-19 pandemic has significantly impacted travel and mode choice, including a slow recovery of transit ridership and a consequent reduction in service. This Chapter, as well as the following Chapter 5, use pre-pandemic conditions due to shifting pandemic travel patterns. Despite the uncertainty of future travel choices, the need for investment in a low-emission and affordable transportation system remains.

4.1 Transit Services

A number of public transit agencies provide services within the Study Area that vary by mode, fare type, and geographic scope. **Figure 4-1** and **Figure 4-2** show Transbay and local bus service respectively in the Study Area. **Figure 4-3** shows passenger rail and ferry service.

AC Transit

The Alameda–Contra Costa Transit District (AC Transit) system is the third-largest public bus system in California, serving 13 cities and adjacent unincorporated areas in Alameda and Contra Costa counties, and encompassing a 364 square mile service area with over 1.5 million residents. As of September 2019, AC Transit operated 158 bus lines, including 69 local lines in the East Bay, 33 Transbay lines connecting the East Bay to San Francisco, 6 All Nighter lines, 2 Flex lines, and 46 supplementary lines.[39] In the 2018-2019 fiscal year, AC Transit served over 53 million annual riders which included approximately 741,000 paratransit riders. Average weekday ridership was approximately 175,000 per day. As part of its network, AC Transit currently operates multiple bus routes within the Study Area including urban crosstown, trunk, major corridor, rapid, supplementary school, all nighter, and Transbay lines that connect riders to other areas of the East Bay, San Francisco, or Peninsula.

Table 4-1 summarizes AC Transit Transbay services that operate on Study Area freeway segments with 15-minute frequencies during the peak periods. Routes combine circulation along local East Bay streets to gather passengers with express operation along the freeways to the Salesforce Transit Center in Downtown San Francisco. The length and location of travel on freeway corridors is noted for each route.

[39] AC Transit, Ridership, Buses and Service, www.actransit.org/ridership, accessed January 12, 2022.

Table 4-1: High-Frequency Transbay Bus Routes on the Study Area Freeways

Route	Origin-Destination	Freeway Entry Interchange	Freeway(s) Served	Approx. Length along Freeway in Study Area (miles)
B	Trestle Glen Road – Salesforce Transit Center	Santa Clara Ave/MacArthur Blvd	I-80	3.9
FS	Solano Ave & Colusa St – Salesforce Transit Center	University Ave	I-580, I-80	3.4
L	San Pablo Dam Rd & Princeton Plaza Shopping Center – Salesforce Transit Center	Central Ave	I-80	3.4
LA	Hilltop Dr Park & Ride – Salesforce Transit Center	Buchanan St	I-80	3.4
O	Fruitvale BART – Salesforce Transit Center	Harrison St, WB/ Webster St, EB	I-880, I-980, I-80	3.4
NL	Eastmont Transit Center to San Salesforce Transit Center	W Grand Ave	I-80	0.7
NX	Millbrae Ave & MacArthur Blvd – Salesforce Transit Center	Santa Clara Ave/MacArthur Blvd	I-980, I-80	3.9
NX1	MacArthur Blvd & Fruitvale Ave – Salesforce Transit Center	Santa Clara Ave/MacArthur Blvd	I-980, I-80	3.9
NX2	MacArthur Blvd & High St – Salesforce Transit Center	Santa Clara Ave/MacArthur Blvd	I-980, I-80	3.9
NX3	Marlow Dr & Foothill Way – Salesforce Transit Center	Santa Clara Ave/MacArthur Blvd	I-980, I-80	3.9

Source: AC Transit, 2019

Table 4-2 summarizes AC Transit rapid and local services in the Study Area with frequencies of 15 minutes or more in the peak periods, noting freeway crossing locations and major roads traversed. Rapid service is a semi-express service operating on local roadways.

Table 4-2: High-Frequency Local Bus Routes in the Study Area

Route	Origin-Destination	Freeway Crossings	Major Roads Traversed by Local Bus Routes
72 Rapid (72R)	Contra Costa College – Jack London Square	I-580/San Pablo Ave, I-980/San Pablo Ave, I-880/Broadway	San Pablo Ave, Broadway
6	Downtown Berkeley – Downtown Oakland	I-580/Telegraph Ave	Telegraph Ave, Broadway
1T	Uptown Oakland – San Leandro BART (Tempo)	N/A	12th Street/11th Street
40	Downtown Oakland – Bay Fair BART	N/A	12th Street/11th Street

Route	Origin-Destination	Freeway Crossings	Major Roads Traversed by Local Bus Routes
51A	Rockridge BART – Fruitvale BART	I-580/Broadway, I-880/Harrison St, I-880/Webster St	Broadway, Harrison St/Posey Tube, Webster St/Webster St Tube

Source: AC Transit, 2019

Regional Express Routes

Western Contra County Transit (WestCAT) and Solano County Transit (SolTrans) operate express Transbay routes that pass through the NACCCP Study Area, although they do not start/end their trips within the Study Area. The nearest bus stop to the Study Area from WestCAT is located in Hercules, while SolTrans' nearest stop is located at the El Cerrito Del Norte BART Station.

WestCAT is a public transit service provider in west Contra Costa County. It serves the cities of Martinez, Hercules, Pinole, Richmond, and El Sobrante and the unincorporated areas in west Contra Costa County. WestCAT provides local and express service between Martinez and Richmond, and Transbay services (Lynx buses) between Hercules and San Francisco. Meanwhile SolTrans provides express Transbay service from the cities of Suisun and Vallejo to El Cerrito and San Francisco. **Table 4-3** summarizes the regional express routes that operate on the I-80 portion of the Study Area.

Table 4-3: Regional Express Transit Service

Agency	Route	Origin-Destination	Freeway(s) Served	Approx. Length along Freeway in Study Area (miles)
WestCAT	Lynx	Hercules Transit Center and/or Rodeo Park and Ride to San Francisco Salesforce Transit Center via I-80	I-80	3.4
SolTrans	82	Vallejo Transit Center to San Francisco Ferry Terminal	I-80	3.4

Emery Go-Round Shuttle

The Emery Go-Round Shuttle is a fare-free fixed route service provided by the Emeryville Transportation Management Association (TMA). This service connects employees, residents, and visitors of Emeryville from the MacArthur BART Station to various locations in the western part of the Study Area, including the Berkeley Bowl grocery store in South Berkeley, AC Transit stops, and the Emeryville Amtrak/Capitol Corridor station. The shuttle operates Monday through Friday from 6:00AM to 10:00PM, Saturdays from 8:00AM to 10:00PM, and Sundays from 9:00AM to 7:00PM. In 2019, the Emery Go-Round saw an average daily ridership of 3,676 passengers.[40]

[40] Emeryville Transportation Management Association, Board of Directors Meeting - December 16th, 2021, https://emerygoround.com/wp-content/uploads/2021/12/ETMA-Agenda-Packet_Dec2021.pdf, accessed January 12, 2022.

Figure 4-1

HIGH-FREQUENCY TRANSBAY BUS SERVICE (2019)

- Major Corridor
- Arterial State Route
- Park and Ride Lots
- High Frequency Transbay AC Transit Routes (≤15 min frequencies)

Source: Countywide Transit Plan, 2016

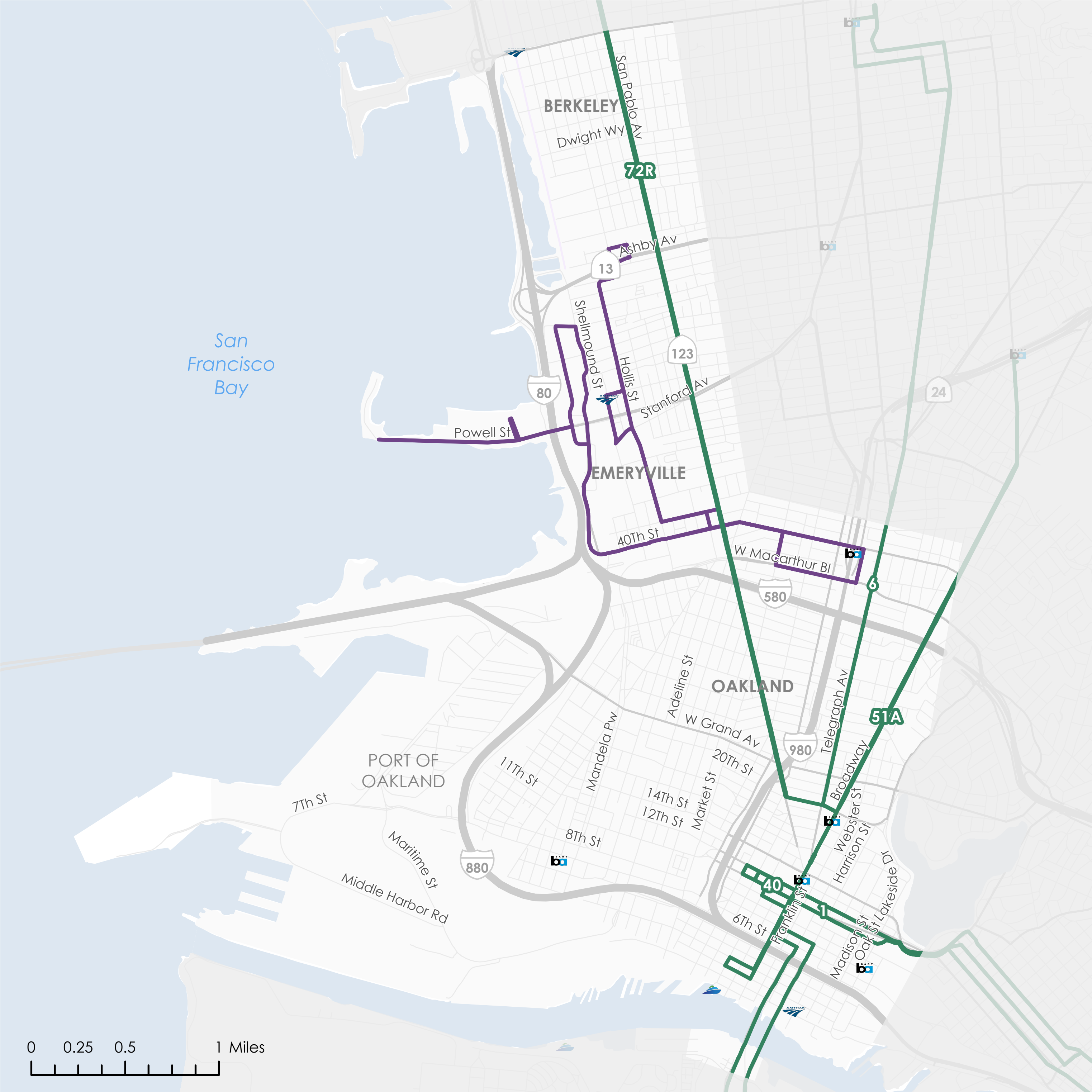

Figure 4-2

LOCAL HIGH-FREQUENCY BUS & SHUTTLE SERVICE (2019)

- Major Corridor
- Arterial State Route
- BART Station
- Amtrak Station
- WETA Terminal
- Local High Frequency AC Transit Routes (≤15 min frequencies)
- Emery Go-Round

Source: Countywide Transit Plan, 2016; Emery Go Round, 2021.
Note: Not all shuttle services in study area are mapped.

East Bay Paratransit

East Bay Paratransit is a public transit service for people with a disability or a disabling health condition. East Bay Paratransit provides demand-based transport for riders' unique origin-destination routes in vans equipped with a wheelchair lift. Service is provided during the hours of AC Transit bus and Bay Area Rapid Transit (BART) rail operations. Service is limited to areas within ¾-mile of an operating bus route or BART station. AC Transit and BART established East Bay Paratransit to meet requirements of the Americans with Disabilities Act (ADA). Only eligible riders who have completed an application and received authorization are permitted to use this service.

BART

The BART system consists of 131.4 miles of heavy rail and 50 stations located throughout Alameda, Contra Costa, San Francisco, San Mateo, and Santa Clara counties. BART provides weekday and weekend service and averaged 411,000 weekday trips in 2019.[41]

Five BART stations serve the NACCCP Study Area: MacArthur, West Oakland, 19th Street/Oakland, 12th Street/Oakland City Center, and Lake Merritt stations. The BART system in the Study Area serves riders traveling on any of the system's Antioch, Richmond, North San Jose Berryessa, Dublin/Pleasanton, or San Francisco/Millbrae lines. The MacArthur and 19th Street/Oakland stations provide timed transfers for southbound and northbound service, respectively. Ridership at 12th Street and 19th Street Stations were the fifth and sixth highest ridership stations compared to all BART stations in 2019.[42]

Prior to the COVID-19 pandemic, 230,000 passengers were transported through the Transbay Tube on a daily basis, demonstrating the importance of BART's transportation function in the Study Area. In comparison, the SFOBB carried 270,000 vehicles daily.[43]

Ferry Service

Regional ferry service is provided by the San Francisco Bay Area Water Emergency Transportation Authority (WETA) which serves the cities of Alameda, Oakland, Richmond, San Francisco, South San Francisco, and Vallejo with seventeen ferry vessels. Each vessel has the capacity to carry at least 30 bicycles, one has capacity for 37 bicycles, and ten can accommodate as many as 50 bicycles. In the 2018-2019 fiscal year, WETA's Alameda/Oakland service had an annual ridership of approximately 1.3 million passengers.[44]

WETA's Jack London Oakland terminal is the only ferry dock located in the Study Area. **Table 4-4** summarizes the ferry schedule for service within the Study Area. Ferry service is also offered for

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[41] BART, BART Facts 2020, https://www.bart.gov/sites/default/files/docs/BARTFacts2020_Final.pdf, accessed on January 11, 2022.

[42] BART, BART Facts 2021, https://www.bart.gov/sites/default/files/docs/BARTFacts2021_0.pdf, accessed on January 11, 2022.

[43] BART, Transbay Corridor Hybrid Summary Comprehensive Multimodal Corridor Plan, 2018, https://www.bart.gov/sites/default/files/docs/BART%20HSCMCP%20Final%20w%20signatures_1.pdf, accessed on March 11, 2022.

[44] San Francisco Bay Area Water Emergency Transportation Authority, 2020 Short Range Transit Plan, https://weta.sanfranciscobayferry.com/sites/weta/files/weta-public/publications/SRTPFY201920toFY202829.pdf, accessed on January 11, 2022.

professional sporting events to San Francisco's Oracle Park and the Chase Center from Alameda, Oakland, and Vallejo.

Table 4-4: Ferry Routes in the Study Area

Route	Description	Weekday		Weekend	
		Hours of Operation	Headways	Hours of Operation	Headways
Oakland & Alameda	Weekday peak hour direct service between Oakland and San Francisco; midday, evening and weekend service between Oakland, Main Street Alameda Ferry Terminal, and San Francisco	6:30 AM-9:50 PM	30 min (peak periods), 60 min (midday, off-peak)	8:30 AM-10:15 PM	60-90 min

Source: Consolidated from WETA ferry schedule, 2022; Fehr & Peers, 2022.

Amtrak

Four Amtrak routes serve the study area. Two are once-daily long-distance routes: the Coast Starlight, running between Seattle and Los Angeles, and the California Zephyr, which operates between Emeryville and Chicago. The other two study area routes are more frequent Caltrans-supported routes: the Capitol Corridor and the San Joaquins, described below. Three Amtrak stations - Jack London Oakland, Emeryville, and Berkeley – are located in the Study Area. Trains serving these locations provide opportunities for transfers to Amtrak Thruway bus service that extends to San Francisco, Vallejo, and other areas of Northern California and the Central Valley. Transfer opportunities to BART occur outside the Study Area at Richmond and Coliseum Stations.

The Capitol Corridor is a 170-mile intercity passenger railroad providing rail service primarily between San Jose and Sacramento, with limited trains continuing to Auburn. Capitol Corridor service is operated by a joint powers authority comprised of six local transit agencies from the eight-county service area. In 2019, Capitol Corridor celebrated record high ridership totaling 1.77 million passengers.[45] In the same year, three of the four highest ridership origin and destination pairs had a trip end in the Study Area. These were Emeryville to Sacramento trains, Sacramento to Emeryville trains, and the Jack London Oakland to Sacramento trains.

The San Joaquins is a 365-mile intercity passenger railroad providing service between the San Francisco Bay Area, Sacramento, and Bakersfield in the Central Valley. The San Joaquins service provides seven daily round trips connecting over 1.1 million annual riders to Los Angeles, Yosemite, Sacramento, and San Francisco via its eighteen train stations and extensive thruway bus network.

Table 4-5 summarizes the Amtrak schedules for service within the NACCCP Study Area.

[45] Capitol Corridor Joint Powers Authority, Performance Report FY19, https://images.capitolcorridor.org/wp-content/uploads/2020/03/CCJPA_Report2019.pdf, accessed on January 11, 2022.

Table 4-5: Amtrak Routes in the Study Area

Route	Description	Weekday Headways	Weekend Headways
Capitol Corridor	Auburn – Sacramento – Emeryville – Oakland – San Jose	1 hour	1-2 hours
San Joaquins	Bakersfield – Central Valley – Emeryville - Oakland	2-4 hours	2-4 hours
California Zephyr	Chicago - Omaha - Denver - Salt Lake City – Sacramento - Emeryville	1 departure per day	1 departure per day
Coast Starlight	Seattle - Tacoma - Portland - Sacramento –Emeryville – Oakland – San Jose - Los Angeles	1 departure per day	1 departure per day

Source: Consolidated from Amtrak Train Schedule, 2022; Fehr & Peers, 2022.

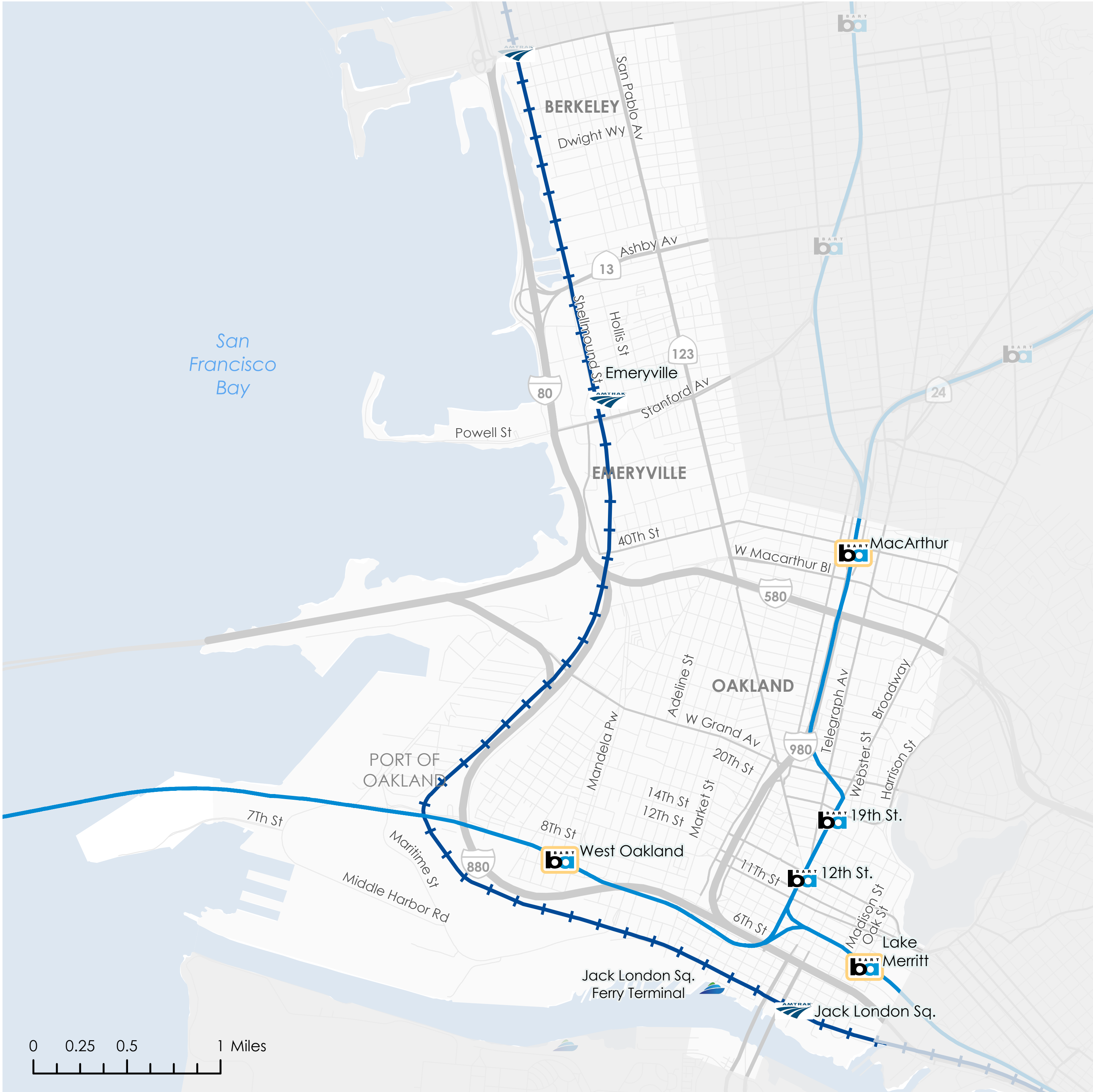

Figure 4-3

RAIL & FERRY TRANSIT SERVICES

- Major Corridor
- Arterial State Route
- Amtrak Station
- WETA Terminal
- BART
- Amtrak
- Bart Station
- Bart Station with Parking

4.2 Park & Ride Facilities

The Caltrans Park-and-Ride (P&R) Program facilitates access to transit and ride sharing services along freeway corridors with the goal to reduce congestion and vehicle miles traveled. There are 49 P&R lots available in Caltrans D4 with a capacity of approximately 5,200 parking spaces.[46] The Study Area hosts one P&R lot located at the intersection of 7th Street/Linden Street intersection. This lot is found in close proximity to the West Oakland BART station and several Transbay AC Transit bus lines. While this is the only P&R lot in the Study Area, there are four transit stations that provide additional P&R opportunities including:

- West Oakland BART parking lot for BART customers
- Lake Merritt BART parking lot for BART customers
- MacArthur BART parking garage for BART customers
- WETA's Jack London Oakland terminal free validated parking for customers

4.3 Bicycle and Pedestrian Facilities

The NACCCP Study Area currently hosts low-stress bicycle and pedestrian facilities such as sidewalks, multi-use paths (Class I), separated bikeways or cycletracks (Class IV), and buffered bike lanes (Class II). Low-stress bike facilities and sidewalk gaps are shown in **Figure 4-4**.

Sidewalks and crossings form the foundation of pedestrian facilities in the Study Area. As of 2017, the City of Oakland had approximately 1,120 miles of adequate sidewalk facilities and 31 miles of sidewalk gaps, 6.7 miles of which are within the Study Area.[47] As of 2020, most streets in the City of Berkeley had adequate sidewalks five feet or greater in width, however 17 percent of the City's road miles had either no sidewalk or were served by sidewalks less than five feet in width.[48] There is nearly half a mile of Berkeley sidewalk gaps in the Study Area. Similarly, as of 2012, most Emeryville streets had sidewalks on both sides of the street, though there is a range in quality, from sidewalks on major arterials like those along San Pablo Avenue with ample width and pedestrian amenities to narrow sidewalks obstructed by utilities located in the City's industrial areas. There are about 2.5 miles of missing sidewalk in Emeryville.[49]

Gaps in sidewalk coverage within the Study Area are concentrated in West Oakland, Emeryville's northwestern and southwestern industrial neighborhoods, and small pockets of Berkeley near the Amtrak station and San Pablo Park between San Pablo Avenue and Sacramento Street. Intersections and mid-block crossings throughout the Study Area are served by a variety of treatments including parallel striped crosswalks at signals, countdown signals,

[46] Caltrans. Park and Ride Inventory – Updated August 2021. https://dot.ca.gov/-/media/dot-media/programs/traffic-operations/documents/managed-lanes/park-ride-inventory-external-aug21-a11y.pdf. Accessed February 17, 2022.

[47] City of Oakland Department of Transportation (OakDOT), Oakland Walks! 2017 Pedestrian Plan Update, https://cao-94612.s3.amazonaws.com/documents/Ped-Plan-2017-rev-sep2018-compressed.pdf, accessed on March 18, 2022, p. 8.

[48] City of Berkeley, 2020 Pedestrian Plan – Revised Draft, https://www.cityofberkeley.info/uploadedFiles/Public_Works/Level_3_-_Transportation/2020%20Pedestrian%20Plan%20FULL%20adopted.pdf, accessed on March 18, 2022.

[49] City of Emeryville, City of Emeryville Active Transportation Plan, https://www.ci.emeryville.ca.us/923/Pedestrian-Bicycle-Plan, accessed on March 18, 2022, p. 3-3.

pedestrian-actuated signals with audio/visual warnings, bulb-outs, and median refuges that reduce crossing distances.

Much of the existing multi-use path connectivity within the Study Area is provided by the San Francisco Bay Trail. The Bay Trail constitutes a 350-mile walking and cycling path that connects all nine Bay Area counties, 47 cities, and the region's seven toll bridges.[50] Some segments are completed Class I paths, while others are currently interim on-street alignments. Within the Study Area, segments of the Trail are accessible via numerous locations along its route through Oakland, Emeryville, and Berkeley. This facility provides active transportation connections to parks, schools, transit, employment centers, and recreational facilities. In addition, the Emeryville Greenway provides a Class I connection between Emeryville and Berkeley.

Beyond these two multi-use paths, the low-stress network is more sparsely connected. There are several existing protected bike lanes, including on Telegraph Avenue and Lakeside Drive in Oakland. Buffered bike lanes in the Study Area are predominantly located in Oakland and provide connections to the Lake Merritt, 19th Street, 12th Street, and MacArthur BART stations. Buffered bike lanes are also provided on Adeline Street and Market Street in West Oakland. Bike boulevards/neighborhood bikeways provide additional low-stress bike connections on neighborhood streets in all three Study Area cities.

In addition to bicycle facilities, the Bay Area hosts a regional bike share program – Bay Wheels – serving Berkeley, Emeryville, Oakland, San Jose and San Francisco. Bay Wheels offers over 7,000 bicycles, both traditional bikes and hybrid electric bikes, at 550 stations across the region. More than 50 such stations are located in the Study Area. Traditional pedal-powered bikes can be picked up and dropped off at Bay Wheels docking stations while electric bikes can use the docking stations or can be locked to any city bike rack. Bay Wheels is a partnership between MTC, the five local governments, and Motivate (a subsidiary of Lyft).

[50] MTC, San Francisco Bay Trail, https://mtc.ca.gov/operations/regional-trails-parks/san-francisco-bay-trail, accessed on March 23, 2022.

Figure 4-4

BICYCLE AND PEDESTRIAN ACCESS

- Major Corridor
- Arterial State Route
- BART Station
- Amtrak Station
- WETA Terminal
- Sidewalk Gaps

Low-Stress Bikeways

- Bay Trail
- Multi-Use Path or Separated Bikeway
- Buffered Bike Lane

Source: Countywide Active Transportation Plan, 2019; MTC, 2021; City of Oakland Pedestrian Master Plan, 2017; City of Berkeley Pedestrian Plan, 2020; City of Emeryville Pedestrian and Bicycle Plan, 2012

Active Transportation Programs

The Alameda CTC Bicycle and Pedestrian Program funds and delivers bicycling and walking projects and programs throughout the county. Programs include Safe Routes to Schools, BikeMobile, Bicycle Safety Education, Bicycling and Bike to Work Day Promotions, and Technical Assistance.[51]

Alameda County Safe Routes to Schools (SR2S) Program

The Alameda County Safe Routes to Schools (SR2S) Program prioritizes safe walking and biking to schools. SR2S is a comprehensive and proven approach to increase safe walking and biking to and from schools with the goals of reducing congestion and harmful pollutants around schools and increasing the safety and physical activity of students. What began as a grant-funded pilot at two schools in Oakland has expanded to serve over 260 public elementary, middle, and high schools throughout the county. Over 172,000 students and their families benefit from educational programs that teach traffic safety and safe behaviors, as well as countywide events that encourage walking, rolling, carpooling and transit use. The program includes efforts such as the BikeMobile, which visits schools to deliver no-cost bicycle repair and safety training, walking school buses, bicycle and pedestrian safety education for students, and encouragement events.

Transportation Demand Management: Bicycle Travel Promotion and Bike Safety Education

Alameda CTC also encourages bicycling through promotions such as the county's annual Bike to Work Day and Bike to School Day events held in May of each year. These highly visible promotions encourage bicycling in Alameda County. In addition, Alameda CTC funds bike safety education, providing free bicycle classes throughout the county that include classroom and on-road instruction for new and experienced cyclists, classes oriented towards adults, teenagers and children, and multilingual options in English, Spanish and Cantonese.

4.4 Transportation Demand Management

Transportation demand management (TDM) is a broad application of programs and services aimed at reducing peak period single occupancy auto travel demand or shifting it to other modes and/or times of day. TDM strategies include the following:

- Alternative mode travel incentives
- Carpool/vanpool incentives
- Subsidized transit passes
- Parking management programs
- Guaranteed ride home programs
- Alternate mode trip planning websites and applications

Comprehensive TDM programs can also include multimodal infrastructure and operational projects, including, but not limited to, shuttle services, High Occupancy Vehicle/Toll (HOV/HOT)

[51] Alameda CTC, Projects and Programs, https://www.alamedactc.org/programs-projects/, accessed on January 26, 2022.

lanes, secure bicycle parking, bicycle and car sharing services, and preferential parking for carpools.

Local TDM Initiatives

Alameda CTC incorporates TDM measures into multimodal planning by statutory requirement of the Congestion Management Program (CMP) and its role as a Congestion Management Agency (CMA).[52] The County implements explicit TDM programs (i.e., the Guaranteed Ride Home Program) as well as other activities that promote reducing or managing demand for automobile travel (i.e., Bike Safety Education, the SR2S Program). Alameda CTC supports local governments' TDM efforts and monitors compliance with the TDM Element of the CMP.

High-Occupancy Vehicle Lanes

High-occupancy vehicle (HOV) or carpool lanes manage demand by encouraging drivers to coordinate shared rides or take transit, and are free to carpoolers, vanpoolers, motorcycles, transit buses, and eligible clean air vehicles who follow the guidelines of each express lane corridor. HOV lanes within the Study Area are located on the I-880 northbound approach to the SFOBB toll plaza and I-80 westbound to Powell Street in Emeryville, as well as the portion of I-80 eastbound from Emeryville to Crockett with a short stand-alone HOV segment across the Carquinez Bridge toll plaza in Vallejo. The minimum number of people required to be in a vehicle to qualify as a carpool range from two to three across the Bay Area but is set at three persons for the I-880 and I-80 Study Area. Carpools receive a discount on bridge tolls and in express lanes.

Express lanes are specially designated segments of HOV lanes that solo drivers can pay a toll to access during periods of peak traffic congestion. Express lanes increase the efficiency of the transportation system by reducing congestion and improving air quality. Alameda CTC does not operate express lanes in the Study Area.

Casual Carpool

Casual carpooling allows cars with three or more people going westbound on the SFOBB in the morning to take advantage of the HOV lanes and receive a reduced bridge toll. A casual carpool is formed when one driver collects at least two riders at a pick-up location in the East Bay during carpool lane hours (Monday - Friday, 5:30am-10:00am). There are over 20 casual carpool pick-up locations around the Bay Area, two of which are located in the Study Area near the Emeryville Marina Park. An additional 12 pick-up locations are just outside of the Study Area spread throughout Berkeley, Oakland, and Alameda.

Transit Fare Discounts

The AC Transit Easy-Pass Program facilitates mode shifts to public transportation by offering groups of 100 or more persons – employers, residential communities, and college students – access to unlimited bus rides all year long. The sponsoring entity, whether a school, employer, or residential development management company, can purchase passes for all beneficiaries and receives a large discount for buying en masse. The maximum annual price for an employee

[52] California Legislative Information, Government Code, Title 7. Planning and Land Use, Division 1. Planning and Zoning, Chapter 2.6. Congestion Management, https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=GOV&sectionNum=65089, accessed on March 23, 2022.

EasyPass is less than the monthly price of a regular pass with equal service. Additionally, the EasyPass is set up as a pre-tax benefit.

Shuttle Services

Private and public shuttle services bolster TDM measures by facilitating multimodal access to key destinations and transit hubs. Below is a list of shuttle programs operating in the Study Area. This is not intended to be an exhaustive list and excludes industry-specific shuttles, such as those operated by Kaiser Permanente Medical Centers.

The **Alameda Landing Express** is a free shuttle that facilitates access to BART from the City of Alameda. The shuttle runs between Alameda Landing and 12th Street on Broadway, located next to the 12th Street BART station in Oakland. The shuttle also provides service between the Marina Village Yacht Harbor and Oakland. The shuttle operates weekdays during peak commute hours, is equipped with exterior bicycle racks, and has capacity to seat 28 passengers.

The **Brooklyn Basin Shuttle** is a free shuttle that facilitates access from the Brooklyn Basin development just east of the Study Area to Lake Merritt, Downtown Oakland 12th Street and 19th Street BART stations, and Jack London Square. The shuttle operates weekday mornings (6:30-10:30 AM) and afternoons (3:00-7:10 PM).

The **Free Broadway Shuttle** is a shuttle that facilitates access from the ferry terminal and Amtrak station in Jack London to Downtown Oakland BART stations, offices, restaurants, local shops, social services, and entertainment venues. The shuttle operates weekdays (7:00 AM-7:00 PM) between Jack London Square and Grand Avenue and weekends (7:00 PM-10:00 PM) between Jack London Square and 27th Street. The service has 11-minute headways during commute hours and 12-15-minute headways at all other times.

The **West Berkley Shuttle** is a free shuttle service funded through the Berkeley Gateway TMA by Bayer HealthCare and Wareham Development, to provide a "last mile" transit connection from the Ashby BART Station to business establishments throughout the West Berkeley Area. The shuttle operates weekday mornings (5:52-10:09 AM) and afternoons (2:56-7:16 PM).

4.5 Transportation Systems Management and Operations

Transportation Systems Management and Operations (TSMO) strategies focus on operational improvements that maintain and/or restore the performance of the existing transportation system for all users and modes of travel. The goal of employing TSMO strategies is to maximize performance of transportation facilities that already exist and defer the need for physical capacity increases. TSMO strategies help agencies balance facility supply and demand to efficiently move people and goods along highly congested urban corridors and provide flexible solutions that can adapt to changing conditions.

TSMO can include the following:

- **System Management** for recurring localized congestion: ramp metering, managed lanes, traveler information, dynamic speed limits, traffic signals and transit priority, parking management system, and automated vehicles.

- **Incident Management** for non-recurrent congestion: detection-verification-response, closed-circuit television (CCTV), changeable message signs (CMS), highway advisory radio (HAR), weather detection, and traveler information systems.
- **Event Management** for emergencies, disasters, and other occurrences through system monitoring, evacuation management, and route selection.
- **Asset Management** for managing existing infrastructure and other assets to deliver an agreed standard of service. One of the first steps in the efficient management of a transportation system is the completion and implementation of a Transportation Asset Management Plan.

Existing Infrastructure

Local agencies use a range of traffic signal coordination and communication infrastructure to improve traffic flow between local streets, expressways, and the highway system. **Table 4-6** below summarizes Intelligent Transportation Systems (ITS) and Transportation Operations System (TOS) elements currently employed on the freeways within the Study Area. They include CCTV, CMS, Extinguishable Message Signs (EMS), Informational Message Signs (IMS), Variable Message Signs (VMS), HAR, Ramp Meters (RMs), and Traffic Monitoring Stations (TMS). Some of these elements can also be found on Caltrans state highways, including CCTVs and EMS on San Pablo Avenue.

Table 4-6: ITS/TOS Elements in the Study Area

Corridor	CCTVs	CMS	TMS	EMS	HAR	RM
Segment 1 (I-80)	7 WB 6 EB	26 WB 8 EB	5 WB 9 EB	0 WB 1 EB	1 WB 1 EB	3 WB 2 EB
Segment 2 (I-880)	7 NB 3 SB	4 NB 1 SB	6 NB 7 SB	0 NB 0 SB	0 NB 0 SB	2 NB 4 SB
Segment 3 (I-580)	1 WB 2 EB	0 WB 0 EB	8 WB 2 EB	0 WB 0 EB	0 WB 0 EB	0 WB 0 EB
Segment 4 (I-980)	2 WB 2 EB	0 WB 1 EB	4 WB 4 EB	0 WB 0 EB	0 WB 0 EB	0 WB 0 EB
SR 13	0 NB 0 SB	0 NB 0 SB	0 NB 1 SB	0 NB 0 SB	0 NB 0 SB	0 NB 0 SB
SR 123	4 NB 4 SB 4 WB 5 EB	0 NB 0 SB 0 WB 0 EB	0 NB 2 SB 0 WB 0 EB	4 NB 3 SB 0 WB 0 EB	0 NB 0 SB 0 WB 0 EB	0 NB 0 SB 0 WB 0 EB

Notes:

Abbreviations: CCTVs = Closed Circuit Televisions, CMS = Changeable Message Sign, RM = Ramp Meters, TMS = Traffic Monitoring Stations, EMS = Extinguishable Message Sign, HAR = Highway Advisory Radio.

Source: Consolidated from Caltrans District 4 Traffic Monitoring Stations Inventory, 2021; Fehr & Peers, 2021.

I-80 SMART Corridor Project

The I-80 Safety Mobility Automated Real-Time (SMART) Traffic Management Corridor Project (i.e., I-80 Integrated Corridor Mobility (ICM)) is an effort to implement a system of integrated electronic signs, ramp meters and other state-of-the-art elements along the I-80 corridor to enhance motorist safety, improve travel time reliability, and reduce collisions and associated congestion.[53] The 20-mile corridor extends from the SFOBB to the Carquinez Bridge. The system provides drivers with real-time traffic information that allows them to make informed decisions in the event of an incident. Signage installations include variable advisory speed signs, blocked lane signs, ramp meters and real-time message signs, all integrated with, and managed from, the Traffic Management Center at the Caltrans Bay Area headquarters in Oakland. Additional improvements include adaptive ramp metering on 43 on-ramps to reduce merging conflicts and manage traffic volumes on I-80.

This project also includes signal coordination and communications improvements along State Route 123 (San Pablo Avenue) with the objective to facilitate the movement of traffic diverted from I-80 back to I-80 at the earliest opportunity. This project component extends 22 miles along SR 123 between West Grand Avenue in Oakland and Pomona Street in Crockett. Corridor improvements generally consist of upgrading traffic signal controllers and electrical systems and installing traffic signals, video detection equipment, pedestrian push button and count–down signals, speed feedback signs, closed circuit TV cameras, trailblazer signs, and arterial changeable message signs.[54]

4.6 Freight Facilities

Northern Alameda County is an area of strategic importance for national and international trade and serves as a natural hub for goods movement throughout the Bay Area and the surrounding Northern California mega region. The county hosts critical goods movement infrastructure or "global gateways," including the Port of Oakland seaport complex, the largest container port in Northern California and ninth busiest in the U.S., the Oakland International Airport, the Union Pacific (UP) Railport and BNSF Railway's Oakland International Gateway, and various rail and highway infrastructure that the greater San Francisco region relies on for delivery of goods from international and national markets.

In Alameda County, a substantial volume of freight enters via the aforementioned global gateways. For example, the Port of Oakland marine container terminals receive a minimum of 2,500 inbound truck trips per day, with an average of nearly 5,000 truck trips depending on weekday activity.[55] In addition, over 8,000 unique trucks are identified with the Port's Secure Truck Enrollment Program, which includes both daily users of the Port's container terminals as well as more infrequent users of the seaport.[56]

Freight is distributed throughout the Study Area via a multimodal freight system comprised primarily of rail corridors, trucking routes, and local city truck routes, as shown in **Figure 4-5**. Trucking is the predominant mode for goods movement in Alameda County, accounting for 81

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[53] Alameda CTC, I-80 Smart Corridor Project, https://www.alamedactc.org/programs-projects/highway-improvement/80smart/, accessed on January 24, 2022.

[54] Alameda CTC, San Pablo Corridor Construction Outreach Notice, https://www.alamedactc.org/wp-content/uploads/2018/12/2013-01-01-San-Pablo-Corridor-Construction-Outreach-491-7.pdf, accessed on March 23, 2022.

[55] Kittelson & Associates, Port of Oakland Long-Term Transportation and Circulation Study: Existing Conditions Report, 2021

[56] Ibid.

percent of tonnage and 60 percent of value moved in 2012.[57] In comparison, carload rail and container rail combined account for approximately eight percent of tonnage moved in the county, making rail the second most significant goods movement mode.

Key interregional and intraregional truck corridors in the county include I-80, I-580, I-880, I-238, and I-680, the first three of which are located in the Study Area.[58] As noted in Chapter 3, all Study Area freeways are National Network Surface Transportation Assistance Act Routes and are part of the National Highway Freight Network, either designated as Primary Highway Freight System (PHFS, I-80 and I-880) or as non-PHFS routes that provide important continuity and access to freight transportation facilities (I-580 and I-980). [59]

Study Area freeway segments provide the primary access routes for goods movement throughout the East Bay with connections to San Francisco, Sacramento, Silicon Valley, and the Central Valley. I-880 carries 66 percent of the truck traffic to and from the global gateways, whereas I-80 at the Carquinez bridge carries 16 percent of the traffic.[60] I-980 provides localized connections to Downtown and West Oakland and links to other trucking routes.

[57] Alameda CTC, Alameda County Goods Movement Plan, https://www.alamedactc.org/wp-content/uploads/2018/11/AlamedaCTC_GoodsMovementPlan_FINAL.pdf, p. 32.
[58] Ibid.
[59] FHWA, National Highway Freight Network Map and Tables, https://ops.fhwa.dot.gov/Freight/infrastructure/ismt/state_maps/states/california.htm, accessed January 6, 2022.
[60] Kittelson & Associates, Port of Oakland Long-Term Transportation and Circulation Study: Existing Conditions Report, 2021

Figure 4-5

FREIGHT FACILITIES

- Major Corridor
- Arterial State Route
- Amtrak Station
- Amtrak/Union Pacific Rail
- Industrial Land Use
- Primary Highway Freight System
- Truck Routes

Source: Caltrans 2021; City of Emeryville General Plan 2019; City of Oakland, 2021; City of Berkeley, 2021; FHA, 2020

4.7 Broadband Network

Broadband communication infrastructure and services (Broadband) has become an essential element of communication and an engine of economic activity, educational opportunity, civic engagement, access to health care, teleworking and much more.

California Governor's Executive Order N-73-20 created the California Broadband Council and mandates the development of the California State Broadband Action Plan which directs CalSTA, Caltrans and the CTC examine their processes and implement the deployment of Fiber optic and Fiber optic conduit of the "middle mile" along the State Highway System. With Governor Newsom's approval of SB 156 Communications: Broadband in July 2021, a $6 billion multiyear investment was established to expand, enhance, operate, and maintain high-speed broadband internet infrastructure to unserved and underserved communities. Caltrans will work closely with the newly established Office of Broadband and Digital Literacy to construct a statewide open-access middle-mile broadband network.[61] The segment of I-80 being analyzed in this NACCCP is designated by the Caltrans Broadband Action Plan as a middle mile corridor and falls within the East Bay and Connected Capitol Area regional Consortiums.

Building on the strategies to enhance the regional communications network, the 2013 Bay Area Regional Communications Plan factored in additional programs (i.e., Express Lanes, Integrated Corridor Management, and Freeway Performance Initiative), and considered new priorities from local and regional stakeholders throughout the Bay Area. This Plan introduced a "Regional Communication Fiber Ring" around the San Francisco Bay, aimed to reduce lease-line recurring costs, upgrade existing infrastructure, and share data among agencies.

The 2019 Bay Area Regional Communication Strategic Investment Plan creates a five-year roadmap for fiber communication investments enabling MTC, Caltrans, and other regional stakeholders to provide a fast, reliable, redundant, and cost-effective regional communications network throughout the Bay Area.

The final plan includes planned regional communications infrastructure and corresponding projects allowing the leveraging of existing and planned investments to complete a regional communication backbone network connecting interfacing networks, express lanes and transportation centers.

[61] Caltrans, Middle-Mile Broadband Initiative. https://middle-mile-broadband-initiative.cdt.ca.gov/, accessed on September 15, 2022.

5. Performance & Needs Assessment

The following performance and needs assessment for the NACCCP Study Area is based on a combination of existing documentation review and modeling of existing and future performance conditions. Because existing performance data was pulled from a variety of sources, "existing" represents a range of years generally representing pre-COVID conditions. Where data was unavailable from observed conditions through previous studies, the MTC Plan Bay Area 2050 Model (MTC PBA 2050 Model, October 2021) was used for existing (2015) and future (2050) conditions. The future conditions are pulled from the Model's 2050 No-Project scenario, which has different assumptions regarding regional household growth and housing distribution than the PBA 2050 With Project scenario. For example, the No-Project scenario assumes more employment growth in San Jose, Oakland, and San Francisco than the PBA 2050 With Project scenario, as well as significantly less housing growth in Transit-Rich Areas (TRAs) and High-Resource Areas (HRAs). [62]

The No-Project scenario was used in order to understand how existing needs may progress in the absence of projects included in this Plan. While most projects in the NACCCP project list in Chapter 7 are not included in the No-Project scenario, there are several projects that are assumed to be completed:

1. ID #5: I-80/Ashby Avenue Interchange Modernization
2. ID #8: San Pablo Avenue Corridor Near-Term Improvement
3. ID #11: BART Core Capacity
4. ID #22: San Francisco Bay Trail and Bay Trail Connectors (Phase I)
5. ID #25: I-80 Design Alternatives Assessments (DAAs) Implementation
6. ID #30: Oakland Army Base Infrastructure Improvements

Performance of transportation facilities in the Study Area is assessed through five profiles: Mobility, Reliability, Safety, Sustainability, and Equity. The performance assessment is followed by a summary of needs broken down by mode: freeways, transit, active transportation, and goods movement. Key findings identified in the needs assessment include:

- Existing peak period travel speeds are low and travel times are long on Study Area freeways and some major arterials. Peak period congestion will continue to worsen in the absence of multimodal solutions.
- High traffic volumes and low vehicle occupancies will continue to drive increases in VMT and GHG emissions.
- Unsafe speeds account for just over half of all injury collisions on Study Area freeways.

62 Transit-Rich Areas are areas within ½ mile of transit, further distinguished by the quality of transit (TRA1, TRA2, etc.). High-Resource Areas are Census Tracts designated "High" or "Highest" Resource by the California Departments of Housing and Community Development and Finance, clipped to urban footprint. These include high percentages of adults with a bachelor's degree or above, high employment rates, high rates of job proximity, high educational proficiencies (math and reading).

- Transit service quality and performance in the NACCCP Study Area freeways is negatively impacted by freeway operational and safety issues.
- A high concentration of both the bicycle and pedestrian High Injury Network is found in the Downtown Oakland area and on main arterials such as Ashby Avenue and San Pablo Avenue.
- There are numerous gaps in the Study Area's bicycle and pedestrian network, which limit accessibility and hinder connections to transit particularly for residents of EPCs.
- Trucks traversing Study Area freeways are expected to see increasing travel times and unexpected delays in the absence of freight system management solutions.

Recommended projects that meet the goals of the NACCCP, and the needs of the Study Area are presented in Chapter 7.

5.1 Mobility Performance

The mobility performance assessment focuses on existing and future roadway volumes, travel speeds and times, Level of Service (LOS), delay, and bottlenecks.

Volumes

Person, vehicle, and truck volumes in the NACCCP Study Area are described in the following sections. Volume data was collected from several sources resulting in a variety of presentation formats.

Person and Vehicle Volumes

Existing and forecasted traffic volumes are drawn from the MTC PBA 2050 Model. Specific points, or screenlines, were selected for analysis on each Study Area freeway to represent the peak period and daily average volumes for the entire freeway. These screenlines, shown in **Figure 5-1** were selected as the portion of the freeway that sees the most representative volumes of the entire corridor. For I-80, general purpose (GP) and high-occupancy vehicle (HOV) lanes were calculated separately. Volume metrics are separated into total person volumes, summarized in **Table 5-1**, and total vehicle volumes, shown in **Table 5-2** .

I-80 experiences the highest person and vehicle volumes compared to the other freeways, followed closely by I-580, which could be due to their connections between the East Bay and San Francisco. Both I-80 and I-580 in the east-west orientation have a higher average daily person volume and peak period vehicle volumes in the eastbound (EB) direction, while I-980 has a higher average daily person and AM peak period vehicle volumes in the westbound (WB) direction, with higher volumes in the EB direction during the AM peak period. I-880 experiences higher average daily person volumes and peak period vehicle volumes in the southbound (SB) direction. Every direction on all freeways have increased volumes in the modeled future conditions, except for number of persons traveling on I-980 in the PM peak period.

Figure 5-1

VOLUME ANALYSIS LOCATIONS

Screenlines

Study Corridors

Major Corridor

Arterial State Route

Table 5-1: Existing and Future Peak Period and Daily Average Person Volumes

Route	Direction	Lane	Location Description	Avg Daily			AM			PM		
				Existing (2015)	Future (2050)	% Change	Existing (2015)	Future (2050)	% Change	Existing (2015)	Future (2050)	% Change
80	EB	GP	North of 880/580 exits & merges	138,000	180,500	31%	31,800	36,200	14%	37,400	50,300	34%
		HOV	North of 880/580 exits & merges	17,300	37,900	119%	3,900	4,800	23%	8,300	15,800	90%
	WB	GP	North of 880/580 exits & merges	123,700	168,600	36%	36,900	49,300	34%	33,200	38,200	15%
		HOV	North of 880/580 exits & merges	29,400	44,000	50%	10,400	21,300	105%	6,400	8,600	34%
580	EB	GP	East of split/merge with 80	126,700	153,700	21%	29,600	35,900	21%	37,700	40,800	8%
	WB	GP	East of split/merge with 80	122,600	141,700	16%	39,600	39,900	1%	29,800	34,300	15%
880	NB	GP	South of 80 ramps	58,500	84,700	45%	15,900	18,300	15%	16,100	23,300	45%
	SB	GP	South of 80 ramps	67,300	90,300	34%	18,200	25,100	38%	18,000	20,300	13%
980	EB	GP	North of 880 ramps	34,200	41,300	21%	7,900	9,500	20%	10,900	10,900	0%
	WB	GP	North of 880 ramps	31,700	44,500	40%	9,500	12,600	33%	9,000	10,400	16%

Notes:

Data excludes persons in trucks. The model defines the AM peak period as 6:00-10:00AM, and the PM peak period as 3:00-7:00PM.

Source: MTC PBA 2050 Model, October 2021 (2015 Historical Scenario, 2050 No-Project Scenario).

Table 5-2: Existing and Future Peak Period and Daily Average Vehicle Volumes

Route	Direction	Lane	Location Description	Avg Daily			AM			PM		
				Existing (2015)	Future (2050)	% Change	Existing (2015)	Future (2050)	% Change	Existing (2015)	Future (2050)	% Change
80	EB	GP	North of 880/580 exits & merges	114,000	151,400	33%	27,800	32,300	16%	32,800	44,700	36%
		HOV	North of 880/580 exits & merges	7,500	19,200	156%	1,100	1,400	27%	2,400	4,500	88%
	WB	GP	North of 880/580 exits & merges	103,800	143,500	38%	32,500	44,000	35%	28,900	33,900	17%
		HOV	North of 880/580 exits & merges	14,600	19,800	36%	3,000	6,100	103%	1,800	2,500	39%
580	EB	GP	East of split/merge with 80	99,200	123,700	25%	23,100	28,300	23%	29,900	33,500	12%
	WB	GP	East of split/merge with 80	94,200	113,700	21%	30,100	32,500	8%	22,400	26,600	19%
880	NB	GP	South of 80 ramps	43,300	63,900	48%	12,200	14,700	20%	11,800	16,900	43%
	SB	GP	South of 80 ramps	50,700	67,800	34%	13,800	18,300	33%	13,700	15,400	12%
980	EB	GP	North of 880 ramps	26,500	33,500	26%	6,300	7,900	25%	8,600	9,200	7%
	WB	GP	North of 880 ramps	24,400	36,200	48%	7,600	10,500	38%	6,900	8,500	23%

Notes:
Data excludes trucks.
Source: MTC PBA 2050 Model, October 2021 (2015 Historical Scenario, 2050 No-Project Scenario).

Transit Ridership

Pre-pandemic ridership data was collected for AC Transit Transbay and key arterial routes, as well as for BART stations in the Study Area. Future ridership for top ridership lines and stations was summarized from the MTC PBA 2050 Model.

Transbay Bus Ridership

Figure 5-2 and **Table 5-3** shows the top five Transbay bus routes with the highest ridership levels. Two routes, NL and O, originate from East Oakland, while lines F, J, and H travel from Berkeley. The highest ridership route, the NL, travels from the Eastmont Transit Center in East Oakland to San Francisco. Based on the MTC PBA 2050 Model, the NL will see the highest ridership increase with approximately 2,300 new riders by 2050, followed by the F with about 1,000 new riders.

Routes have a peak frequency that vary between 10 to 60 minutes. Ridership levels do not necessarily align with higher frequencies in the peak. For example, Route F has one of the lowest frequencies at 30 minutes but has the second highest ridership.

Table 5-3: Existing and Future Ridership on Top 5 Transbay Ridership Routes

Transbay Route	Peak Frequency (min)	Average Daily Ridership (2019)	Modeled Ridership Growth[1]	Future Average Daily Ridership (2050)
NL	15	3,123	74%	5,434
F	30	1,976	51%	2,984
O	10 – 30	1,876	30%	2,439
J	20 – 60	1,038	48%	2,574
H	20 – 35	636	17%	744

Source: AC Transit, 2019; MTC PBA 2050 Model, October 2021 (2050 No-Project Scenario)

Park and Ride Lots

Study Corridors

Major Corridor

Arterial State Route

Top Ridership Transbay AC Transit Routes

F

H

J

NL

O

Figure 5-2

TOP FIVE RIDERSHIP TRANSBAY BUS ROUTES

Source: AC Transit, 2019

Bus Ridership on Key Arterials

Table 5-4 shows the local AC Transit routes that provide service along the key arterials in the Study Area. All three 72 lines (72, 72M and 72R) travel from Richmond to the Jack London waterfront along San Pablo Avenue. Lines 72 and 72R follow roughly the same route, beginning in Hilltop, Richmond, with the 72R providing rapid service at higher frequencies and a reduced number of stops. Line 80 travels along Ashby Ave, from the City of El Cerrito to the Claremont neighborhood. The MTC PBA 2050 Model shows that the 72R will see the highest growth in ridership with over 7,700 new riders, followed by the 72 with over 5,800 new riders in 2050.

Routes have a peak frequency that varies between 12 – 60 minutes. Ridership on the 72R is significantly higher than the other lines. Line 80 ridership is the lowest, even though it runs at a higher peak period frequency than both the 72 and 72M. Line 80 service was suspended in 2020 due to the COVID-19 pandemic and has not been restored.

Table 5-4: Existing and Future Ridership on Top 5 Local Ridership Routes

Local Route	Peak Frequency (min)	Average Daily Ridership (2019)	Modeled Ridership Growth	Future Average Daily Ridership (2050)
72R	12	5,305	146%	13,030
72	30	3,766	156%	9,650
72M	30	3,557	118%	7,750
80	20	565	N/A	N/A

Source: AC Transit, 2019; MTC PBA 2050 Model, October 2021 (2050 No-Project Scenario).

BART Ridership

The highest ridership BART stations in the NACCCP Study Area are 12th Street/Oakland City Center and 19th Street Oakland with 13,908 and 13,165 weekday average exits, respectively. The 12th Street and 19th Street stations saw the fifth and sixth highest ridership in the BART system overall in 2019.[63] **Table 5-5** details the existing and calculated future weekday average exits from BART stations in the Study Area. According to the MTC PBA 2050 Model, total BART ridership will more than double by 2050. The model includes the completion of the BART extension to downtown San Jose, and modernization projects that increase frequencies on rail networks including South Bay Connect and the BART Core Capacity project. Assuming the same distribution of BART trip origins and destinations, ridership at 12th Street and 19th Street will see the largest increase within the Study Area with over 16,000 new riders at each station.

[63] BART, BART Facts 2021, https://www.bart.gov/sites/default/files/docs/BARTFacts2021_0.pdf.

Table 5-5: Existing and Future BART Ridership

BART Station	FY19 Weekday Average Exits	Calculated Future Weekday Average Exits (2050)[1]
12th Street / Oakland City Center	13,908	30,862
19th Street Oakland	13,165	29,213
MacArthur	8,618	19,123
Lake Merritt	7,010	15,556
West Oakland	7,143	15,851
Total BART System	410,774	911,521

Notes:

1. The MTC PBA 2050 Model run available for this analysis does not provide BART ridership estimates by station. Therefore, future ridership (2050) was calculated by taking percent of total FY19 ridership at each station and applying the same percentage for total modeled future ridership.

Source: BART, 2021; MTC PBA 2050 Model, October 2021 (2050 No-Project Scenario).

Truck Volumes

Existing and future truck volume data was collected from the Caltrans Traffic Census and the Northern Alameda County Truck Access Management Study, respectively, and is described below.

Existing Truck Volumes

Existing truck volumes were collected from the 2019 Caltrans Traffic Census and are shown in **Table 5-6.** Of the NACCCP Study Area freeways, I-880 carries the majority of truck traffic (23,187 trucks daily), which accounts for over 10% of the corridor's total traffic. The NACCCP segment of I-980 sees the lowest total truck volumes (2,001 trucks daily) and share of truck traffic relative to all traffic (just over 1%). Trucks with five or more axles make up roughly half of all truck traffic on I-80 and I-880 (46.4% and 51.6% respectively), compared to 21% on I-980 and 28.6% on I-580.

Table 5-6: Existing Daily Average Truck Traffic

	I-80[1]	I-580[2]	I-880[3]	I-980[4]
Daily Truck Traffic (AADTT)	8,159	5,257	23,187	2,001
Truck Share of Total Traffic (% of AADT)	3.4%	5.6%	10.7%	1.3%
Daily 5+ Axle Truck Traffic (5+ Axle AADTT)	3,788	1,506	11,964	421
5+ Axle Truck Share of Total Truck Traffic (% of AADTT)	46.4%	28.6%	51.6%	21.0%

Notes: AADT = Average Annual Daily Traffic, AADTT = Average Annual Daily Truck Traffic

1. I-80: Average Total AADTT and 5+Axle AADTT based on counts from PM 1,989, 2.802, 3.786 and 4.582, an area extending from the San Francisco – Oakland Bay Bridge (SFOBB) Toll Plaza to SR 13 East junction.
2. I-580: Average Total AADTT and 5+Axle AADTT based on counts from PM 45.151, 46.01 and 46.46, an area extending from the SR 24/I-980 junction to the I-80/I-880 junction.
3. I-880: Traffic census data from PM 31.091, the segment of I-880 between Oak and Madison Street.
4. I-980: Average Total AADTT and 5+ Axle AADTT based on counts from PM 0.009, 0.702 and 2.036, an area extending from the I-880 junction to I-580/SR 24 junction.

Source: Compiled from Caltrans Traffic Census, 2019; Fehr & Peers, 2021.

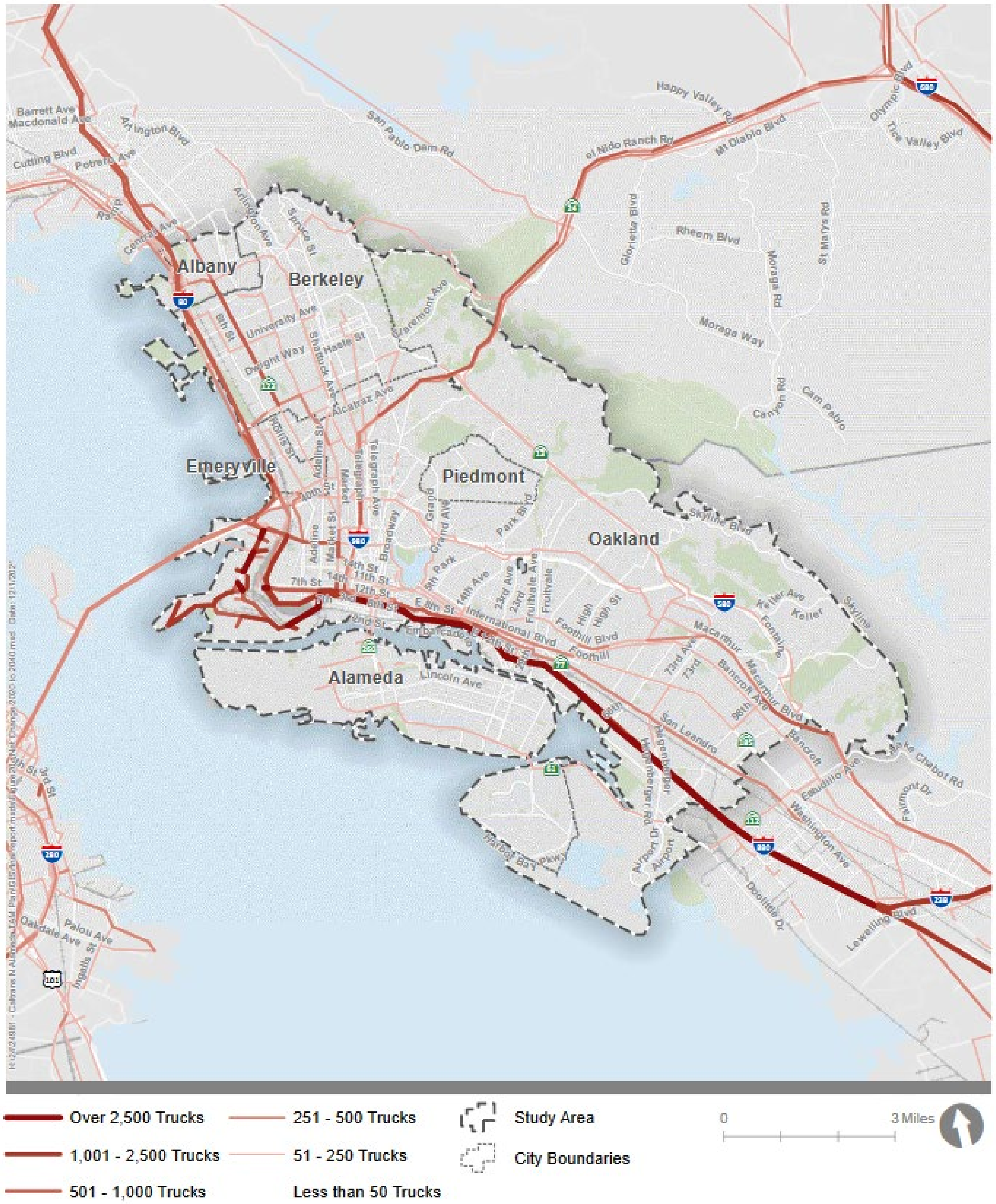
Future Truck Volumes

Forecast truck volumes for the NACCCP Study Area freeways were reported in the Northern Alameda County Truck Access Management Plan, in which the Alameda Countywide Travel Demand Model (Countywide Model) was used to identify corridors where truck traffic is expected to grow, and locations where predicted changes in truck or total vehicle volume may disrupt truck freight movement or may lead to undesirable changes in truck patterns that increase conflicts between trucks, other road users, and residents. While existing and future truck volume data was also drawn from the MTC PBA 2050 model, and can be found in **Appendix A,** data from the Caltrans Traffic Census and the Countywide Model provide a more nuanced view of truck volumes.

According to the Countywide Model, land use changes anticipated in Alameda County between 2020 and 2040 will prompt an increase in truck freight traffic. The model projects an increase in truck traffic concentrated in and around the Port of Oakland, with I-880 being the most impacted. Roadway segments parallel to the highway are projected to see the greatest overall percentage increase in truck trips due to diversion of truck traffic seeking to avoid congestion.

Figure 5-3 and **Figure 5-4** show the forecasted net and percent change in freight traffic expected between 2020 and 2040 on roads in Northern Alameda County.

Figure 5-3: Net Increase in Daily Truck Volumes (2020 to 2040)

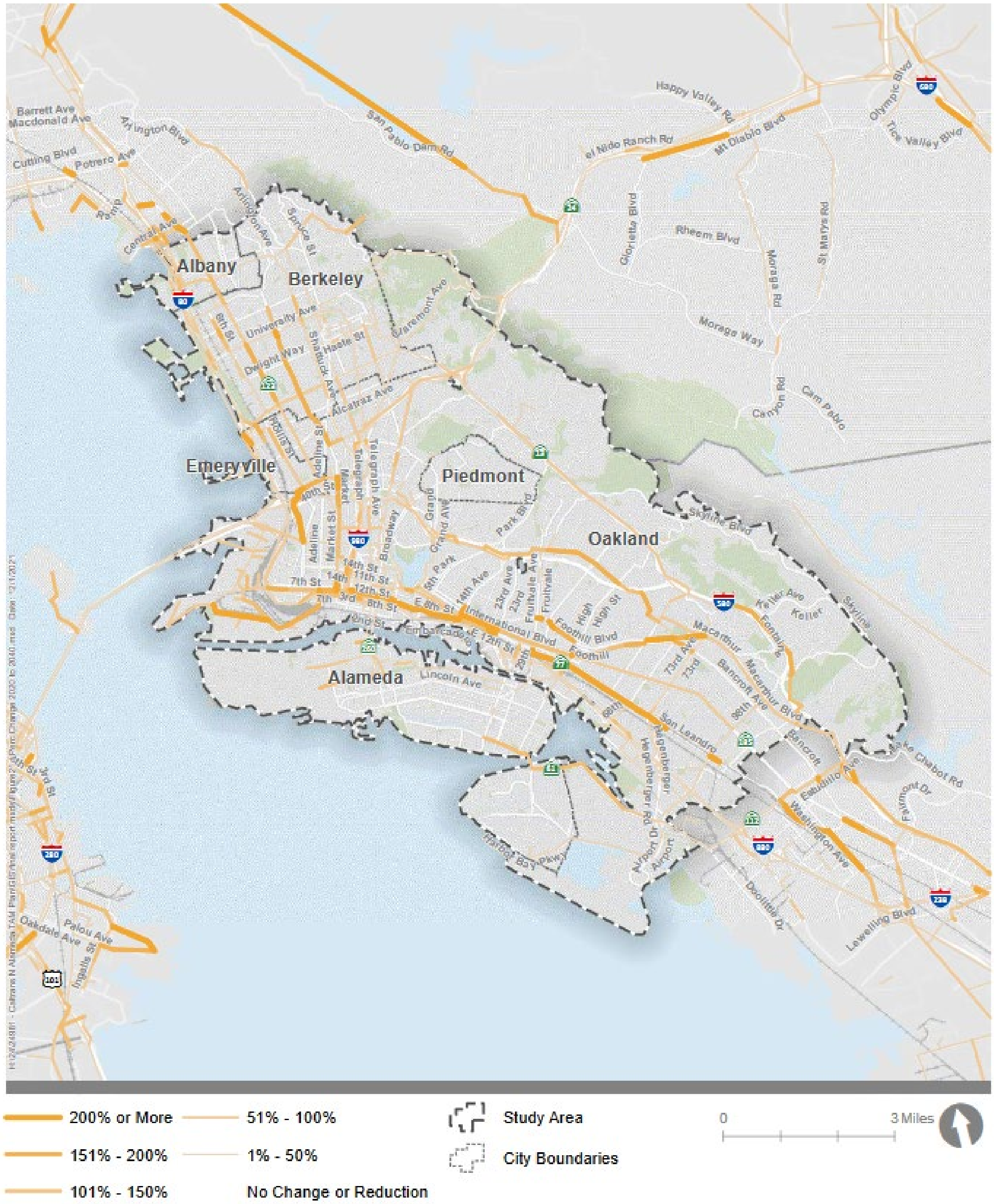


Notes:

These figures focus only on segments with at least 50 existing daily truck trips to avoid highlighting low-volume segments that having a high percentage increase when adding only one or two trucks.

Source: Kittelson & Associates, Inc; Alameda CTC, Northern Alameda County Truck Access Management Plan, 2021, p. 63.

Figure 5-4: Percent Increase in Daily Truck Volumes (2020 to 2040)



Notes:

These figures focus only on segments with at least 50 existing daily truck trips to avoid highlighting low-volume segments that having a high percentage increase when adding only one or two trucks.

Source: Kittelson & Associates, Inc; Alameda CTC, Northern Alameda County Truck Access Management Plan, 2021, p. 64.

Speeds

Auto and transit speeds in the NACCCP Study Area are described in the following sections. Speed data was collected from several sources resulting in a variety of presentation formats.

Auto Speeds

Existing and future speeds for each Study Area freeway are presented in **Table 5-7**. Speed data was sourced from the MTC PBA 2050 Model (Model Speeds) and the Alameda CTC Level of Service Monitoring Report (2018) (Observed Speeds). The model speeds presented are averaged over the hours of each time period, which are defined in the model as 6:00-10:00AM for the AM peak period, and 3:00-7:00PM for the PM peak period. Due to concerns about the accuracy of travel demand models in forecasting future freeway speeds (i.e., speeds are higher than expected in the model during the peak period), 2050 speeds were calculated as follows:

- The future speeds use a calculated travel time. Future travel times were calculated by adding the difference between modeled existing and future times to the travel time calculated from observed speed on each individual corridor. For example, if the observed speed is 30 mph on a one-mile corridor, then the calculated existing travel time is 2 minutes. If the existing and future modeled travel times for that one-mile corridor are 1.5 minutes and 2.5 minutes (a difference of one minute), then the calculated future travel time is 3 minutes, and the calculated future speed is 20 mph.

As **Table 5-7** shows, speeds on most of the Study Area freeways are forecast to fall between 4% and 15% by 2050. The I-80 WB GP lanes show the biggest drop in travel speeds in the AM peak period (33%) and the EB GP lanes show the biggest drop in the PM peak period (24%). The I-80 WB HOV lane is the only segment that shows the same speed performance in the existing and future conditions in both AM and PM peak periods. The I-80 EB GP lane and I-880 SB lane both see the greatest impact on travel speeds in the future scenario, slowing by 8 mph. In the PM peak period, the I-80 EB GP lane and the I-880 NB lane both see the most impact to travel speeds, with a reduction of 4 mph from the existing scenario leading to slower speeds. In the future scenario, I-980 WB speeds slightly decrease in the AM peak period, while the EB speeds slightly decrease in the PM peak period.

Existing and future travel times are shown in **Table 5-8.** Existing travel time in minutes was calculated using the distance of the segment and observed peak hour vehicle speeds from **Table 5-7.** Travel times for I-80 GP and HOV lanes were calculated separately. **Figure 5-5** and **Figure 5-6** show the average speeds on NACCCP Study Area freeways for the AM and PM peak periods, respectively. Modeled existing speed data can be found in **Appendix A**.

Most freeway segments perform similarly to freeflow conditions in the AM peak period except on I-80 WB lanes. In the PM peak period, several segments have travel times significantly below freeflow conditions. The I-80 EB and I-580 EB segments experience significantly slower travel times relative to the freeflow time for each freeway, including the I-80 HOV lane. Since I-980 serves as a local connector, travel times tend to stay consistent in the morning and evening peak periods.

Table 5-7: Existing and Future Peak Period Travel Speeds

Route	Direction	Lane	Location Description	AM Speeds (mph)			PM Speeds (mph)		
				Existing[1]	Future[2]	Change	Existing[1]	Future[2]	Change
80	EB	GP	Bay Bridge exit to University Ave	61	55	-10%	17	13	-24%
		HOV	Start of HOV lane to University Ave	69	69	0%	16	16	0%
	WB	GP	University Ave to Bay Bridge entry	24	16	-33%	28	26	-7%
		HOV	University Ave to end of HOV lane	34	32	-6%	46	46	0%
580	EB	GP	I-80 to Harrison	62	59	5%	18	17	-6%
	WB	GP	Harrison to I-80	53	49	-8%	59	57	-3%
880	NB	GP	Oak to I-80	56	54	-4%	44	40	-9%
	SB	GP	I-80 to Oak	54	46	-15%	28	27	-4%
980	EB	GP	I-880 to I-580	62	62	0%	56	54	-4%
	WB	GP	I-580 to I-880	64	62	-3%	59	59	0%

Note: Data based on average weekday outputs.

1. Calculated Future Speeds (mph) = Calculated Future Travel Time (min) / Distance (mi) * 60. Future calculated travel times are provided in Table 5-5.

Source: MTC PBA 2050 Model, October 2021 (2015 Historical Scenario, 2050 No-Project Scenario); Alameda CTC 2018 Level of Service Monitoring Report.

Table 5-8: Existing and Future Peak Period Travel Times

Route	Direction	Lane	Location Description	AM Travel Time (min)			PM Travel Time (min)		
				Existing[1]	Future[2]	Change	Existing[1]	Future[2]	Change
80	EB	GP	Bay Bridge exit to University Ave	4.1	4.6	11%	15.3	19.6	29%
		HOV	Start of HOV lane to University Ave	2.6	2.6	0%	11.2	11.2	0%
	WB	GP	University Ave to Bay Bridge entry	10.6	15.6	47%	9.0	9.7	9%
		HOV	University Ave to end of HOV lane	6.9	7.2	4%	5.0	5.0	0%
580	EB	GP	I-80 to Harrison	2.6	2.8	5%	9.3	9.7	4%
	WB	GP	Harrison to I-80	3.1	3.4	8%	2.9	2.9	3%
880	NB	GP	Oak to I-80	3.4	3.6	4%	4.5	4.8	6%
	SB	GP	I-80 to Oak	3.5	4.1	17%	6.8	6.9	1%
980	EB	GP	I-880 to I-580	2.3	2.3	0%	2.7	2.6	-1%
	WB	GP	I-580 to I-880	2.3	2.4	2%	2.6	2.5	-4%

Notes: Data based on average weekday outputs.

1. Modeled freeflow speed is 60 mph for all freeways, except on large, curved exits from I-880 to I-980 where modeled freeflow speeds are 55 mph.
2. Existing (2018) Travel Time = Distance / Observed Speed (2018)
3. Future (2050) Travel Time = Existing (2018) Travel Time + (Modeled Future (2050) Travel Time – Modeled Existing (2015) Travel Time)

Source: MTC PBA 2050 Model, October 2021 (2015 Historical Scenario, 2050 No-Project Scenario); Alameda CTC 2018 Level of Service Monitoring Report.

Figure 5-5

AM PEAK AVERAGE CORRIDOR SPEEDS

Study Corridors

- Major Corridor
- Arterial State Route

AM Peak Period Speed (mph)

- ≤30
- 31-40
- 41-50
- ≥50

Source: Level of Service Monitoring Report, 2018.

Figure 5-6

PM PEAK AVERAGE CORRIDOR SPEEDS

Study Corridors

- Major Corridor
- Arterial State Route

PM Peak Period Speed (mph)

- ≤30
- 31-40
- 41-50
- ≥50

Source: Level of Service Monitoring Report, 2018.

Transit Speeds

Average Transbay bus speeds were analyzed based on 2019 AC Transit Automatic Vehicle Location (AVL) data. This data is made available through vehicle position tracking technology on-board buses, which provides a timestamped vehicle location every few seconds. Weekday AVL data was processed for the month of May and reflects transit speeds on all NACCCP Study Area corridors, with the exception of I-980, which has no Transbay bus service.

Figure 5-7 and **Figure 5-8** show the average Transbay bus speeds by segment for the AM peak period (6:00 am – 9:00 am) and PM peak period (4:00 pm – 7:00 pm) respectively. Note the peak period used for Transbay bus speed analysis differs from the PBA 2050 Model peak periods (6:00-10:00AM and 3:00-7:00PM). In the morning peak period, buses traveling on I-80 WB and I-580 WB experience the lowest average speeds, with an increase in average speeds when entering the Bus Only Lane on I-80 WB. In the afternoon peak period, all Transbay lines running in the EB direction along Study Area freeways operate under 30 mph after exiting the Bus Only Lane on I-80.

Figure 5-7

AM PEAK
AVERAGE TRANSBAY BUS SPEEDS

Study Corridors

- Major Corridor
- Arterial State Route

AM Peak Period Speed (mph)

- ≤30
- 31 - 40
- 41 - 50
- ≥50

Source: AC Transit AVL data, May 2019

Figure 5-8

PM PEAK
AVERAGE TRANSBAY BUS SPEEDS

Study Corridors

- Major Corridor
- Arterial State Route

PM Peak Period Speed (mph)

- ≤30
- 31 - 40
- 41 - 50
- ≥50

Source: AC Transit AVL data, May 2019

Level of Service

As the Congestion Management Agency (CMA) for Alameda County, Alameda CTC is responsible for implementing the county's Congestion Management Program (CMP). The CMP includes strategies to assess and improve the performance of the multimodal transportation system by monitoring, among other metrics, Level of Service (LOS) of CMP roadway segments every two years. Existing LOS for the CMP Study Area freeways was pulled from the 2018 LOS Monitoring Report. LOS grades A through F are assigned based on the average speeds calculated for each freeway segment, where A reflects conditions at or above 60 mph and F reflects conditions below 30 mph.

The CMP legislation requires a standard of LOS E for all CMP roads that are subject to CMP conformance. This would include all freeways and state highways except those that are deemed exempt by, for example, being defined as legacy segments in the CMP. The majority of freeway segments in the NACCCP Study Area are legacy segments which have measured at LOS F since the beginning of the CMP program. Freeway segments within the NACCCP Study Area that are subject to the LOS E standard include I-80 WB from Powell to I-80/I-580, I-880 NB from I-980 (off) to I-880/I-80 split, I-880 SB from I-880/I-80 merge to I-980, and both the I-980 WB and EB segments.[64]

Table 5-9 summarizes existing peak period LOS on Study Area segments, while **Figure 5-9** and **Figure 5-10** show CMP roadway segments with poor LOS in the AM and PM Peak Period respectively. All segments subject to the LOS E standard meet the condition except for I-80 WB from Powell to I-80/I-580 in the AM peak period. I-80 WB and I-580 WB have an LOS of E or F during the AM peak period as do both I-80 WB/EB and I-580 WB/EB during the PM peak period. I-880 performs relatively well in the AM peak period but performs at D or below in the PM peak period. The only freeway with LOS above C in both the AM and PM peak periods in both directions is the I-980 corridor.

Table 5-9: Existing Peak Period LOS

Route	Direction	Location Description	Length (miles)	LOS AM	LOS PM
80	EB	San Francisco – Oakland Bay Bridge (SFOBB) Toll Plaza to I-580 SB Merge	1.30	A	F
		I-80/I-580 (Merge) to Powell	0.54	B	F
		Powell to Ashby	0.72	A	F
		Ashby to University	1.30	A	F
	WB	University to Ashby	1.30	F	F
		Ashby to Powell	0.71	F	F
		Powell to I-80/I-580 (Split)	0.47	**F**	E
		I-580 Split to SFOBB Toll Plaza	1.31	F	E
580	EB	I-80 to I-980	1.27	B	F
		I-980 to Harrison	1.00	A	F

[64] Alameda CTC, Congestion Management Program Update, 2019. p. 46

Route	Direction	Location Description	Length (miles)	LOS AM	LOS PM
	WB	SR 24 On-Ramp to I-80/I-580 Split	1.17	E	**F**
880	NB	I-980 (Off) to I-880/I-80 Split	2.43	A	B
		I-880/I-80 Split to I-880/I-80 Merge	1.44	B	**F**
	SB	I-880/I-80 Split to I-880/I-80 Merge	1.28	B	D
		I-880/I-80 Merge to I-980	2.51	A	**F**
980	WB	SR 24 at I-580 to I-880	2.49	A	B
	EB	I-880 to SR 24 at I-580	2.44	A	B

Notes:
Segments in gray are legacy segments and are not subject to the LOS E standard.
Source: Alameda CTC, Level of Service Monitoring Report, 2018.

As seen in **Figure 5-9** and **Figure 5-10,** there are several key arterials in the NACCCP Study Area that experience LOS at or below E during the peak periods. San Pablo Avenue experiences stretches of poor LOS within the City of Berkeley and just north of I-580 in Emeryville. Poor LOS is also observed on the Posey Tube connecting travelers from Alameda to Oakland.

Figure 5-9

CORRIDORS WITH POOR AM PEAK PERIOD LOS

LOS E or F AM Freeways

LOS E of F AM Arterials

Study Corridors

Major Corridor

Arterial State Route

Source: Level of Service Monitoring Report, 2018.

Figure 5-10

CORRIDORS WITH POOR PM PEAK PERIOD LOS

LOS E or F PM Freeways

LOS E or F PM Arterials

Study Corridors

Major Corridor

Arterial State Route

Source: Level of Service Monitoring Report, 2018.

Delay

Average weekday total vehicle and person delay was calculated using the MTC PBA 2050 Model and observed travel times discussed earlier in this section, as well as modeled volumes. Three different types of delay were calculated for each freeway for both the AM and PM peak periods: vehicle hours including trucks, vehicle hours (autos only), and person hours (autos only), as shown in **Table 5-10** and **Table 5-11**.

Auto & Person Delay

Per the existing conditions data presented below, most freeways experience substantial delays in the PM peak period, however the AM peak period delay outweighs PM delay on I-80 WB and I-580 WB. The highest levels of existing delay are in the eastbound and southbound directions, but even segments that do not serve the primary commute direction see delays. While not as high as the general-purpose lanes, the HOV lanes on I-80 also experience delay.

By 2050, delay is forecasted to worsen on most freeways, in many cases more than doubling. I-80 sees the worst increases in delay in absolute terms, especially in the WB AM peak period and EB PM peak period. Comparatively, I-580 and I-880 experience much smaller increases in delay. I-980 sees little to no increase in delay for vehicles including trucks.

Table 5-10: Peak Period Vehicle Delay (Hours)

Route	Direction	Lane	AM						PM					
			All Vehicles (including trucks)			Automobiles			All Vehicles (including trucks)			Automobiles		
			Existing	Future	Change	Existing	Future	Change	Existing	Future	Change	Existing	Future	Change
80	EB	GP	0	190	-	0	180	-	5,800	7,200	24%	5,400	6,800	26%
		HOV	0	0	0%	0	0	0%	280	500	79%	280	500	79%
	WB	GP	3,300	7,800	136%	3,200	7,600	138%	2,000	2,300	15%	1,800	2,100	17%
		HOV	150	310	107%	150	310	107%	40	40	0%	40	40	0%
580	EB	GP	0	40	-	0	40	-	2,400	2,600	8%	2,300	2,500	9%
	WB	GP	120	220	83%	120	220	83%	20	20	0%	20	20	0%
880	NB	GP	40	80	100%	40	80	100%	270	380	41%	240	350	46%
	SB	GP	70	330	371%	70	320	357%	900	1,100	22%	900	1,000	11%
980	EB	GP	0	0	0%	0	0	0%	20	30	50%	20	20	0%
	WB	GP	0	10	-	0	0	0%	0	0	0%	0	0	0%

Notes:

1. Existing (2018) Vehicle Hours Delay = # of Vehicles * (Observed travel time – Modeled freeflow travel time)
2. Future (2050) Vehicle Hours Delay = # of Vehicles * (Future travel time – Modeled freeflow travel time)

Source: MTC PBA 2050 Model, October 2021 (2015 Historical Scenario, 2050 No-Project Scenario); Alameda CTC, Level of Service Monitoring Report, 2018.

Table 5-11: Peak Period Person Delay (Hours)

Route	Direction	Lane	AM			PM		
			Existing[1]	Future[2]	Change	Existing[1]	Future[2]	Change
80	EB	GP	0	220	-	6,400	8,100	27%
		HOV	0	0	0%	1,000	1,900	90%
	WB	GP	3,800	9,000	137%	2,100	2,500	19%
		HOV	500	1,100	120%	120	140	17%
580	EB	GP	0	50	-	2,900	3,000	3%
	WB	GP	160	270	69%	20	20	0%
880	NB	GP	50	100	100%	330	480	45%
	SB	GP	90	420	367%	1,100	1,300	18%
980	EB	GP	0	0	0%	30	30	0%
	WB	GP	0	10	-	0	0	0%

Notes:
1. Existing (2018) Person Delay = # of Persons * (Observed travel time – Modeled freeflow travel time)
2. Future (2050) Person Delay = # of Persons * (Future travel time – Modeled freeflow travel time)

Source: MTC PBA 2050 Model, October 2021 (2015 Historical Scenario, 2050 No-Project Scenario); Alameda CTC, Level of Service Monitoring Report, 2018.

Truck Delay

Truck delay data was collected from the MTC 2050 PBA Model. **Table 5-12** presents existing and future truck delay (in hours) for the AM and PM peak periods. Truck delay was calculated as the difference between all vehicle delay (including trucks) and auto only delay. The largest amount of delay is experienced in the PM peak period on I-80 EB, with 400 hours of truck delay in both the existing and future scenarios. During the AM peak period, truck delay grows on I-80 EB from 0 to 10 hours and on I-80 WB, doubling from 100 to 200 hours. In the PM peak period, delay grows from 0 hours to 100 on I-880 SB, and from 0 to 10 on I-980 EB. This growth in delay is expected due to the anticipated levels of growth in population and employment in the Bay Area.

Table 5-12: Peak Period Truck Delay (hours)

Route	Direction	Lane	AM Truck Delay			PM Truck Delay		
			Existing[1]	Future[2]	Change	Existing[1]	Future[2]	Change
80	EB	GP	0	10	-	400	400	0%
	WB	GP	100	200	100%	200	200	0%
580	EB	GP	0	0	0%	100	100	0%
	WB	GP	0	0	0%	0	0	0%
880	NB	GP	0	0	0%	30	30	0%
	SB	GP	0	10	-	0	100	-
980	EB	GP	0	0	0%	0	10	-
	WB	GP	0	10	-	0	0	0%

Source: MTC PBA 2050 Model, October 2021 (2015 Historical Scenario, 2050 No-Project Scenario).

Bottlenecks

Bottlenecks occur at roadway locations with persistent and significant drops below freeflow speed. Recurring bottlenecks impacting the Study Area are described below, including their location, direction, and queue characteristics. Bottleneck information was collected from several existing sources resulting in a variety of presentation formats.

I-80 Bottlenecks

The I-80 Design Alternatives Assessment (2021) identifies bottlenecks along the I-80 corridor using INRIX congestion scans and speed heat maps. The analysis focused on the peak direction of travel, i.e., westbound during the AM peak period and eastbound during the PM peak period. As of 2019, the top bottleneck locations within the Study Area primarily occurred in the WB direction and include the segments upstream of the San Francisco – Oakland Bay Bridge (SFOBB) Toll Plaza and the I-580/I-880 split in Emeryville. These locations are characterized by sizable demand for I-80 to the SFOBB Toll Plaza and significant weaving activity between I-80, I-580, and I-880. The top bottlenecks for I-80 WB/EB are detailed in **Table 5-13.**

Table 5-13: I-80 Bottleneck Summary

Bottleneck Location	Direction	Cause	Time(s) of Day	Average Congested Time (mins) [1]	Average Queue Length (miles)	Number of Occurrences[2]
SFOBB Toll Plaza	WB	High traffic demand across the SFOBB	5:30 AM; 6:30 AM; 7:30 AM; 8:30 AM; 9:30 AM; 10:30 AM	41	8.7	469
Emeryville I-580 / I-880 Split	WB	High traffic demand to the SFOBB, roadway geometry	7:30 AM; 8:30 AM; 9:30 AM; 10:30 AM	58	3.2	342
I-580 Exit 11 / University Ave / Eastshore Hwy	WB	High traffic volumes going to the SFOBB	6:30 AM; 7:30 AM; 8:30 AM; 9:30 AM; 10:30 AM	23	4.4	128
I-580 Exit 10 / CA-13 Ashby Ave / Frontage Rd	WB	High traffic volumes going to the SFOBB	7:30 AM; 8:30 AM; 9:30 AM; 10:30 AM	35	6.2	52
I-580 Exit 11 / University Ave / Eastshore Hwy	EB	High traffic volumes coming from the SFOBB	3:00 PM; 4:00 PM; 5:00 PM. 6:00 PM; 7:00 PM; 8:00 PM	71	2.7	75

Notes:

1. INRIX platform data collected in April, May, September, October of 2019; M-F; excluding Memorial Day and Labor Day.
2. Number of times the bottleneck occurred in the four-month period.

Source: I-80 DAA: Data Collection and Analysis Memo, Fehr & Peers, 2021.

I-880 Bottlenecks

The Oakland-Alameda Access Project: Traffic Operations Analysis Report (2020) describes bottlenecks in relation to AM and PM peak period operations. This data represents a compilation of bottleneck locations derived from April 2015 floating car runs, Google Maps® historical speed maps, and field observations throughout key freeway and local street locations focusing on known congested areas of Downtown Oakland and Chinatown neighborhoods. A major construction project to alter the 23rd Avenue and 29th Avenue interchange was underway at the time of data collection and may have altered the congestion pattern observed.

Bottlenecks along the I-880 corridor represent congestion issues on the corridor itself and delays caused by spillover congestion from adjacent surface streets. No bottlenecks were observed on the I-880 SB corridor during the AM peak period or NB during the PM peak period. The top bottleneck locations along the I-880 corridor for the AM peak period (6:00 AM – 10:00 AM) and PM peak period (3:00 PM – 7:00 PM) are summarized in **Table 5-14** and **Table 5-15**, respectively.

Table 5-14: I-880 Bottleneck Summary – AM Peak Period

Roadway Segment	Direction	Cause
Corridor Segment		
Between the 23rd Ave on-ramp and 5th St off-ramp	NB	Roadway geometry, high traffic demands, and non-standard roadway features
Approach to the Jackson on-ramp and I-980 off-ramp	NB	Right-lane overload associated with high traffic volumes exiting the corridor at I-980, Broadway, and Oak Street
Adjacent roadways		
Near the Jackson Street on-ramp to I-880; Jackson Street, 6th Street, 7th Street, Harrison Street, Posey Tube	NB	High demand on this on-ramp
Broadway, between 5th Street and 6th Street	SB	High volumes of traffic turning left into the Webster Tube or onto 5th Street to access I-880 SB, or traveling to Jack London
I-980 off-ramp at 12th Street	WB	(No reason given)

Source: Compiled from DKS, Oakland-Alameda Access Project: Traffic Operations Analysis Report, 2020, p. 34; Fehr & Peers, 2022.

Table 5-15: I-880 Bottleneck Summary – PM Peak Period

Roadway Segment	Direction	Cause
Corridor Segment		
I-880 mainline, from the Union Street off-ramp south	SB	Spillback from congestion south of NACCCP corridors

Roadway Segment	Direction	Cause
Adjacent roadways		
Numerous alternate surface streets adjacent the I-880 mainline	SB	Overall heavy traffic demand and few alternative routes
5th Street, Adeline Street to Broadway	SB	Heavy traffic traveling from I-880 SB to Alameda, via 5th Street and the Webster Tube, and use of 5th Street as an alternate route to I-880 SB
Northbound Harrison, eastbound 7th Street, and southbound Jackson loop leading to I-880 on-ramp	NB	Signal timing at the 7th Street/Harrison Street intersection (21 seconds in the PM peak period compared to 28 in the AM peak period)
Webster Street, Webster Tube, 8th Street, and 9th Street	SB	Heavy traffic demand on the southbound middle Webster Street lanes and frequent obstruction of the left-turn lane onto 6th Street
Broadway, between 5th Street and 6th Street, extending on to the I-880 Broadway off-ramp	NB	Heavy traffic demand on the Webster Tube
I-980 connector	WB	Congestion due to spillover from heavy traffic demand on I-880 SB
I-980 off-ramp to Jackson Street/5th Street	WB	Congestion due to high demand and constraints on the Jackson/5th Street intersection
I-980 off-ramp at 12th Street, not extending to the freeway	WB	Congestion due to overall high traffic demand

Source: Compiled from DKS, Oakland-Alameda Access Project: Traffic Operations Analysis Report, 2020, p. 34; Fehr & Peers, 2022.

I-980 Bottlenecks

The I-980 Transportation Concept Report (2017) provides a brief summary of bottlenecks for the whole corridor as identified by Caltrans Performance Measurement System (PeMS) data. The top bottlenecks on the corridor are attributed to the impacts of peak period congestion along peripheral roadways. Downstream bottlenecks outside the corridor itself, combined with storage constraints at on- and off-ramps and freeway-to-freeway connectors, cause delays on the I-980 facility. The locations with the most recurring congestion are the I-580/I-980 freeway connectors and the eastbound on-ramps at 27th Street – Grand Avenue connecting to I-580 and SR 24.[65]

I-580 Bottlenecks

Similar to the I-80 DAA, the I-580 DAA (2018) describes I-580 bottlenecks along the corridor that were identified using INRIX congestion scans and speed heat maps. Bottlenecks on I-580 WB/EB are detailed in **Table 5-16.** The most notable bottleneck is on I-580 WB at the SFOBB Toll Plaza during the AM period, where congestion typically lasts about seven hours from early morning to

[65] Caltrans, I-980 Transportation Concept Report, 2017, pp. 29-30.

early afternoon. While the I-580/I-80 connector is a location of delay in the AM and PM, it is not identified as a bottleneck in the I-580 DAA.

Table 5-16: I-580 Bottleneck Summary

No	Bottleneck Location	Direction	Congested Time	Queue Length	Possible Causality
1	Park Blvd on-ramp to Lakeshore Ave off-ramp[1]	WB	~8:00-9:15 AM	Typical queue extends through upstream bottleneck at Fruitvale Ave	Heavy on-ramp traffic from Park Blvd & heavy off-ramp traffic to Lakeshore Ave
2	SFOBB Toll Plaza	WB	~5:00 AM-12:00 PM	Typical queue extends to I-980/SR 24; Additional recurring backup from I-80 EB Connector (AM & PM)	SFOBB metering lights and toll plaza & heavy off-ramp traffic to I-80 EB
3	Oakland Ave/ Harrison St on-ramp to Grand Ave off-ramp	EB	~3:15-7:00 PM	Typical queue extends to SFOBB toll plaza	Heavy on-ramp traffic from Oakland Ave/ Harrison St & heavy off-ramp traffic to Grand Ave

Notes:

1. Bottleneck location just outside of NACCCP Study Area.

Source: HDR, ALA 1-580 Design Alternatives Assessment, 2018.

5.2 Reliability Performance

The assessment of reliability focuses on characteristics of NACCCP facilities that make travel times unpredictable for users of the system, such as recurring significant variations in travel time and issues like bus bunching that leads to not meeting schedules.

Vehicle Buffer Time Index

In the 2018 LOS Monitoring Report, Alameda CTC evaluated reliability using a Buffer Time Index (BTI) for its corridor segments for AM and PM periods peaks. BTI is used to express the extra travel time cushion that travelers must add to the average travel time when planning trips to ensure on-time arrival based on their knowledge of recurring variations like congestion. BTI is represented as a percentage of average travel time, calculated as follows:

$$Buffer\ Time\ Index = \frac{95th\ Percentile\ Travel\ Time - Average\ Travel\ Time}{Average\ Travel\ Time}$$

A higher BTI implies a greater departure of the 95^{th} percentile travel time from the average travel time, and therefore, worse travel time reliability. The least reliable corridor segments are shown in **Table 5-18** using BTI as the primary metric categorized as follows:

Table 5-17: Reliability Index

Reliability	BTI Index
Reliable	< 25%
Mostly Reliable	25 – 50%
Less Reliable	50 – 100%
Unreliable	> 100%

Table 5-18: Least Reliable Freeway Segments

Description	Peak Period	Segment Length	BTI
I-880 SB from I-80 to SR 92	PM	18.8 mi	90% (Less Reliable)
I-580 WB from SR 13 to I-80	AM	7.7 mi	70% (Less Reliable)

Source: Alameda CTC, Level of Service Monitoring Report, 2018.

Figure 5-11 and **Figure 5-12** demonstrate the reliability/buffer time index on the Study Area freeways. In the AM peak period, a majority of freeway corridors are Less Reliable measuring at over 50% BTI in the northbound or westbound directions. In the PM, this trend continues but is most prominent on I-880 NB/SB.

Figure 5-11

RELIABILITY/BUFFER TIME INDEX AM PEAK PERIOD

Study Corridors

- Major Corridor
- Arterial State Route

Buffer Time Index

- Reliable - Less than 25%
- Mostly Reliable - Between 25% to 50%
- Less Reliable - Over 50%

Source: Level of Service Monitoring Report, 2018

Figure 5-12

RELIABILITY/BUFFER TIME INDEX PM PEAK PERIOD

Study Corridors

- Major Corridor
- Arterial State Route

Buffer Time Index

- Reliable - Less than 25%
- Mostly Reliable - Between 25% to 50%
- Less Reliable - Over 50%

Source: Level of Service Monitoring Report, 2018

Freeway Transit Travel Time Reliability

Travel time reliability for Transbay bus service along the Study Area freeways was analyzed based on AC Transit's AVL data. Weekday 24-hour AVL data was processed for the month of May 2019 for all of the NACCCP Study Area freeways except I-980, which has no Transbay bus service. Two metrics were used to analyze reliable performance: travel time variability and travel time reliability.

Travel time variability was assessed by comparing the average travel time to the travel time expected to occur in the worst conditions, which are represented by the 95^{th} percentile of travel time. A rider can expect to experience these worst-case conditions about 5% of the time, or one weekday per month, as 95% of weekdays will have shorter travel times. Where travel time is shown as zero in the figures in the following sections, Transbay bus service was not running on that segment during that time. Travel time reliability was analyzed using the BTI metric as described in the previous section.

The Study Area freeways were divided into five segments, as shown in **Figure 5-13** and listed below. These segments were selected to represent the locations where Transbay bus services along the Study Area freeways converge and diverge. The following sections describe the travel time variability and reliability in each travel direction of Transbay bus service along each of the five freeway segments:

- Segment A: I-80 from University Ave Interchange to I-580 Interchange
- Segment B: I-80 from I-580 Interchange to I-880 Interchange
- Segment C: I-80/I-880 Interchange to Bay Bridge
- Segment D: I-580 from I-80 Interchange to Broadway
- Segment E: I-880 from I-80 Interchange to Oak Street

Figure 5-13

FREEWAY STUDY SEGMENTS FOR TRANSIT TIME VARIABILITY

Transbay Transit Reliability Assessment Segments

Study Corridors

Major Corridor

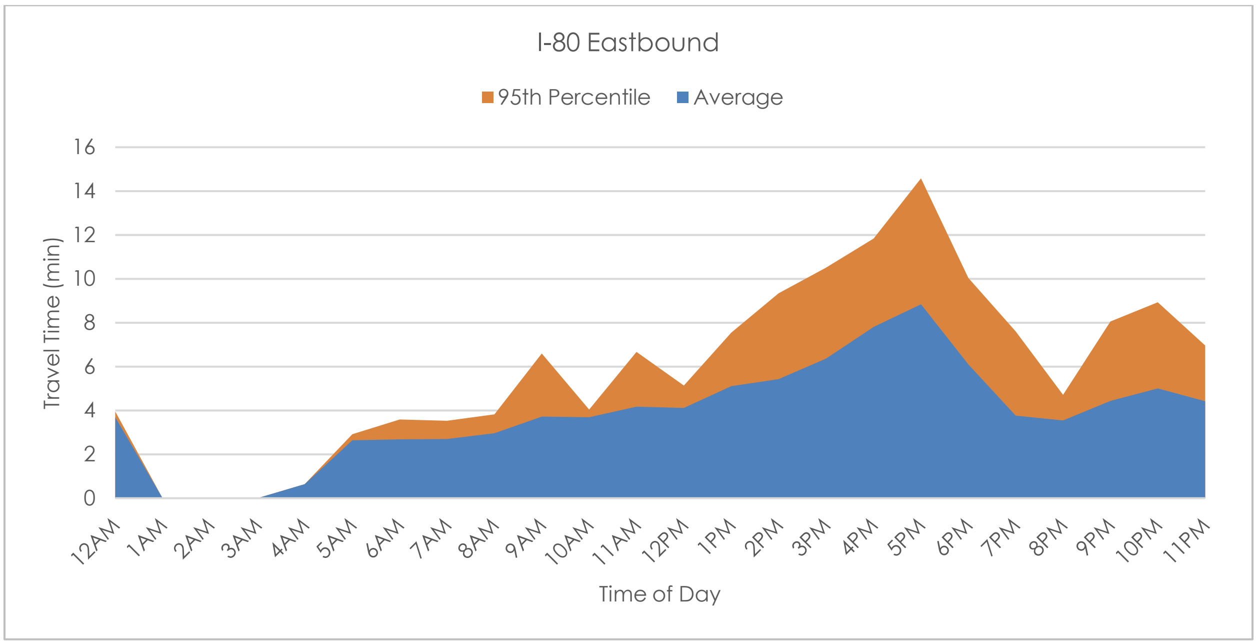
Arterial State Route

Segment A: I-80 from University Ave Interchange to I-580 Interchange

Figure 5-14 and **Figure 5-15** show the average and 95th percentile travel time of Transbay buses along I-80, between the University Ave interchange and the I-580 interchange in the east and westbound direction, respectively. Both the average and 95th percentile travel times follow the same pattern throughout the day, with an increase in the afternoon peak period and the 95th percentile travel time about twice as large as the average travel time**.**

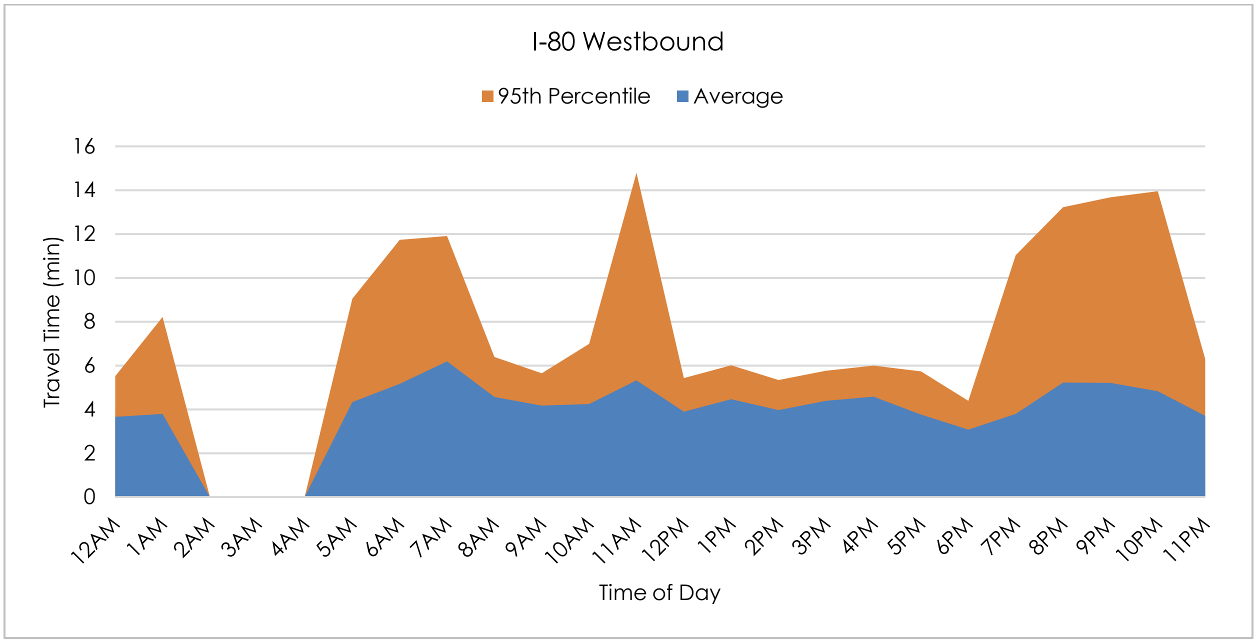
Figure 5-16 shows that the travel time is Unreliable on I-80 WB in the early morning, in the late afternoon and in the evening, while I-80 EB is Less Reliable for most of the day.

Figure 5-14: Weekday Transit Travel Time Variability Along Segment A, I-80 EB



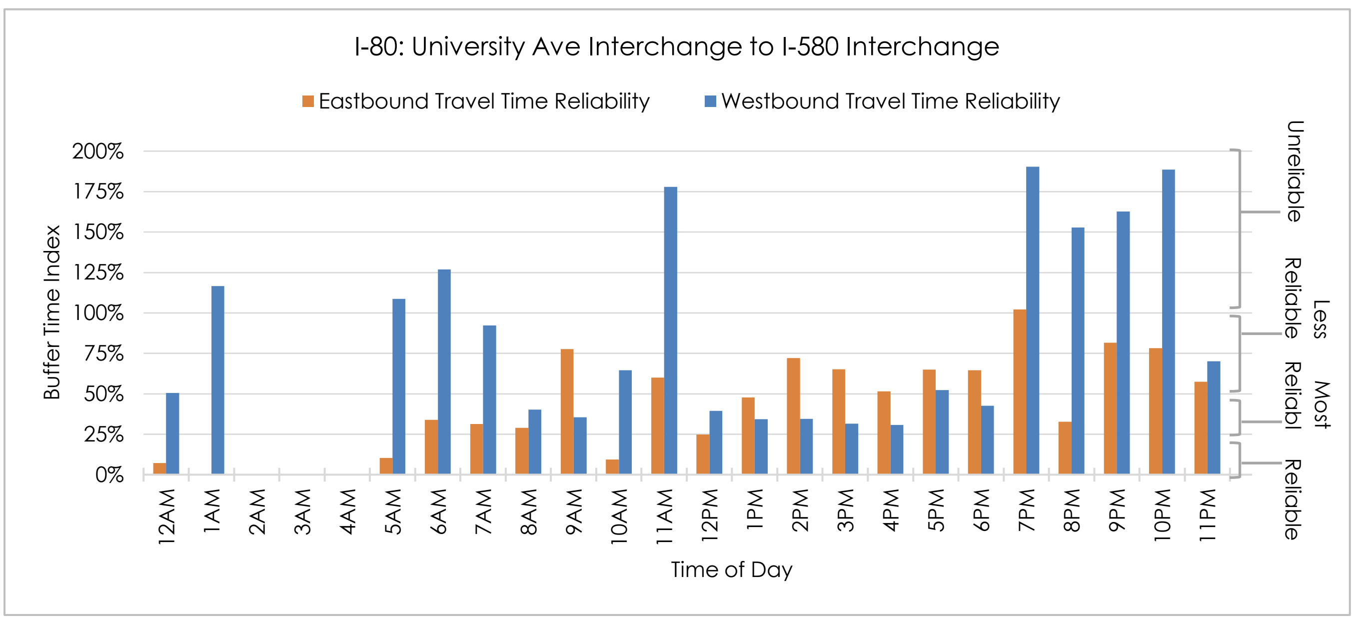
Source: AC Transit, May 2019 AVL data.

Figure 5-15: Weekday Transit Travel Time Variability Along Segment A, I-80 WB



Source: AC Transit, May 2019 AVL data.

Figure 5-16: Weekday Transit Buffer Time Index Along Segment A



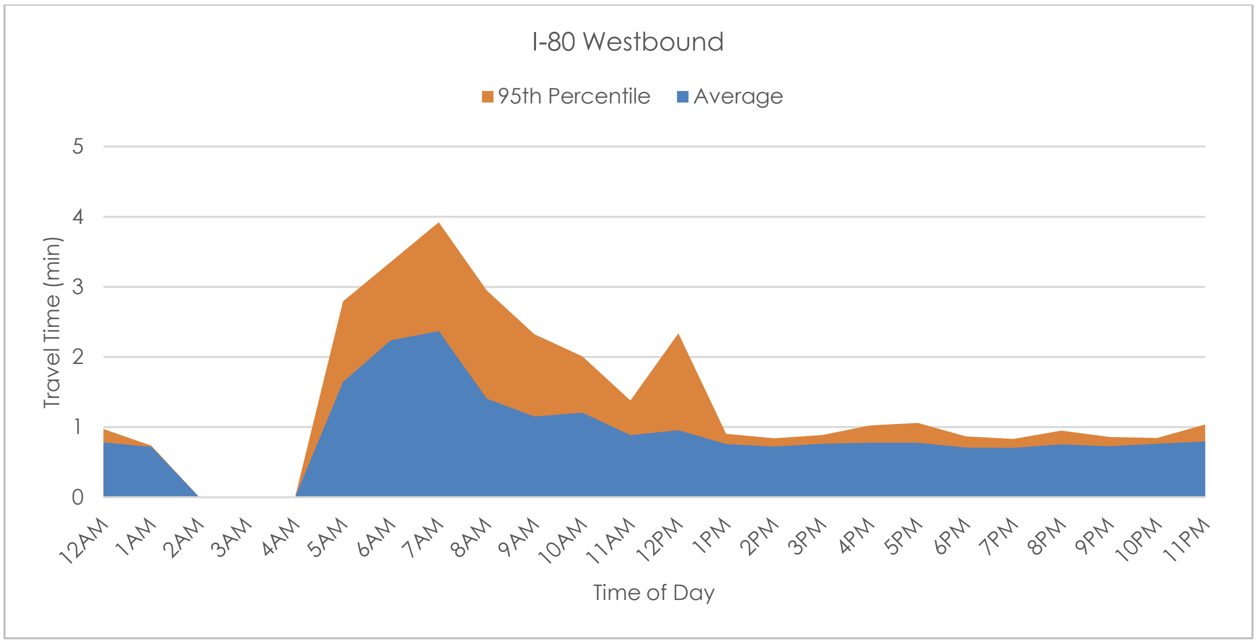
Source: AC Transit, May 2019 AVL data.

Segment B: I-80 from I-580 Interchange to I-880 Interchange

Figure 5-17 and **Figure 5-18** show distinct peaks in the average and 95th percentile travel times in the peak periods for each direction of travel. Travel time is more variable in the morning peak period on I-80 EB, while I-80 EB has more variability in the afternoon peak period.

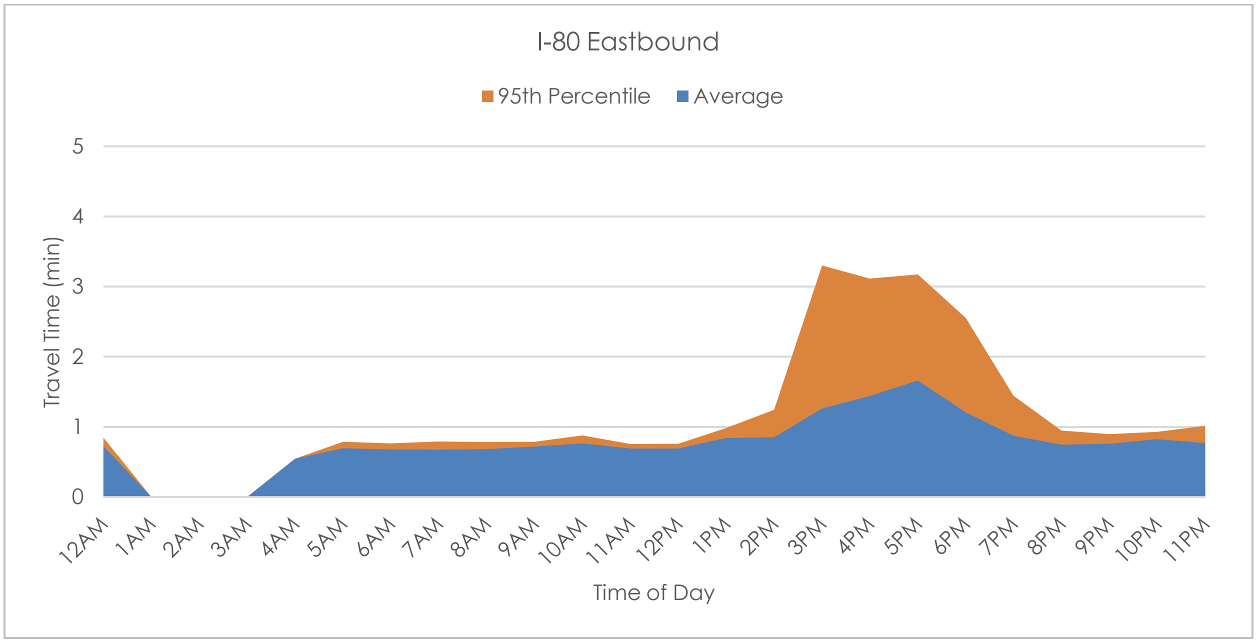
Figure 5-19 shows that Transbay bus service is Less Reliable in the morning on I-80 WB and Unreliable in the afternoon on I-80 EB.

Figure 5-17: Weekday Transit Travel Time Variability Along Segment B, I-80 WB



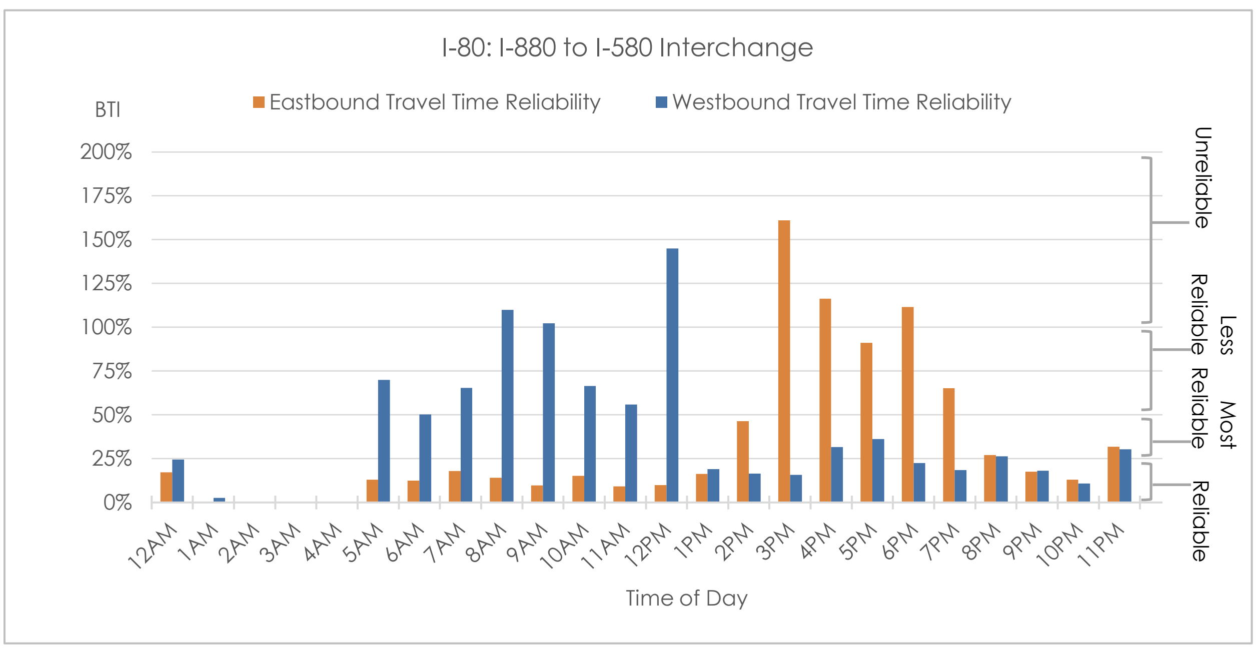
Source: AC Transit, May 2019 AVL data.

Figure 5-18: Weekday Transit Travel Time Variability Along Segment B, I-80 EB



Source: AC Transit, May 2019 AVL data.

Figure 5-19: Weekday Transit Buffer Time Index Along Segment B



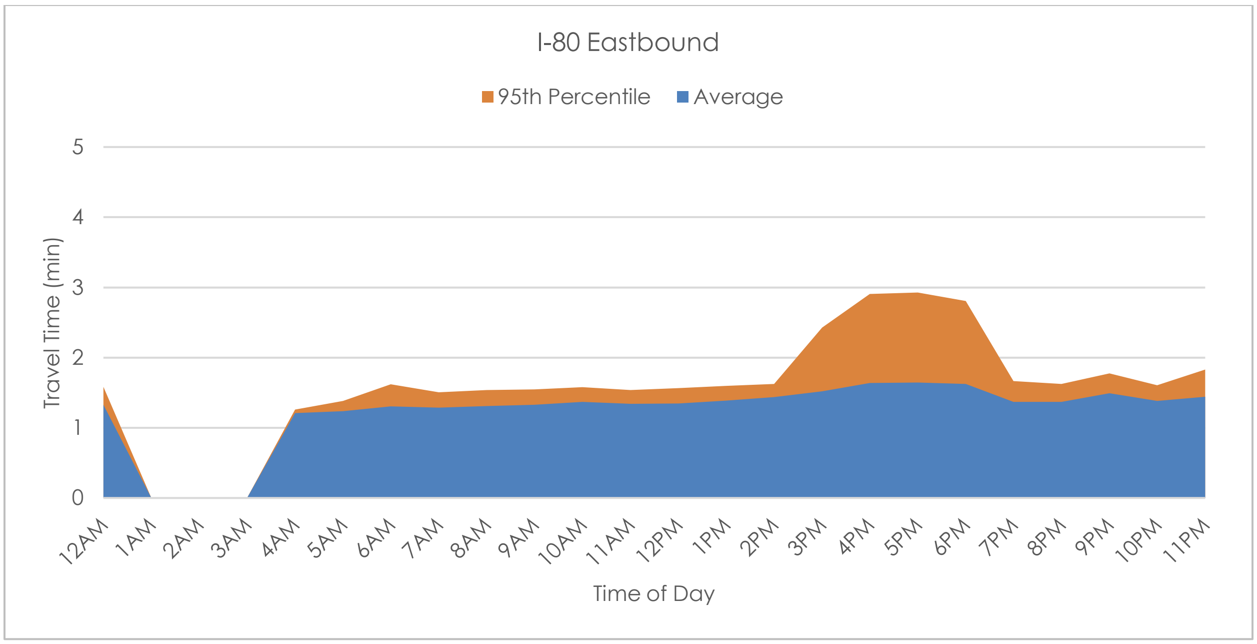
Source: AC Transit, May 2019 AVL data.

Segment C: I-80 I-880 Interchange to Bay Bridge

Figure 5-20 and **Figure 5-21** show that average travel time is stable throughout the day in both directions of travel, with I-80 EB experiencing a peak in the 95th percentile travel time in the afternoon peak, of roughly twice the average travel time. I-80 WB experiences a peak in the 95th percentile travel time both in the morning and the afternoon peak periods, so is less reliable.

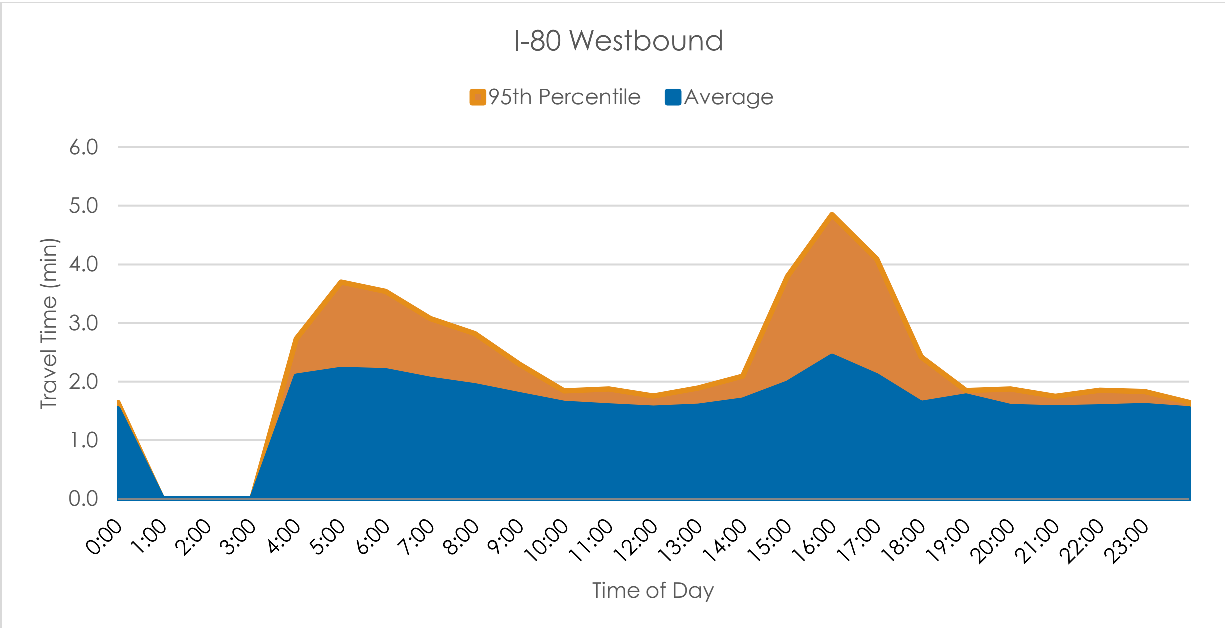
While **Figure 5-22** shows that both directions of travel are Less Reliable in the afternoon, this segment experiences the smallest unreliability of all study segments, with a BTI of about 100% on I-80 WB and about 80% on I-80 EB. Segment C includes the Bus Only lanes on I-80, which can contribute to an increase in travel time reliability.

Figure 5-20: Weekday Transit Travel Time Variability Along Segment C, I-80 EB



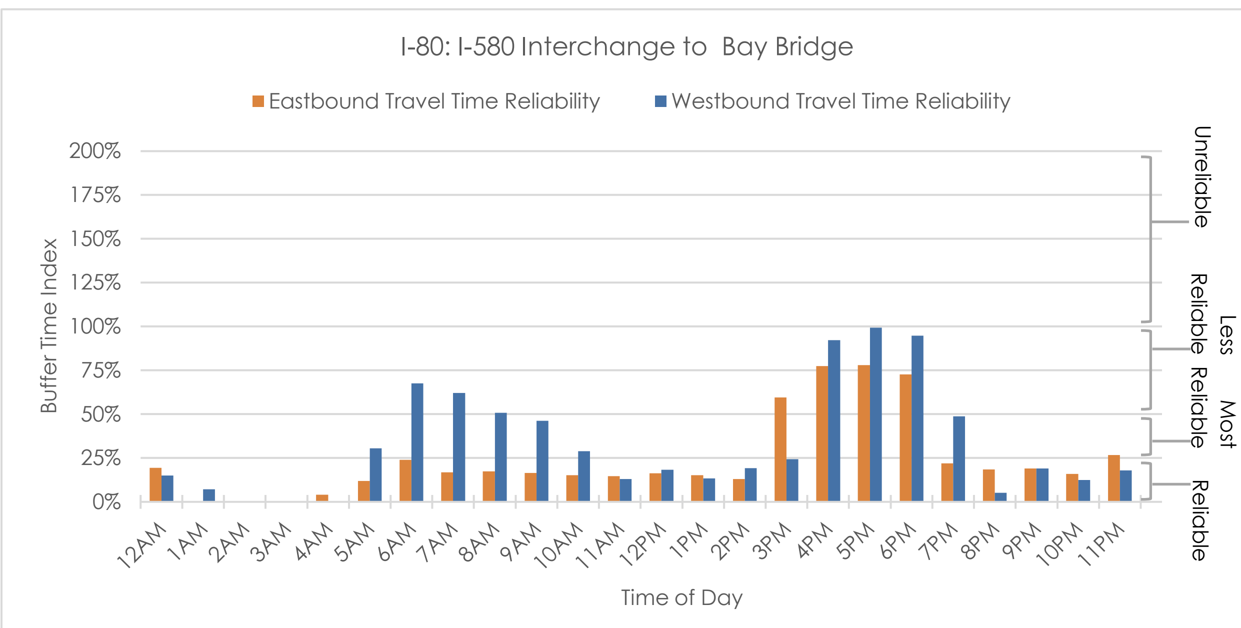
Source: AC Transit, May 2019 AVL data.

Figure 5-21: Weekday Transit Travel Time Variability Along Segment C, I-80 WB



Source: AC Transit, May 2019 AVL data.

Figure 5-22: Weekday Transit Buffer Time Index Along Segment C



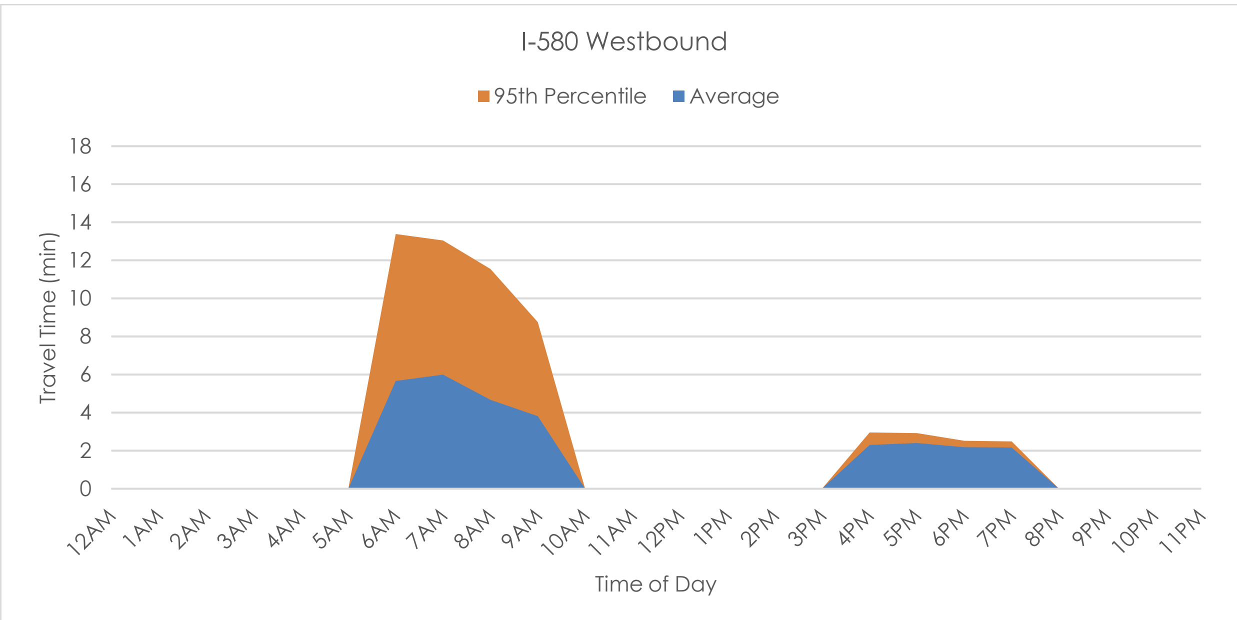
Source: AC Transit, May 2019 AVL data.

Segment D: I-580 from I-80 Interchange to Broadway

Figure 5-23 and **Figure 5-24** show distinct peaks in the average and 95th percentile travel times in the peak periods for each direction of travel. However, travel time is more variable in the morning peak period on I-580 WB, with a 95th percentile travel time more than twice the average travel time.

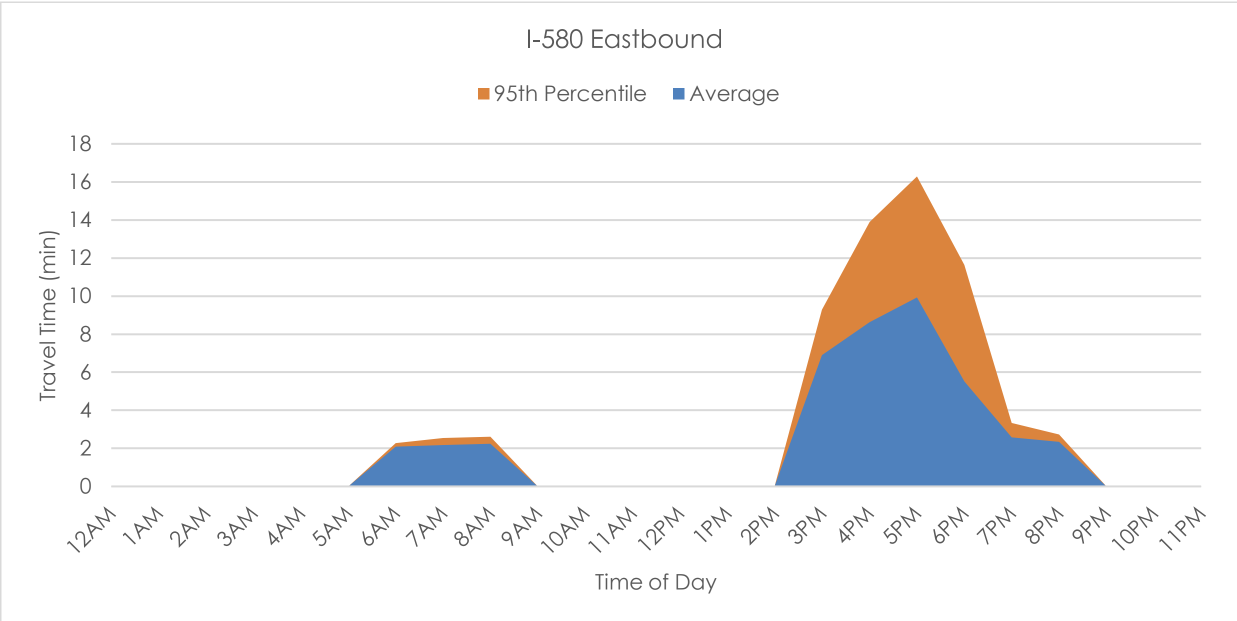
This pattern is also reflected in **Figure 5-25**, which shows that Transbay bus service is Unreliable in the morning on I-580 WB, while Less Reliable in the afternoon on I-580 EB. However, BTI around 6 pm on I-580 EB crosses to the Unreliable threshold of over 100%. Transbay lines running along this segment operate exclusively during the morning (5:00 AM - 10:00 AM) and afternoon (3:00 PM – 8:00 PM) periods.

Figure 5-23: Weekday Transit Travel Time Variability Along Segment D, I-580 WB



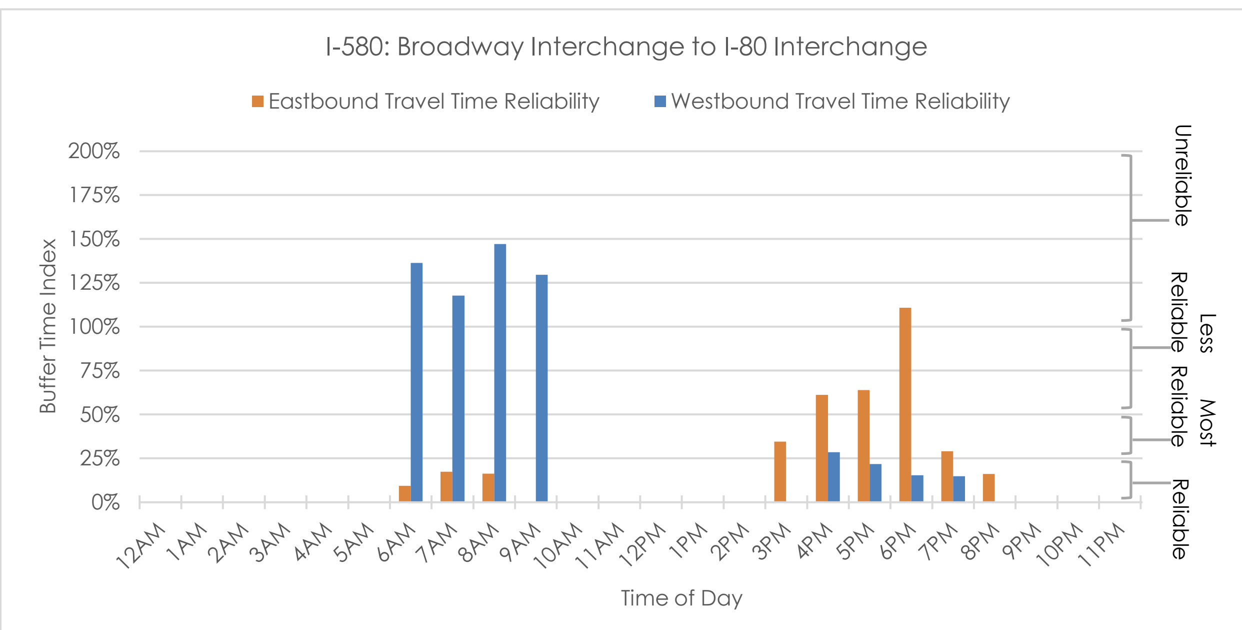
Source: AC Transit, May 2019 AVL data.

Figure 5-24: Weekday Transit Travel Time Variability Along Segment D, I-580 EB



Source: AC Transit, May 2019 AVL data.

Figure 5-25: Weekday Transit Buffer Time Index Along Segment D



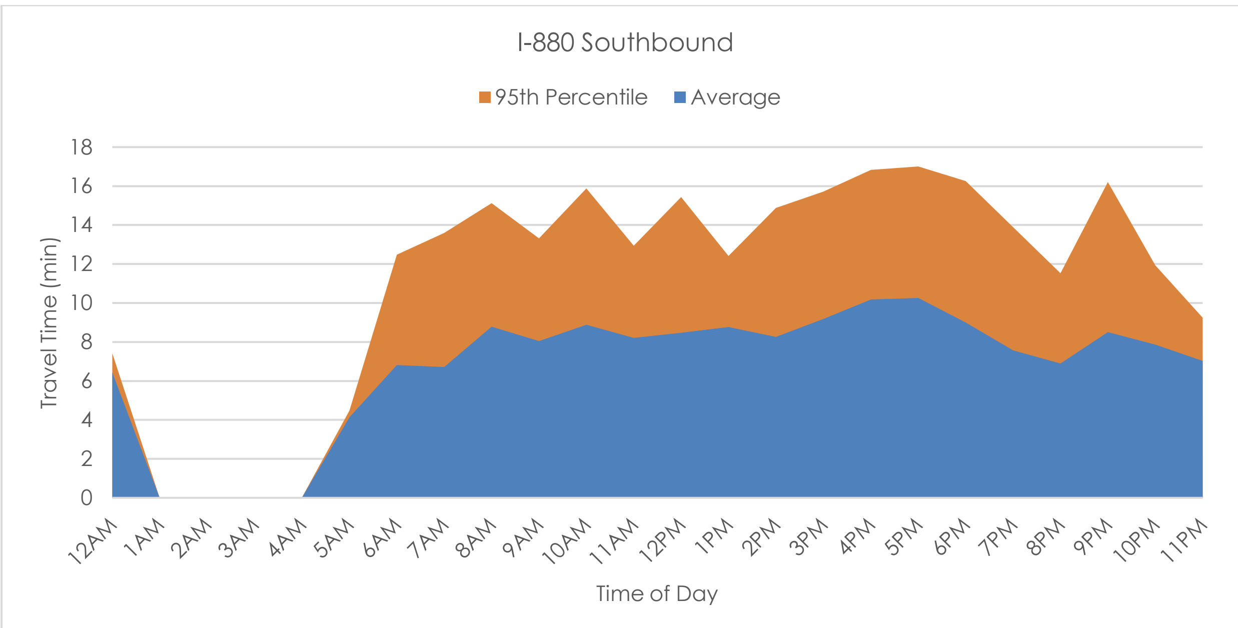
Source: AC Transit, May 2019 AVL data.

Segment E: I-880 from I-80 Interchange to Oak Street

Figure 5-26 and **Figure 5-27** show that while the average travel time is stable throughout the day in both directions of travel, the 95th percentile travel is highly variable. There are no clear peaks in the travel time variability, with the 95th percentile of travel time fluctuating between four and ten minutes above the average travel time throughout the day. This segment presents the largest variability in travel time of all the study segments.

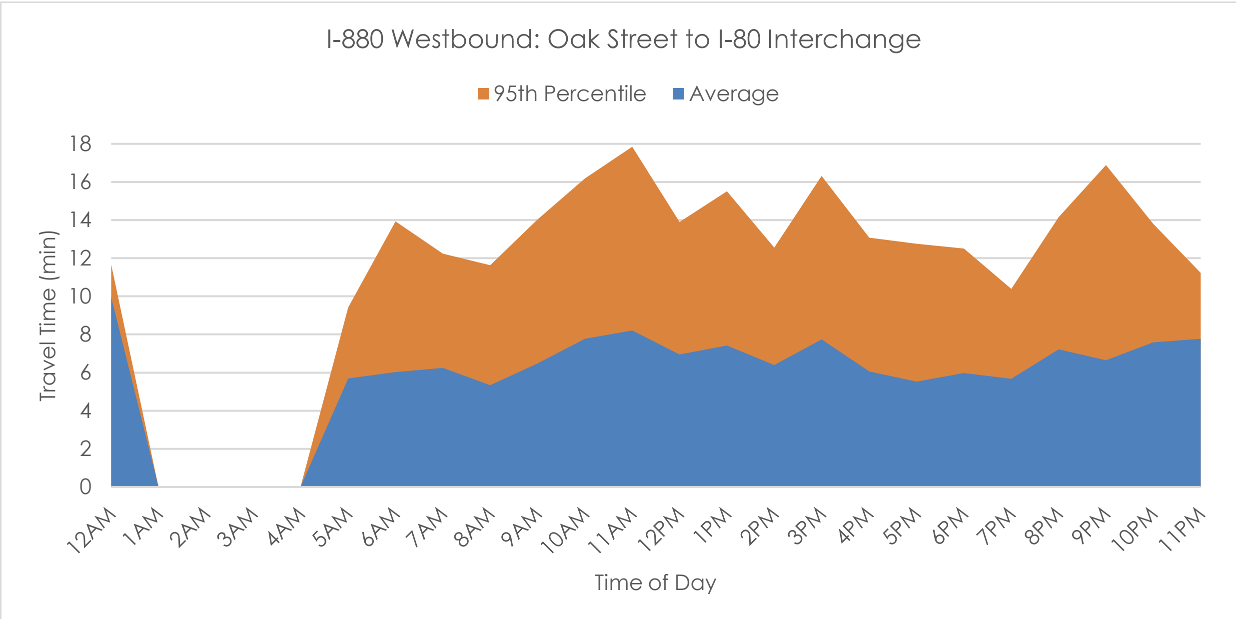
Figure 5-28 shows that while both directions of travel are Unreliable throughout the day, I-880 NB has a BTI about 40% higher than on I-880 SB.

Figure 5-26: Weekday Transit Travel Time Variability Along Segment E, I-880 SB



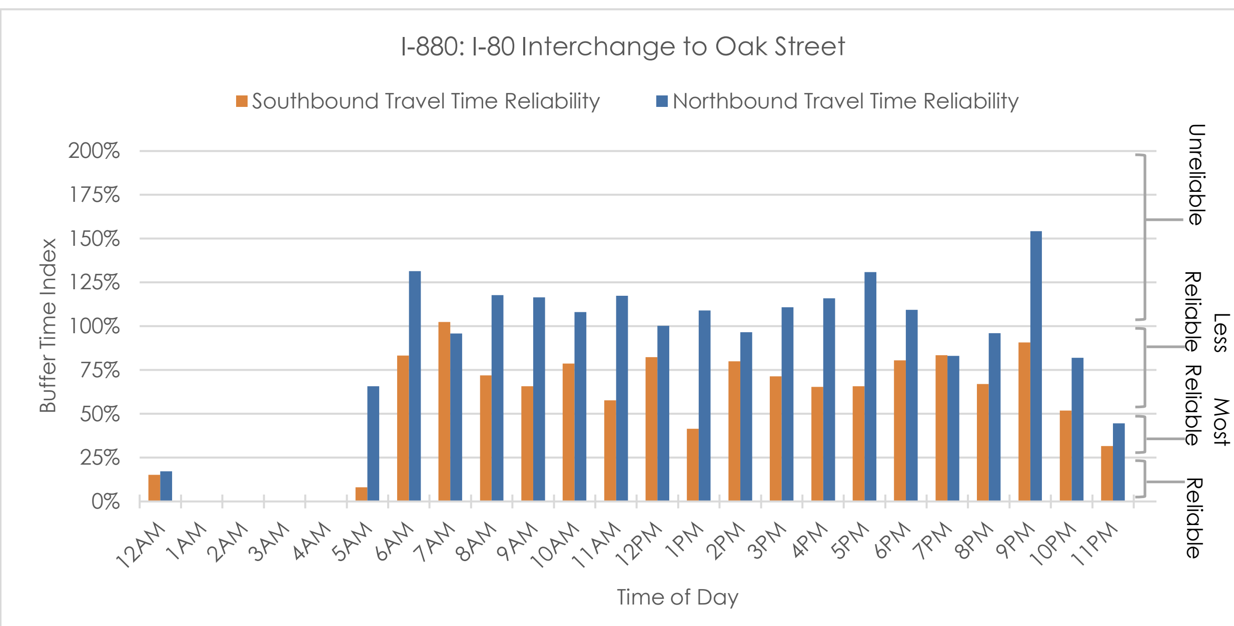
Source: AC Transit, May 2019 AVL data.

Figure 5-27: Weekday Transit Travel Time Variability Along Segment E, I-880 NB



Source: AC Transit, May 2019 AVL data.

Figure 5-28: Weekday Transit Buffer Time Index Along Segment E



Source: AC Transit, May 2019 AVL data.

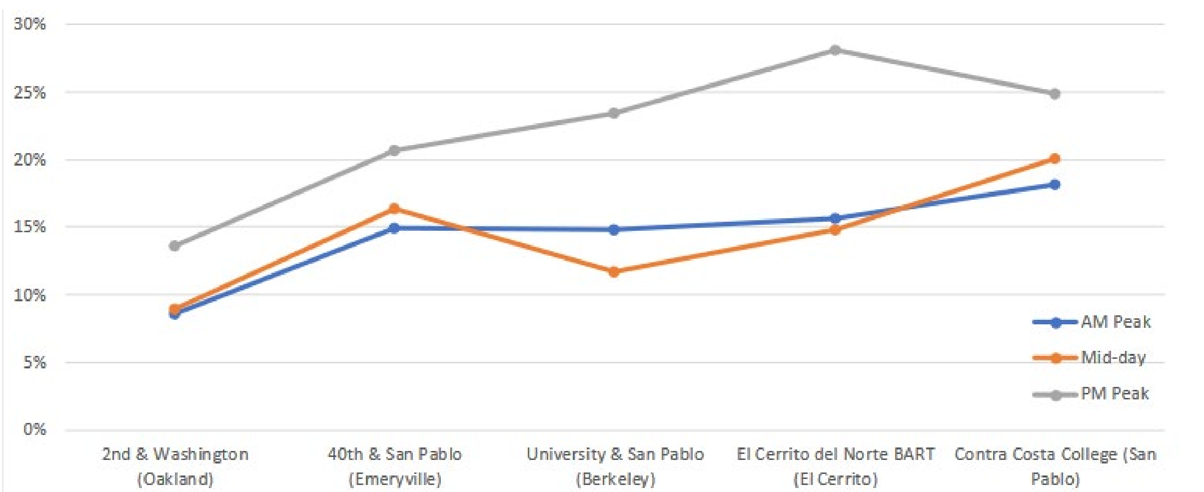
Local Transit Travel Time Reliability

Within the Study Area, there are other local transit lines where reliability is also a concern. The 72R, one of AC Transit's highest ridership lines, is one of the transit lines we have detailed reliability data for. The San Pablo Avenue Corridor Project Existing Conditions Report (2018) details transit service reliability in terms of the consistency in meeting scheduled headways on the 72R line.[66] Route 72R is scheduled to operate with a 12-minute headway throughout the day. On average, however, approximately one in five buses arrive more than 18 minutes after the prior bus, and reliability worsens in the peak period as seen in **Figure 5-29** and **Figure 5-30.**

In the northbound direction, the largest reliability issues occur during the PM peak period. About 14 percent of buses begin the route with a gap of at least 18 minutes, but almost 30 percent arrive more than 18 minutes apart at the El Cerrito del Norte BART station. Unreliability is therefore associated with both schedule adherence challenges at the beginning of the route and travel time variability along the route.

In the southbound direction, similar patterns are observed in all time periods. In the AM peak period, four percent of buses begin with a gap of 18 minutes or longer, but 25 percent arrive at the terminus of the route with such a gap. This indicates an issue of travel time variability along the route. In the PM peak, 18 percent of buses begin the route at Contra Costa College with a gap of at least 18 minutes and approximately 25 percent of buses arrive at the terminus at 2nd & Washington in Oakland with a gap of 18 minutes or longer. This only moderate decrease in reliability indicates the primary issue during the PM peak is that buses are beginning their route with a long gap, likely due to a late arrival in the northbound direction.

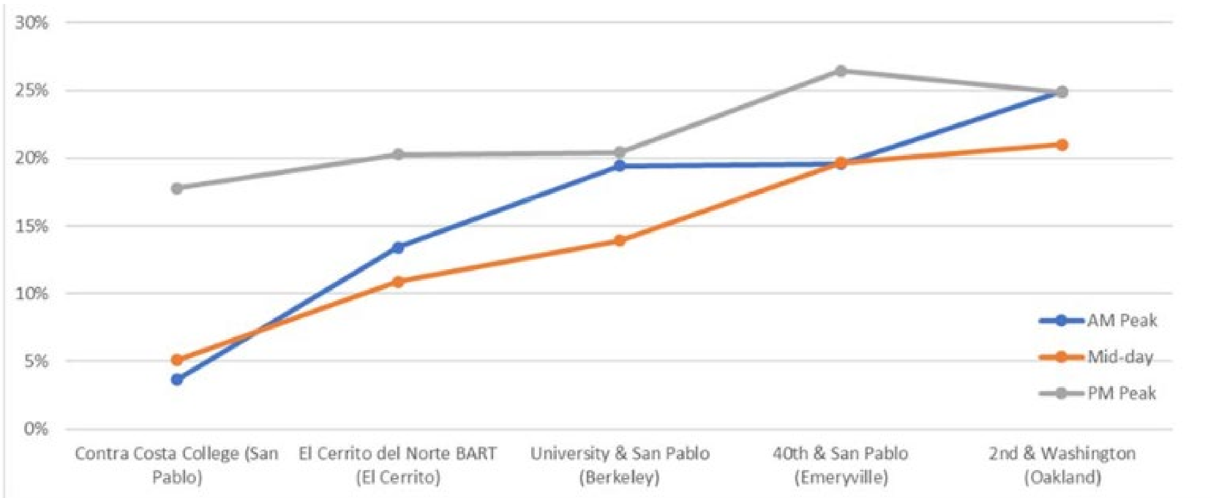
Figure 5-29: 72R Bus Unreliability by Time of Day and Location (San Pablo Avenue NB)



Notes:
Percent of buses arriving more than 18 minutes apart (scheduled 12-minute headways).
Source: AC Transit, April/May 2017 data; Alameda CTC, Existing Conditions Report San Pablo Avenue Corridor Project, 2018, p. 80.

[66] Alameda CTC, Existing Conditions Report San Pablo Avenue Corridor Project, 2018.

Figure 5-30: 72R Bus Unreliability by Time of Day and Location (San Pablo Avenue SB)



Notes:

Percent of buses arriving more than 18 minutes apart (scheduled 12-minute headways).

Source: AC Transit, April/May 2017 data; Alameda CTC, Existing Conditions Report San Pablo Avenue Corridor Project, 2018, p. 80.

5.3 Safety Performance

This section describes existing safety issues within the NACCCP Study Area.

Freeway Collisions

A safety analysis was conducted to document total injury collisions, with a focus on collisions resulting in a severe injury or fatality (KSI collisions), along the Study Area freeways and ramps. This analysis includes reported injury collisions from 2015 to 2019 available through the Transportation Injury Mapping System (TIMS) as of March 2022. TIMS reports injury collisions from the Statewide Integrated Traffic Records System (SWITRS). This analysis does not include collisions that were reported as property damage only.

A summary of collisions by Study Area freeway and primary collision factor is provided in the following sections.

Collisions by Study Area Corridor

Table 5-19 provides a summary of total collisions between 2015 and 2019 by freeway corridor. During this time period, there was a total of 1,568 collisions across all freeways, 95 of which resulted in a severe injury, and 17 of which were fatal. Half of these KSI collisions occurred on I-80, and just over a fifth occurred on I-880. About 96% of KSI collisions and 98% of all collisions occurred directly on freeways as opposed to ramps. All fatalities occurred on freeway mainline segments.

Table 5-19: Freeway Corridor Collisions, 2015 - 2019

	I-80	I-580	I-880	I-980	Total
Total Collisions	930	326	224	88	1,568
KSI Collisions	56	20	25	11	112
% KSI (of Fwy Total Collisions)	6%	6%	11%	13%	6%
Fatalities	6	2	7	2	17

Notes:
Abbreviation: KSI = Killed or Seriously Injured.
Source: Compiled from Transportation Injury Mapping System (TIMS) 2015 – 2019; Fehr & Peers, 2022.

Figure 5-31 shows the freeway collision density of KSI collisions along the Study Area freeways. The highest collision densities are located in the vicinity of the I-80/I-580 interchange, and on the Bay Bridge approaches. Smaller KSI collisions hotspots occur at the I-80/Ashby Avenue interchange and along I-880, in the vicinity of Jack London Square.

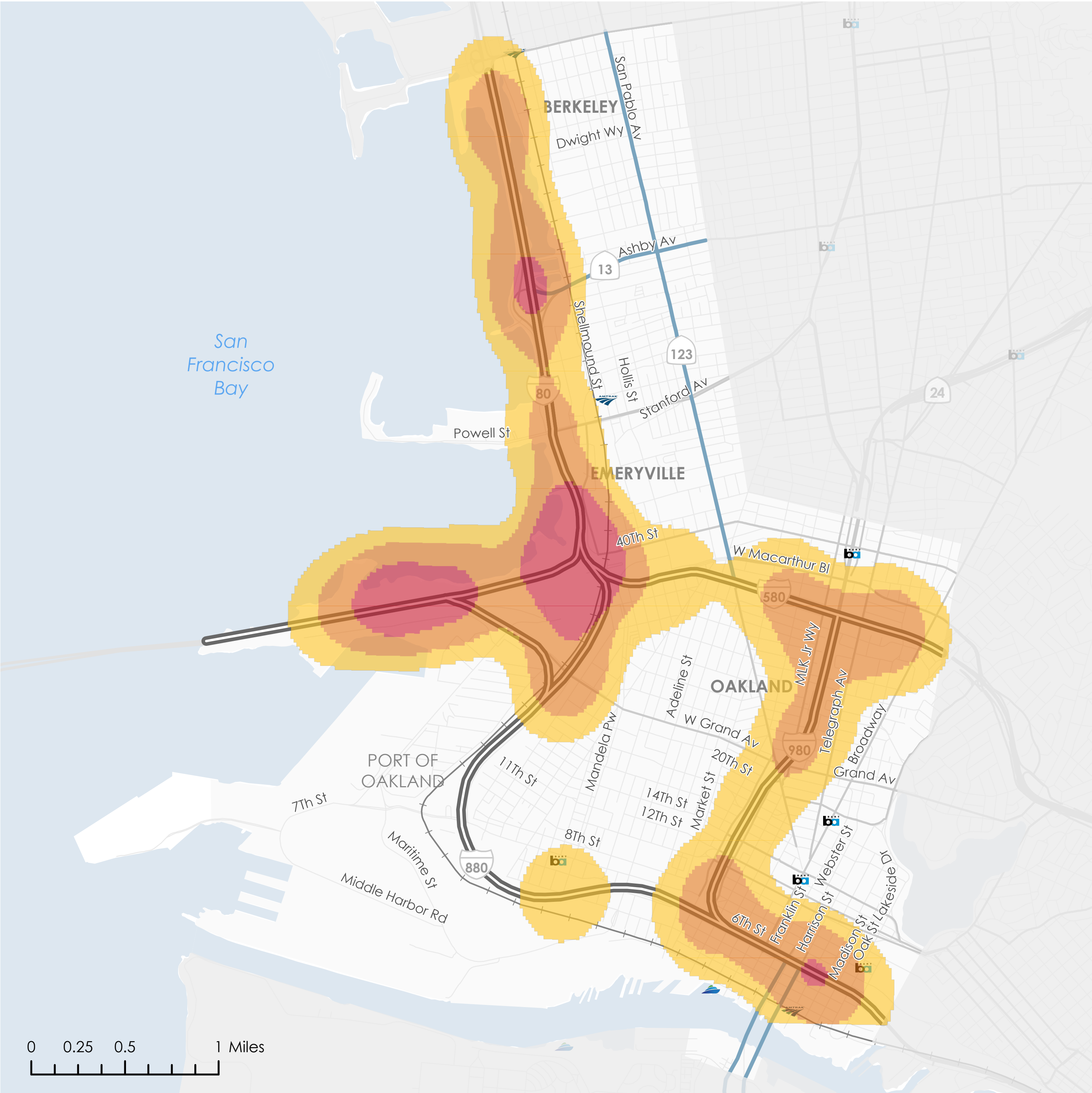


Figure 5-31

KSI FREEWAY COLLISION HOTSPOTS

Study Corridors

Major Corridor

Arterial State Route

Collision Density

Low

Medium

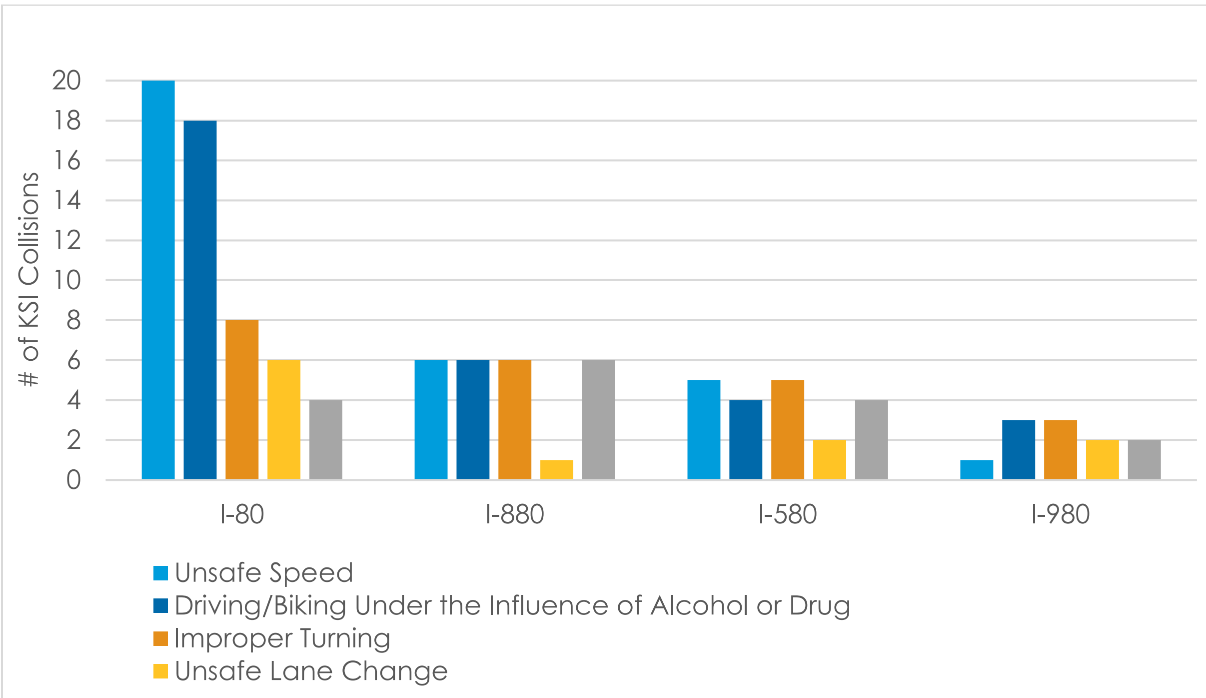
High

Source: TIMS, 2015-2019, KSI collisions along freeways

Collision Factors

For all collisions, the three most common Primary Collision Factors (PCFs) on the Study Area freeways are unsafe speed (53%), unsafe lane changes (17%), and improper turning (14%). The three most common PCFs for KSI collisions specifically are unsafe speed (29%), driving or biking under the influence of alcohol or drugs (28%), and improper turning (20%). PCFs for KSI collisions by freeway corridor are shown in **Figure 5-32.**

Figure 5-32: Primary Collision Factor (PCF) for KSI Collisions on Freeways, 2015-2019



Source: Compiled from Transportation Injury Mapping System (TIMS) 2015 – 2019; Fehr & Peers, 2022.

High Injury Network

The Alameda County High Injury Network (HIN) (2012-2016) represents local streets with relatively high numbers of traffic collisions resulting in injuries in Alameda County. **Figure 5-33** shows a high concentration of the bicycle and pedestrian HIN in the Downtown Oakland area, and along Ashby Avenue and San Pablo Avenue, which are key arterials in the NACCCP Study Area located near EPCs. The large mix of land uses and multimodal facilities that encourage travel through active modes can contribute to the high HIN concentration in Downtown Oakland. Based on the Alameda County Auto HIN, automobile-only collisions are also concentrated in Downtown Oakland and on arterials, particularly on Ashby Avenue and San Pablo Avenue.

During the COVID-19 pandemic, although overall total collisions fell in Alameda County, fatal collisions increased sharply, and speeding remains a common factor in collisions.[67]

[67] Alameda CTC, 2021 Performance Report, March 2022: https://www.alamedactc.org/wp-content/uploads/2022/03/2021_Performance_Report_RPT_Final.pdf

Figure 5-33

BICYCLE & PEDESTRIAN HIGH INJURY NETWORK

Bicycle & Pedestrian High Injury Network

Study Corridors

Major Corridor

Arterial State Route

Source: Alameda County Active Transportation Plan, 2019.

5.4 Sustainability Performance

The sustainability performance assessment focuses on VMT, emissions, vehicle occupancy, and transit ridership on the Study Area freeways

Vehicle Miles Traveled & Emissions

Existing and forecasted daily VMT was calculated using the MTC PBA 2050 Model, based on origin and destination distances. For this analysis, VMT is the sum of the number of miles traveled by each vehicle traveling on each freeway in each direction. As shown in **Figure 5-34**, I-80 has the most existing daily VMT compared to the other freeways as this corridor serves an important connection between the North and East Bay and San Francisco. Year 2050 conditions show significantly higher VMT in both directions on I-80, while I-880 shows a slight increase in VMT in both directions. VMT is not expected to significantly increase on I-580 or I-980 by 2050 –I-580 VMT will actually decline in the westbound direction.

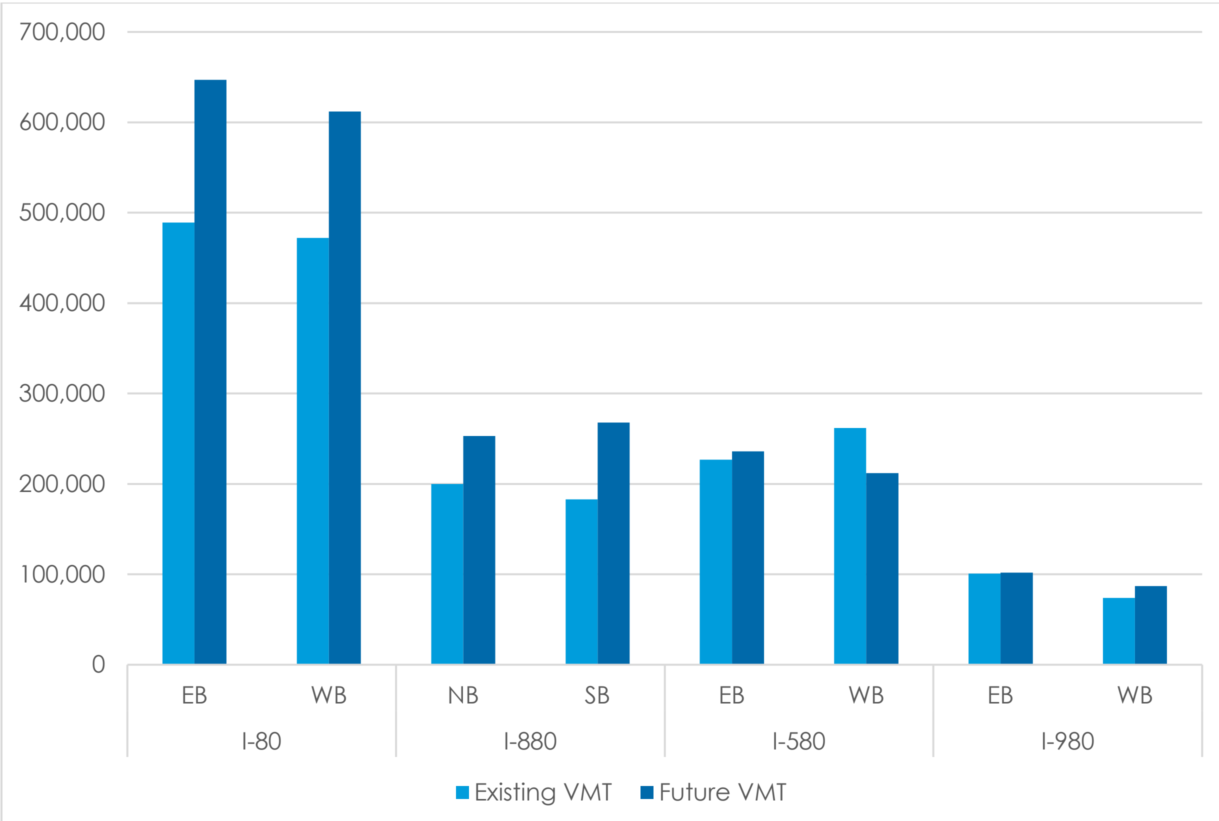
GHG emissions and criteria pollutants for each corridor were calculated through the Emissions Factor (EMFAC), which calculates emissions inventories for motor vehicles operating on roads in California based on VMT and speeds[68]. Vehicle delay and slower speeds can lead to higher GHG emissions even when travel distances are short. The EMFAC calculates carbon dioxide (CO2), a GHG, and the criteria pollutants which include nitrogen dioxide (NOX), sulfur oxides (SOx), and Particulate Matter 2.5 (PM 2.5).

The EMFAC tool provides two alternatives to calculate future conditions. The first alternative uses the same vehicle fleet mix as the existing scenario, while the second alternative assumes a cleaner vehicle fleet mix than the existing scenario, including zero-emission vehicles (ZEVs) and gas vehicles with lower emission rates than vehicles in the present scenario. The EMFAC tool estimates the percentage of ZEVs based on historical trends for the sales of these vehicles. For example, the year 2025 assumes 15.7% of vehicles in which people are driving alone are electric, and 84.3% are gasoline.

As seen in **Table 5-20**, the first alternative shows higher levels of emissions and pollutants than the existing scenario, as expected with higher rates of VMT. There is a significant increase in emissions on most freeways in this alternative, especially on I-80 in both directions. The second alternative reports similar or lower emissions and pollutants on all freeways, despite the increase in VMT, due to the cleaner vehicle fleet. The specific quantities of emissions pulled from the MTC PBA 2050 Model can be found in **Appendix B**.

[68] VMT and vehicle speeds were taken from the MTC PBA 2050 Model, October 2021 (2015 Historical Scenario, 2050 No-Project Scenario)

Figure 5-34: Existing and Future Daily Vehicle Miles Traveled by Freeway



Source: MTC PBA 2050 Model, October 2021(2015 Historical Scenario, 2050 No-Project Scenario); EMFAC 2021.

Table 5-20: Existing and Future VMT and Emissions

Route	Direction	Daily VMT		CO2 (tons)			NOx (pounds)			Sox (pounds)			PM 2.5 (pounds)		
		2015	2050 % Change	2015	2050 % Change	Clean Fleet % Change	2015	2050 % Change	Clean Fleet % Change	2015	2050 % Change	Clean Fleet % Change	2015	2050 % Change	Clean Fleet % Change
I-80	EB	489,000	32%	240	58%	13%	540	83%	-38%	4.7	36%	8%	11.2	78%	-65%
	WB	472,000	30%	230	39%	-4%	490	53%	-58%	4.5	29%	-5%	9.5	46%	-73%
I-580	EB	200,000	18%	100	10%	-30%	200	10%	-300%	1.9	10%	-36%	3.9	18%	-74%
	WB	183,000	16%	110	0%	-36%	220	0%	-340%	2.2	0%	-47%	4.5	-11%	-80%
I-880	NB	227,000	11%	90	33%	0%	190	47%	-90%	1.8	25%	-13%	3.9	36%	-72%
	SB	262,000	2%	80	13%	-25%	150	20%	-200%	1.5	17%	-25%	3.3	18%	-73%
I-980	EB	101,000	1%	40	0%	-25%	90	0%	-350%	0.9	0%	-50%	2	-5%	-75%
	WB	74,000	18%	30	33%	0%	70	0%	-250%	0.6	14%	-20%	1.5	0%	-73%

Notes:

1. 2050 Scenario using the same vehicle fleet mix as the existing 2015 Scenario.
2. 2050 Scenario using a projected "cleaner" fleet mix, producing less emissions despite higher levels of VMT.

Source: MTC PBA 2050 Model, October 2021(2015 Historical Scenario, 2050 No-Project Scenario); EMFAC 2021; Fehr & Peers, 2022.

Vehicle Occupancy

Vehicle occupancy is determined by the average number of persons per vehicle identified on each corridor using the MTC PBA 2050 Model output for vehicle and person volumes. For I-80, GP and HOV lanes were calculated separately.

In both existing and future scenarios, occupancy is relatively consistent across freeways in the Study Area, ranging between 1.1 to 1.4 people per vehicle in the peak periods in GP lanes, as seen in **Table 5-21**. Most GP lanes have an average between 1.2 and 1.4 persons per vehicle in the AM and PM peak periods, except I-80 which has 1.1 persons per vehicle in the AM and PM peak periods.

The occupancy rates in the HOV lanes are higher than expected, but the methodology used to calculate vehicle occupancy does not account for "cheating," such as when SOVs use HOV lanes despite not meeting the required number of occupants. Overall daily average occupancy is slightly higher than peak period occupancy rates, which could potentially be due to lower rates of carpooling for commute trips during the peak hour. In both existing and future scenarios, the I-80 HOV lane sees at least 3 persons per vehicle during the peak periods.

Table 5-21: Existing and Future Vehicle Occupancy

Route	Direction	Lane	Location Description	Existing (2015) Persons/Vehicle		Future (2050) Persons/Vehicle	
				Avg Peak Period	Daily	Avg Peak Period	Daily
80	EB	GP	North of 880/580 exits & merges	1.1	1.2	1.1	1.2
		HOV	North of 880/580 exits & merges	3.5	N/A	3.4	N/A
	WB	GP	North of 880/580 exits & merges	1.1	1.2	1.1	1.2
		HOV	North of 880/580 exits & merges	3.5	N/A	3.5	N/A
580	EB	GP	East of split/merge with 80	1.3	1.3	1.3	1.2
	WB	GP	East of split/merge with 80	1.3	1.3	1.2	1.2
880	NB	GP	South of 80 ramps	1.3	1.4	1.2	1.3
	SB	GP	South of 80 ramps	1.3	1.3	1.4	1.3
980	EB	GP	North of 880 ramps	1.3	1.3	1.2	1.2
	WB	GP	North of 880 ramps	1.3	1.3	1.2	1.2

Notes:
I-880, I-580, and I-980 all have one person/vehicle in existing and future AM, PM, and daily conditions.
Source: MTC PBA 2050 Model, October 2021(2015 Historical Scenario, 2050 No-Project Scenario).

5.5 Equity Performance

Assessment of existing equity performance focuses on how the Study Area's nearly 60,000 residents in MTC Equity Priority Communities (EPCs)[69] can currently access goods, services, and jobs through the existing bicycle and transit network. EPC bicycling and transit access sheds were determined using 2019 Census OntheMap data and the Fehr & Peers' TravelAccess+ model in ArcGIS. While pedestrian access sheds were not analyzed, the study area is considered largely walkable with high Walk Scores, although safety remains a significant challenge particularly for pedestrians in EPCs and along the waterfront.[70]

As the EPCs in the Study Area are located in an urban environment, current access through biking and transit is considered good relative to more suburban environments. However the pedestrian and bicycle High Injury Network (HIN), shown in **Figure C-1** in Appendix C, is disproportionately located in EPCs, and overlaps large portions of the access sheds shown below. Projects that continue to advance multimodal access and safety for EPC residents are critical in removing barriers to needed goods and services and reducing transportation costs.

Biking Access in Equity Priority Communities

Biking access for EPC residents was evaluated using 10-minute and 15-minute bicycle sheds. The bicycle access analysis found that within a 15-minute bike ride, EPC residents living in the NACCCP Study Area can reach over 230,000 jobs, 16 commercial shopping areas, 10 rail stations, 48 grocery stores, and five medical centers. EPC residents living in the northern parts of the Study Area can reach Albany and North Berkeley BART within a 15-minute bike ride, while those further south can reach the northern parts of the City of Alameda if one accepts that these bicyclists are willing to ride through the Posey and Webster tubes. EPC residents living in the southern part of the Study Area have particularly good access to Downtown Oakland, which provides a high density of active land uses and transit. **Figure 5-35** shows bicycling ease of access within 10-minute and 15-minutes of EPC areas.

Transit Access in Equity Priority Communities

Transit access for EPCs was evaluated for 20-minute and 30-minute travel sheds. The transit access analysis found that within a 30-minute transit ride, EPC residents can reach 815,000 jobs, over 20 commercial shopping areas, over five colleges and universities, and six medical centers. Within a 30-minute transit ride, EPC residents can reach a wide variety of destinations including cities outside the Study Area such as San Francisco, San Leandro, and El Cerrito. EPC residents can also reach BART stations in South San Francisco, San Leandro, and Bay Fair within 30 minutes. Generally, the EPC residents in the Study Area have high levels of access given the range of multimodal options available. **Figure 5-36** shows transit access sheds within 20-minutes and 30-minutes of EPC residents.

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[69] Plan Bay Area 2050 identifies Equity Priority Communities (EPCs), formerly called "Communities of Concern," as census tracts that have a significant concentration of underserved populations, such as households with low incomes and people of color. EPCs are identified based on the concentration of the census tract population meeting certain demographic factors.

[70] Countywide Active Transportation Plan, 2019

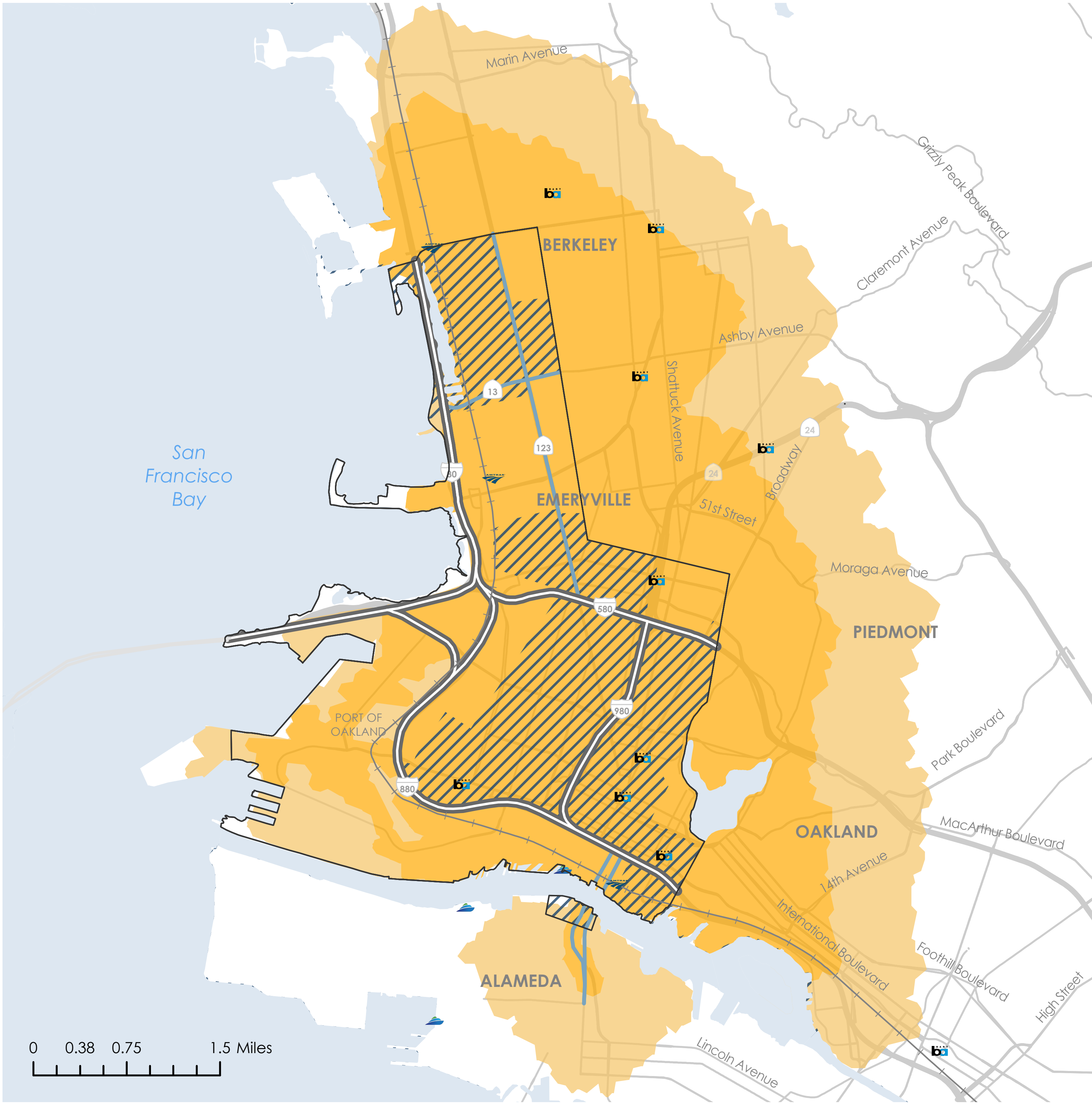

Figure 5-35

EQUITY PRIORITY COMMUNITY BICYCLE SHEDS

10-Minute Bicycle Shed

15-Minute Bicycle Shed

Equity Priority Communities (2050)

Study Area

Study Corridors

Major Corridor

Arterial State Route

Source: MTC Plan Bay Area 2050; Fehr & Peers, TravelAccess+, 2022.

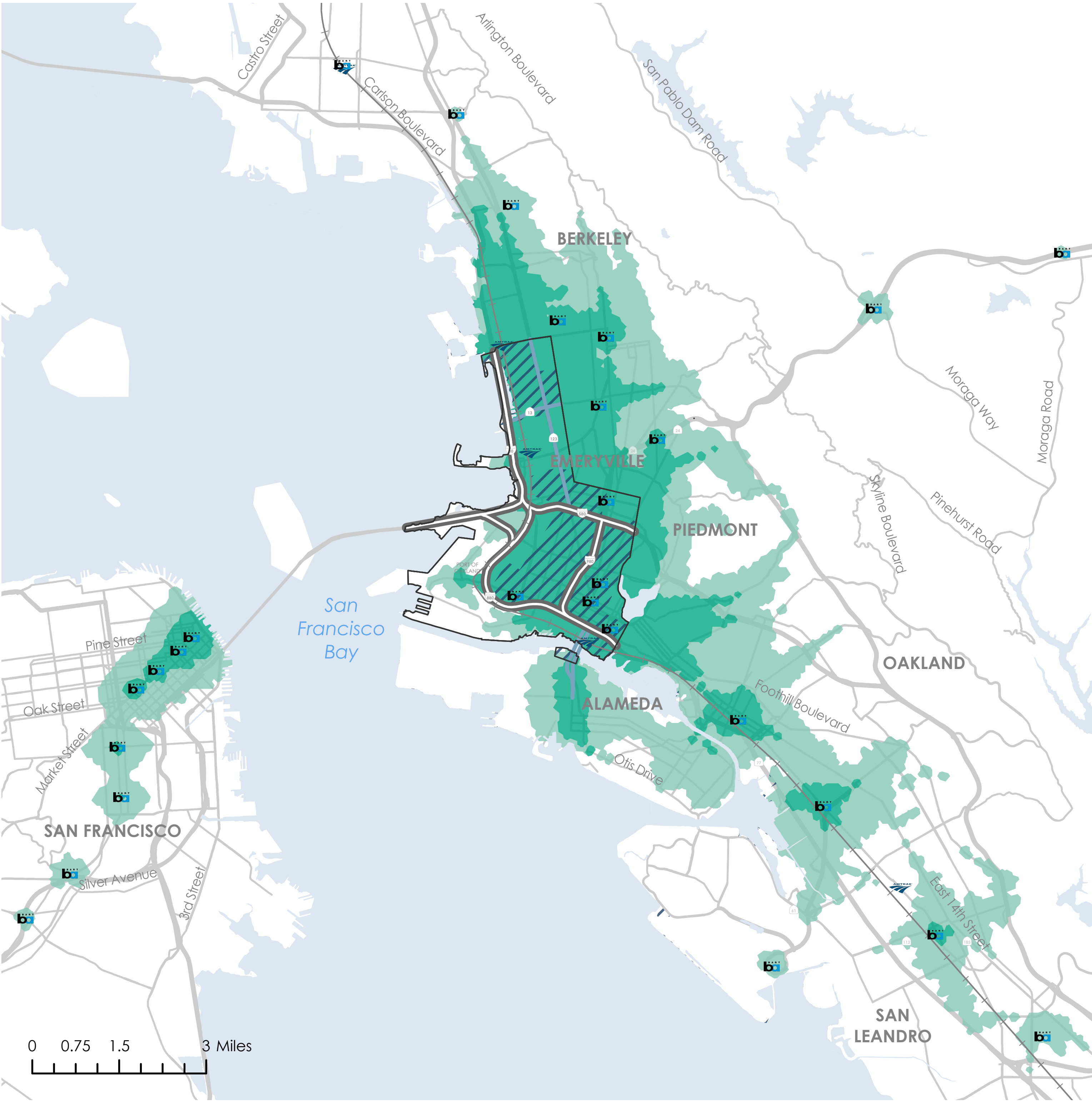

Figure 5-36

EQUITY PRIORITY COMMUNITY TRANSIT ACCESS SHEDS

20-Minute Transit Shed

30-Minute Transit Shed

Equity Priority Communities (2050)

Study Area

Study Corridors

Major Corridor

Arterial State Route

Source: MTC Plan Bay Area 2050; Fehr & Peers, TravelAccess+, 2022.

5.6 Needs

The following section summarizes the unmet transportation needs for freeways, transit services, active transportation facilities, and goods movement in the Study Area. These needs were identified through the performance assessment in Sections 5.1 through 5.5 as well as a review of existing documentation.

Freeways

As described in Sections 5.1, 5.2, and 5.3, traffic volumes are expected to grow over time and the generally existing poor performance of freeways is expected to worsen in terms of high levels of delay, poor levels of service, unreliable travel times and reduced travel speeds for all modes. Safety is also an issue on Study Area freeways due to high collision rates at several hot spots.

Congestion, Travel Time, and Delay

There is a need to address peak period congestion in the Study Area, especially for commuters traveling westbound into San Francisco in the AM peak period and eastbound to the East Bay in the PM peak period. Additionally, I-80 WB and I-580 WB experience high levels of congestion in the reverse commute direction during the PM peak period. I-980 is the only freeway segment that experiences little congestion due to its nature as a more local connector rather than a regionally serving route. Due to the level of congestion and complex merging activities, there are several major bottlenecks extending for long distances along the Study Area freeways in both peak periods, particularly on I-80 westbound approaching the Bay Bridge.

As a result of this congestion, travel speeds are low and travel times are long, which leads to high levels of vehicle and person delay along the Study Area. Most freeways, except I-980 WB, experience significant delay in the PM peak period, while I-880 experiences delay in both directions during the AM peak period.

Under the Future No-Project scenario, these conditions are forecast to worsen over time as traffic volumes grow in response to increased population and employment in the Study Area and the region.

The types of projects that would address congestion include interchange improvements, express lanes, additional lanes dedicated to HOVs/transit priority, and multimodal solutions such as transit improvements on and off freeways.

Safety

There is a need to improve safety in the Study Area, especially along I-80 in the vicinity of the SFOBB Toll Plaza and the interchange with I-580. Collision analysis concluded that unsafe speeds are the most frequent primary collision factor listed for all injury collisions. For KSI collisions, unsafe speeds are closely followed by driving/biking under the influence of alcohol or drugs as the most common primary collision factor.

The types of projects that would address the safety issues identified above are ramp metering and improved striping or signage.

Auto Reliability

There is a need to improve the reliability of auto travel times for travelers in the Study Area. Most of the freeways are rated as Less Reliable for auto travel during the AM peak period with a BTI of 50% to 100% in the commute travel direction. In the PM peak period, the situation is similar but is most prominent on I-880 in both directions.

Projects that address safety issues and/or alleviate bottlenecks would improve reliability by removing the main sources of unpredictable delays. These types of projects include HOV lane extensions and managed lanes.

Vehicle Miles Traveled and Greenhouse Gasses

There is a need to reduce VMT and GHG and criteria pollutant emissions due to high traffic volumes and low vehicle occupancies in the Study Area. General purpose lane vehicle occupancy ranges from 1.1 to 1.2 persons per vehicle. Although HOV lanes have occupancies around 3.5 persons per vehicle, they are limited to I-80, so most travelers do not currently have a strong incentive to carpool or take transit. These trends are expected to persist in the future under the No-Project conditions.

The types of projects that will reduce VMT include extensions of the existing HOV lanes, implementation of managed lanes, transit service improvements along with first-last mile connections to premium transit lines, and major investments in high-quality pedestrian and bicycle connections.

Transit

As discussed in Sections 5.1 and 5.2, transit service quality and performance in the NACCCP Study Area is negatively impacted by the same freeway operational and safety issues as autos and a lack of facilities that prioritize transit. Additionally, gaps in first/last mile connections and lack of service coordination present challenges to increasing ridership, especially for residents living in EPCs.

Freeway Congestion

There is a need to improve the speed and reliability of transit service in the NACCCP Study Area. Transbay transit speeds on freeways follow similar trends as vehicle speeds. I-80 WB and I-580 WB experience the lowest average Transbay bus speeds in the AM peak period going to San Francisco traveling under 30 mph, while all Study Area freeways that service Transbay buses operate under 30 mph in the eastbound direction in the PM peak period. Due to the level of congestion, there are several freeway segments where transit travel times are long, and unreliability is high. The freeway segment with the greatest unreliability throughout the day in both directions is on I-880 from the I-80 Interchange to Oak Street, while I-80 from the University Avenue Interchange to the I-580 Interchange experiences the worst unreliability during the peak periods.

Based on the 2016 I-580 Transportation Concept Report, I-580's existing infrastructure has constraints preventing easy addition of transit service.[71] The I-580 Design Alternatives Assessment (2020) reported similar findings of infrastructure constraints such as structural columns, retaining

[71] Caltrans, I-580 Transportation Concept Report, 2016.

walls, and signposts preventing a bus-on-shoulder lane from being viable.[72] Bypass lanes along freeway on- and off-ramps could improve transit connections throughout the corridor where space allows. Additional needs include improved service along parallel arterials, and an expansion in the number and volume of park-and-ride facilities.

The I-80 Design Alternatives Assessment found similar barriers for transit travel along I-80. Because I-80 is one of the most congested freeway corridors in the Bay Area, buses are often slowed by congestion. The existing HOV lane on I-80 has a high rate of carpool lane violations which degrade its efficiency during commute hours.[73] Providing improvements on freeways and parallel arterials, such as transit priority treatments and better HOV lane enforcement, can help support enhanced transit service along the corridor and lead the way to providing high-capacity transit with ongoing infrastructure investments.

Congestion and reliability are expected to worsen over time as traffic volumes grow. The types of projects that can address congestion and improve reliability of Transbay lines include transit only lanes or HOV lanes, where viable, and arterial transit improvements.

Arterials

There is a need to address vehicle congestion on Study Area arterials. San Pablo Avenue is a key arterial connecting much of the Study Area east of I-80 and parallel to I-80 while Ashby Avenue provides an east-west connection across Berkeley to Oakland, and SR-260 provides a connection from Oakland to Alameda. According to the San Pablo Avenue Corridor Project, the population along the corridor is projected to increase; improving mobility options for current and future residents will be important to manage congestion and enhance safety.[74] Vehicle congestion is projected to significantly increase in the future, especially since San Pablo Avenue serves as a reliever route to I-80. The Alameda County Community-Based Transportation Plan (CBTP, 2020) also expressed the need to provide smoother transit connections and improve transit service and reliability for EPC residents.[75]

Projects that address congestion and improve transit service on arterials include multimodal travel improvements or transit-specific improvements. Multimodal improvements can help mitigate congestion and provide various travel options, some of which are discussed below under the Active Transportation section. Transit-specific improvements such as enhanced bus service, dedicated bus lanes, signal priority, and improved bus stops can help increase transit speeds and reliability and provide a sustainable commute mode for many.

First/Last Mile Connections

There is a widespread need for improved connections between the pedestrian and bicycle network and transit service, particularly for low-income residents in the Study Area that rely on transit. While residents living in EPCs can currently reach a wide range of destinations using transit as evidenced in Section 5.5, building better connections to and between transit services would serve to improve travel comfort and time. Currently, for example, BART and Amtrak/Capitol Corridor riders cannot easily transfer between the two services in West Oakland even though the

[72] Alameda County Transportation Commission, I-580 Design Alternatives Assessment Final Report, 2020.
[73] Caltrans, I-80 Design Alternatives Assessment, 2021.
[74] Alameda CTC, San Pablo Avenue Corridor Project, 2018.
[75] Alameda CTC, Alameda Countywide Community-Based Transportation Plan, 2020.

routes cross each other. More abundant end-of-trip facilities (e.g., bicycle parking) and increased bicycle carrying capacity on transit would support enhanced bicycle connections to transit. Likewise, coordinated service schedules and timed bus transfers could help transit riders access Amtrak/Capitol Corridor via BART, and vice versa.

As part of the BART Station Access/Gaps Studies completed in June 2020, BART identified conceptual access improvements to make walking and biking to and from 17 BART stations safer and easier, which included the12th Street/Oakland City Center station. Projects that address first/last mile connection concerns would improve access to the 12th Street/Oakland City Center BART Station, as well as other stations within the Study Area. These types of projects include better on-street bike facilities, secure bicycle parking near station entrances, and pedestrian improvements to curb ramps, signal push buttons, and lighting.

Active Transportation

The following active transportation needs assessment is based on review of the Caltrans District 4 and Alameda County Plans described in Chapter 2, as well as the safety performance assessment described above. In general, the following strategies should be implemented where appropriate to ensure the safety of bicyclists and pedestrians, as well as to provide connections for multi-modal travel.

Safety & Comfort

There is a broad need to address factors that contribute to an uncomfortable pedestrian and bicyclist environment within the NACCCP Study Area. Although the equity performance analysis from Section 5.5 shows that residents in EPCs can currently access a variety of goods, services, and jobs through the existing bicycle network, there are still accessibility gaps and safety issues that need to be addressed. A high concentration of both the bicycle and pedestrian HIN is found in the Downtown Oakland area, as well as on Ashby Avenue and San Pablo Avenue near EPCs. The mix of land uses and multimodal facilities that encourage travel through active modes may contribute to the concentration of the HIN in Downtown Oakland, meaning future improvements in this area should prioritize the safety and comfort of pedestrians and cyclists.

Safety and poor street conditions have also been previously cited as concerns in EPCs. In the 2020 Alameda Countywide Community-Based Transportation Plan, residents living in EPCs were identified as having more miles of auto, walking, and biking HIN than non-EPCs in the county.[76] EPC residents are also twice as likely to encounter "at-risk" pavement conditions as non-EPC residents in the county.[77]

Well-designed multimodal improvements are needed for all users on key arterials near jobs and housing centers. San Pablo Avenue, in particular, requires improvements for pedestrians and bicyclists. Large gaps between protected crossings and wide cross-sections make for an uncomfortable pedestrian experience, while most of the corridor is considered a high-stress facility for bicyclists.

Some state and local facilities feature intersections with missing or unrecognizable pedestrian markings, non-contiguous sidewalks, free left- and right-turn movements, large corner radii, and inadequate ADA ramps. The types of projects that would address safety issues include providing

[76] Alameda CTC, Alameda Countywide Community-Based Transportation Plan, 2020.
[77] Ibid.

high-quality bicycle facilities on local roads and on interchanges and increasing visibility at crossings through countermeasures like corner bulbouts and high-visibility crosswalks. Safety improvements should focus on collision hotspots and areas with historically high levels of traffic stress and transportation demand, particularly within or near EPCs.

Addressing comfort and enhancing the quality of active transportation experience can be accomplished through implementing shade structures, landscaping, art, and human-scale lighting. These improvements are particularly needed in EPCs.

Network Connectivity

Regional and local plans emphasize the need to develop a low-stress pedestrian and bicycle network that connects key locations and services throughout the Study Area. While bikeways can be found throughout the Study Area, gaps in the network preclude a seamless bicycle connection to jobs and transit centers.

The types of projects that would address network connectivity include new or upgraded bikeways that are comfortable for people of all ages and abilities and that close the gaps in the network, particularly along the San Francisco Bay Trail and other multiuse paths and protected bikeways that enhance longer commutes and recreational trips.

Goods Movement

The following needs assessment is based on review of the Caltrans District 4 and Alameda County Plans described in Chapter 2, as well as the freight facilities assessment described in Chapter 4.

Northern Alameda County serves as a natural hub for goods movement throughout the Bay Area. Key interregional and intraregional truck corridors in the Study Areas include I-580, I-80, and I-880, which are often impacted by congestion.[78] The Study Area is also home to the Port of Oakland, which is a major regional generator of truck trips and emissions.

Congestion

There is a need to address traffic congestion for freeway goods movement. In general, trucks traversing the Study Area freeways can continue to expect increasing travel times and unexpected delays, particularly on I-80 EB and I-880 NB. I-880 carries the highest five-axle truck volume in the region, which compete for use of freeway facilities with autos traveling to major employment centers as well as event/retail venues, industrial, and residential areas.[79]

In the absence of policy or project interventions, auto and truck delays are expected to worsen as employment and housing grow in the area, making conditions more difficult for the transportation of goods on crucial freight routes.[80] The types of strategies that would address congestion and support the movement of goods through the highly-congested freeway corridors could include promoting mode shift, implementing travel demand management strategies to reduce VMT, and improving freight system management.

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[78] Alameda CTC, Alameda County Goods Movement Plan, https://www.alamedactc.org/wp-content/uploads/2018/11/AlamedaCTC_GoodsMovementPlan_FINAL.pdf, p. 32.

[79] Caltrans District 4, I-880 Corridor System Management Plan: Volume 1, 2010.

[80] Caltrans District 4, Northern Alameda County Truck Access Study, 2021.

Emissions

There is a need to reduce emissions from freight in the NACCCP Study Area. Goods movement operations are a major emissions generator in the Study Area. Industrial activities at and adjacent to the Port of Oakland, as well as emissions from freeway and rail operations, emit greenhouse gasses and criteria pollutants (carbon monoxide, nitrogen dioxide, sulfur oxides, and PM 2.5).[81] City blocks adjacent to the Study Areas particularly in West and Downtown Oakland, and arterials such as Grand Avenue and 7th Street, carrying high vehicle and truck traffic volumes, experience higher levels of black carbon, NP, and NO_2 pollutants than the surrounding neighborhoods. Areas near the Port likewise experience high levels of PM2.5 due to the operation of cargo equipment, port trucks, locomotives, ocean-going vessels, and harbor craft as well as passenger rail and Union Pacific Railroad commercial heavy rail.

High levels of pollutants directly affect climate change and the health of communities in the Study Area. Strategies that can help reduce emissions include promoting cleaner modes of goods movement by incentivizing zero emissions trucks, expanding charging infrastructure, providing adequate truck parking, and improving operational logistics and maritime services.

[81] Environmental Defense Fund, How pollution impacts health in West Oakland, https://www.edf.org/airqualitymaps/oakland/pollution-and-health-concerns-west-oakland, accessed on February 11, 2022.

6. Stakeholder and Community Engagement

6.1 Summary of Previous Plans

The following includes a review of community engagement efforts and activities related to transportation planning in the NACCCP Study Area. **Table 6-1** lists the plans and studies with relevant stakeholder and community engagement that informed the development of the evaluation framework and project list in Chapter 7. The engagement processes of these plans and studies are described below.

Table 6-1: Previous Plans Relevant to Community Engagement

Plan Type	Source
Regional Plans	• Caltrans D4 Bike Plan • Alameda County Transportation Plan • Alameda County Community-Based Transportation Plan 2020 • Alameda Countywide Active Transportation Plan 2019
Project-Specific Engagement	• San Pablo Avenue Corridor Project • I-80 Ashby Interchange • Oakland/Alameda Access Project

Regional Plans

Caltrans D4 Bicycle Plan 2018

The Caltrans D4 Bicycle Plan identifies infrastructure improvements that enhance bicycle safety and mobility and remove barriers to bicycling in District 4, which consists of the nine-county Bay Area region. The plan builds on the 2017 California State Bicycle and Pedestrian Plan, Toward an Active California, to prioritize utilitarian bicycle trips that connect to work, school, shopping, and transit, and also considers state highways that serve as recreational or touring routes. Opportunities for complete streets investments by Caltrans and projects eligible for ATP funding are detailed in the plan.

The plan's community engagement activities included coordination with a Technical Advisory Committee (TAC) and public feedback collected through an online survey, focus groups, community workshops, webinars, and a project website. The TAC met five times and provided strategic guidance on the engagement efforts and technical analysis. Additional meetings were held throughout the nine-county region with bicycle advisory committees and local agencies. The online survey was held between February and June 2017. Caltrans used an interactive map and survey to gather information about mobility, barriers, and safety on and across the State Transportation Network. Over 4,700 people responded to the survey, nearly 3,500 people answered questions, and roughly 20,160 pins were placed on the interactive map.

Caltrans also hosted six focus groups with the help of community-based organizations (CBOs), and two rounds of community workshops. Workshops had an open house format with interactive opportunities, polling, a presentation, maps, and comment forms. Caltrans hosted nine webinars concurrently with the second round of community workshops, which drew 88 participants.

Key needs and gaps were identified through the study and engagement activities. The plan describes the need to improve areas with existing bicycle collisions and high levels of traffic stress and expand the bicycle network throughout the East Bay. Stakeholders listed safety and comfort as priorities for creating complete bicycle networks and designing safer and more intuitive highway crossings and interchanges. Specific locations brought up by the community underscore the importance of the NACCCP Study Area, as they include safer crossings along San Pablo Avenue and Ashby Avenue, connections to Emeryville, and connections to San Francisco. Projects and high-need areas that were identified in the D4 Bike Plan and are included in the NACCCP include those on 40th Street in Emeryville, Grand Avenue and 14th Street in Oakland, Alameda-Oakland connections, and interchange improvements along I-80.

Alameda Countywide Transportation Plan

The 2020 update to the Countywide Transportation Plan (CTP) establishes near-term projects, programs, and strategic priorities in Alameda County, and details a 30-year transportation vision and guide for Alameda CTC's decision-making processes. This plan is updated every 4 years to emphasize projects, programs, and strategies to pursue over a shorter 10-year horizon.

The 2020 CTP was developed through two years of engagement, technical analysis, and prioritization efforts for transportation in Alameda County. Engagement efforts for the CTP included a countywide poll (May 2019), pop-up outreach events in conjunction with the Countywide Community-Based Transportation Plan (CBTP) engagement efforts (October 2019 – February 2020), and virtual outreach (August – October 2020).

The countywide phone survey, which polled residents' transportation needs and priorities, deliberately oversampled residents in low-income communities and communities of color, resulting in a reach of 500+ total residents and 200+ respondents from low-income communities and communities of color. Virtual outreach consisted of four CBO focus groups, a survey, and material dissemination through the CTP website. Virtual engagement drew 700+ unique visitors to the CTP webpage, and elicited 1,300+ survey responses and 1,000+ open-ended comments

Mobility and accessibility needs were identified through outreach and based on county trends. Some of these include improved safety for active transportation; addressing freight volumes; competitive commute alternatives to driving; more reliable travel times; complete streets and multimodal corridors; better and affordable access to transit; congestion management on freeways; and operational improvements at the Port of Oakland.

All projects in the CTP within the NACCCP Study Area are considered in this Plan.

Alameda County Community-Based Transportation Plan 2020

The Community-Based Transportation Plan (CBTP), required by MTC, identifies transportation needs within Alameda County's low-income and minority communities and highlights ways to improve access and mobility for low-income and minority communities across the county. The CBTP's recommendations were incorporated into the 2020 update of the CTP.

Outreach for the CBTP built upon Alameda CTC's findings from the 2019 countywide poll. Between October 2019 and February 2020, pop-up events were held throughout the county featuring trilingual display boards in English, Spanish, and Cantonese; an invitation to take a survey; and printed fact sheets. Additional presentations and workshops were held in low-income areas of the county. Lastly, interviews with 14 CBOs were conducted via phone and email to gather input.

In North County, the CBTP identified the need for better pedestrian and bicyclist safety, better access to frequent and affordable transit, and mitigations to address truck traffic and parking impacts on communities. Analysis of commute data and survey findings show that residents in CBTP study areas within the North County area are more likely to walk or bicycle compared to residents in Central, South, and East County. However, a higher percentage of pedestrian and bicycle incidents also occur in the North County CBTP study areas compared to non-CBTP study areas, so a greater emphasis on walking and cycling safety is needed. This is supported by survey responses from North County area residents, in which more than half of all respondents provided feedback on needs for walking and biking in their neighborhoods.

Projects in Berkeley along Martin Luther King Jr Way, Telegraph Avenue, and San Pablo Avenue; I-80 interchange projects; projects in Oakland spanning West Oakland, 7th Street, 14th Street, MacArthur Boulevard, and downtown BART stations; and 40th Street in Emeryville, were all identified in the CBTP and are included in the NACCCP.

Alameda Countywide Active Transportation Plan 2019

The Alameda Countywide Active Transportation Plan provides a vision, goals, and priorities to improve walking and biking throughout the fifteen diverse jurisdictions in Alameda County. This plan guides Alameda CTC in planning, funding, and delivering pedestrian and bicycle facilities and programs throughout Alameda County.

Engagement for the plan included public presentations, mailings, an online website and webmap, surveys, open houses, listening sessions, online meetings, and social media posts. Engagement resulted in a total of ten public events and meetings, four presentations to organizations, 25,140 emails delivered via nine different mailing lists, eight surveys with a total of 683 responses, and 550 comments on the bicycle network webmap.

Major barriers identified within the plan will be addressed through projects in the NACCCP Study Area. Some of these include railroad barriers in Berkeley; railroad barriers in west Emeryville; high-stress bicycle connections across Powell and Shellmound streets; a disconnected street network across San Pablo Avenue; bicyclist conflicts at interchanges in Oakland; and disconnected street networks for pedestrians and bicyclists throughout Oakland.

Project-Specific Engagement

Many projects considered in the NACCCP included engagement efforts to confirm needs and priorities with the community, as well as identify projects. The following sections summarize project-specific engagement.

San Pablo Avenue Corridor Project

The San Pablo Avenue Corridor Project identifies short- and long-term improvements to address the increasing multimodal demands along the San Pablo corridor. The purpose of the project is to improve multimodal mobility, efficiency, and safety to sustainably meet the current and future transportation needs along the corridor between Oakland and San Pablo.

Stakeholder and public engagement were conducted in two phases. Phase 1 of the project included two rounds of outreach on needs, opportunities, and concepts, while Phase 2 has focused on gathering input on near-term projects for the corridor in 2021-2022.

Phase 1 engagement (Fall 2017 – Spring 2018, February – May 2019) included the following:

- Meetings and focus groups with CBOs, bus riders, cyclists, seniors, and people with disabilities
- Community workshops
- Pop-up events
- Intercept surveys
- A survey of San Pablo Avenue businesses
- An online survey to the general public
- Flyers on all route 72 buses
- An article in the East Bay Times

Phase 2 engagement (2021 – 2022) has included the following:

- Focus groups conducted in partnership with CBOs focused on reaching people in EPCs
- One-on-one engagement with merchants and storefronts
- Community organization presentations and partnerships
- Active transportation working group comprised of stakeholders from all four Alameda County cities along the corridor
- Other targeted outreach around specific design issues and locations

Throughout, the project has been informed by a TAC comprised of representatives from Caltrans, BART, AC Transit and the seven cities along the two-county corridor – Oakland, Emeryville, Berkeley, Albany, El Cerrito, Richmond, and San Pablo. The TAC guided the project team to complete technical work and narrow the field of improvements to three concepts that represent distinctly different ways of using space on San Pablo Avenue. These three concepts were then the subject of the Round 2 engagement process.

In Phase 1, there was widespread community and political support for safety upgrades to the San Pablo Avenue corridor. Safety enhancements include high-visibility crosswalks and striping; improved pedestrian crossing signals; ADA-compliant curb ramps and sidewalks; wayfinding signage; improved bicycle crossings at San Pablo Avenue with bike routes; and targeted lighting improvements at crosswalks and bus stops. Phase 1 also saw support for side-running bus lanes and the consideration of protected bicycle lanes.

Throughout Phase 2, Alameda CTC has received strong community and Commission support to advance safety improvements for pedestrians and cyclists, transit efficiency, and placemaking that supports existing communities. The San Pablo Avenue Corridor Project is included in the NACCCP project list.

I-80 Ashby Interchange

The I-80 Ashby Interchange project was developed in partnership between Alameda CTC, Caltrans, and the cities of Berkeley and Emeryville. The project proposes reconstructing the I-80/ Ashby Avenue interchange to improve accessibility, safety, and traffic flow, increasing the vertical clearance of overcrossings to meet current federal standards and facilitate freight vehicles, and constructing a new bicycle and pedestrian bridge to improve community connectedness and provide direct access to the Bay Trail.

Alameda CTC and Caltrans held an open house event in May 2019 at the South Berkeley Senior Center to present an overview of the project timeline and milestones, existing conditions that will be addressed through the project, and preliminary interchange layout concepts. The project team also held a second virtual open house in January 2022 to present an overview of the Draft Environmental Document and its appendices.

Throughout outreach and project development, the key needs identified centered on accessibility. The existing I-80/ Ashby interchanges does not provide access to Shellmound Street to/from WB I-80 nor from Shellmound Street to Frontage Road. All WB traffic must use the Powell Street interchange to access Emeryville. The project also identified the lack of direct pedestrian and bicyclist access to the Bay Trail from Shellmound Street. The I-80 Ashby Interchange Project is included in the NACCCP project list.

Oakland/Alameda Access Project

Alameda CTC is working in partnership with Caltrans and the cities of Oakland and Alameda on the Oakland Alameda Access Project, which aims to support the state's emissions reduction goals while increasing access to historically disadvantaged communities. The project proposes reconfiguring interchanges and intersections, constructing bike lanes, sidewalks, and cross walks, and synchronizing signals to improve multimodal connectivity and safety, and reduce collisions and congestion between I-880, I-980, and SR 260 (the Posey and Webster tubes).

A robust stakeholder engagement process was implemented which included Caltrans, the Port of Oakland, the cities of Oakland and Alameda, representatives from the Chinatown Chamber of Commerce, the Jack London Improvement District, Oakland Heritage Alliance, Bike East Bay, Walk Oakland Bike Oakland, many local businesses and development projects, and the general public. Over 250 focused meetings were held between June 2017 and September 2020. Other community engagement efforts included letters to elected officials, popup events, social media events, e-blast postcards, website events and newspaper advertisements.

A virtual public hearing was held in October 2020, and attended by approximately 240 members of the public. The Draft EIR/EA received 635 total comments from the public, which included questions and concerns regarding traffic, bicycle and pedestrian safety improvements, the Estuary Crossing bridge (a separate project under study by Alameda CTC), on-street parking loss, historical resource impacts, Environmental Justice, noise, air quality, and utility impacts. These comments informed the project's Purpose and Need, and have been acknowledged in the Final EIR/EA, which was signed on August 2021. Community engagement is continuing through the current phase of the project focused on plan design and specifications.

6.2 NACCCP Engagement Process

To augment the public engagement efforts and activities performed through past plans and projects within the Study Area, the NACCCP conducted additional public engagement focused on confirming transportation needs and priorities. The outreach and engagement process included both technical advisor and public engagement as described below.

Technical Advisor Engagement

The NACCCP project team held three TAC meetings with representatives from local jurisdictions and transit agencies, listed in Chapter 1, to advise on the development of the NACCCP. In January 2022, the first TAC meeting was held to define plan goals and the initial project list. In April 2022, the TAC discussed the corridor performance assessment presented in Chapter 5 and public engagement efforts. The third and final meeting in July 2022 centered on the project evaluation presented in Chapter 7.

Public Engagement

Targeted outreach was conducted in Spring 2022 to confirm community needs and priorities via an interactive online webmap and through one-on-one CBO meetings as described below.

Webmap

In March 2022, an interactive webmap of NACCCP projects was launched and shared with the TAC, CBOs, resident groups, and transportation advocacy groups to solicit feedback on travel needs and community priorities. The webmap allowed users to view and react to projects, comment on general needs throughout the Study Area, and like or dislike other users' comments. The webmap platform allowed for Google translations of any text on the webpage. The webmap was active from late March to early May 2022 and solicited over 100 comments.

Projects with significant support through comments or likes were the West Grand Avenue Corridor project, the Alameda West End Bike/Pedestrian Crossing, the San Pablo Avenue Corridor Near-Term Improvements project, and the Telegraph Avenue Complete Streets project. Each of these projects received at least fifteen comments or likes in support. Projects with moderate support included the Oakland–Alameda Access Project, the 40th Street Transit-Only Lanes and Multimodal Enhancements, the I-580 Design Alternatives Assessment Phase 1, the Downtown Oakland East – West Safe Streets, and the West Oakland Industrial Streets project. In total, 46 comments were made about biking,18 about transit, 14 about walking, eight about driving, and 10 related to projects or other suggestions.

Community Based Organizations

The project team held four CBO meetings, one each with the West Oakland Cultural Action Network (WOCAN), West Oakland Neighbors, the East Bay Asian Local Development Corporation (EBALDC), and the Ecology Center in April and May 2022. CBOs were invited to provide feedback directly on the webmap and/or through these meetings. General feedback received includes the following:

- Pedestrian Comments:
    - High vehicle speeds and long pedestrian crossings on San Pablo Avenue make for an unsafe pedestrian environment
    - Pedestrian safety is a key concern in Chinatown
    - Need for street designs to improve access for people with disabilities
- Bicyclist Comments:

    - Crossing train tracks (e.g., In Jack London Square) poses safety challenges for bicyclists
    - Need for additional protected bicycle lanes and bicycle parking in the Study Area
- Transit Comments:
    - General support for transit and expanding bus shelters
    - Support for expanding transit access, including through more frequent and reliable AC Transit and Emery-Go-Round service
- Congestion Comments:
    - Concern for loading zones at small business locations
    - Better traffic circulation needed near Howard Terminal for trucks, vehicles, and active transportation
    - Support for reducing emissions and pollution burden along the Port of Oakland
    - Truck traffic is an issue along Peralta, Adeline, 32nd, and 34th Streets
    - Support for traffic calming measures to mitigate high vehicle speeds, which are an issue throughout West Oakland
    - EV charging infrastructure would be beneficial in West Oakland

One or more of the CBOs supported the following projects:

- San Francisco Bay Trail and Bay Trail Connectors
- Near and Mid-Term Port Operations and Emission Reductions
- West Oakland TOD
- West Oakland Industrial Streets
- Rail Safety Enhancement Program
- San Pablo Avenue Near-Term Improvements
- Greenway and Mandela Connector
- 40th Street Transit-Only Lanes and Multimodal Enhancements
- Downtown Oakland East – West Streets
- Broadway Transit Corridor
- Prescott Greening
- West Grand Avenue Corridor
- Lake Merritt TOD
- Oakland Alameda Access Project

Summary of Feedback

The NACCCP engagement process built on and confirmed prior planning and engagement efforts in the Study Area. The project team engaged with technical advisors, collected public comments on projects through a webmap, and conducted one-on-one meetings with CBOs to confirm project needs and priorities. Of the feedback collected, key areas of significance and common themes emerged from multiple stakeholders.

Key areas of significance identified through engagement included San Pablo Avenue, West Grand Avenue, Oakland-Alameda, and Downtown and West Oakland. Common themes included pedestrian and bicyclist safety, improved transit service along key arterials, and truck traffic impacts. Many comments described high vehicle speeds on local roads, long pedestrian crossing distances, or lack of bicyclist facilities as factors contributing to unsafe walking and biking conditions. High levels of auto congestion on freeways and arterials were noted as strong reasons for supporting transit projects. In West Oakland, truck traffic and freight emissions were major concerns for CBOs.

NACCCP feedback aligns with priorities and project needs identified through previous planning efforts described above, such as improved pedestrian and bicyclist safety and connectivity, improved transit access and service, and reduced congestion on roadways. Mitigating truck emissions and railroad barriers were also commonly cited needs in previous plans.

Feedback collected through the NACCCP engagement process helped inform the project evaluation framework presented in Chapter 2 and the evaluation of projects in Chapter 7.

7. Recommended Strategies

This chapter summarizes the recommended projects within the NACCCP Study Area and describes the extent to which each project meets the goals of the Plan.

7.1 Developing the Project List

The majority of NACCCP Study Area projects are projects included in the 2020 Alameda Countywide Transportation Plan (CTP). As previously noted in Chapter 2, the CTP establishes near-term projects, programs, and strategic priorities for the area grounded in four transportation system goals: 1) accessible, affordable, and equitable, 2) safe, healthy, and sustainable, 3) comprises high quality and modern infrastructure, and 4) supportive of economic vitality. These goals and the broader CTP vision align with those of the NACCCP. Thus, implementation of CTP projects inherently supports this Plan's core objectives.

Additional projects were sourced from Technical Advisory Committee members and included if they were consistent with the transportation strategies recommended for the Caltrans-defined place types in the NACCCP Study Area. The Smart Mobility Framework, described in Chapter 3, identifies transportation strategies for each place type so that context-specific transportation efficiency and benefits can be achieved. **Table 7-1** lists place types in the corridor Study Area and identifies examples of planning considerations and transportation strategies for each place type.

Table 7-1: Examples of Transportation Strategies for Place Types within the Study Area

Place Type	Transportation Strategies
Central 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
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

Place Type	Transportation Strategies
	• Shared mobility opportunities • Complete Streets facility treatments • Limited parking to reduce demand

Source: Caltrans, Smart Mobility Framework Guide, February 2020, https://dot.ca.gov/-/media/dot-media/programs/transportation-planning/documents/active-transportation-complete-streets/final-smf-guide-110220-not-remediated-11-4.pdf, p. 111-12.

7.2 Project List

This section presents the NACCCP projects by project type: 1) Active Transportation, 2) Environment, 3) Goods Movement, 4) Multimodal, 5) Rail Safety, 6) Technology, and 7) Transit. Projects are not listed in order of priority. A map of the projects by project type is shown in **Figure 7-1** followed by a description of the projects by project type, as well as their capital cost estimate and source.

Figure 7-1

RECOMMENDED PROJECTS

Project Type

- Active Transportation
- Environmental
- Goods Movement
- Multimodal
- Rail Safety
- Transit

- BART Station
- Amtrak Station
- Amtrak Rail

*Only evaluated and mappable near-term and medium-term projects are included in this map.

Active Transportation Projects

The NACCCP active transportation projects are shown in **Table 7-2**. Projects are not listed in order of priority. These include four projects from the Alameda CTP and one from the Caltrans District 4 Bicycle Plan. Strategies here include elevated pedestrian and bicycle pathways, improved bicycle connections, and bikeway improvements (e.g., signals, wayfinding).

Table 7-2: NACCCP Active Transportation Projects

ID #	Title	Description	Cost Estimate ($M)	Source
3	Oakland-Alameda Bicycle/Pedestrian Bridge	Complete feasibility studies and all pre-construction phases, and then construct an estuary crossing serving people walking and biking between Oakland near Jack London Square and the west end of Alameda via a bridge that is compliant with all Coast Guard navigational requirements.	$150	CTP ID #14
17	Bay Skyway (formerly West Oakland Link)	Construct an elevated pedestrian and bicycle path connecting the West Oakland community to Gateway Park and the Bay Bridge East Span bike path.	$63	CTP ID #62
18	I-80/Powell St Bike Improvements	Improve striping and signage, and potentially install a bicycle signal for crossings of the I-80 on and off-ramps.	$1	Caltrans D4 Bicycle Plan ID #Ala-80-X02
20	Greenway and Mandela Connector	Create a bicycle connection from Sherwin Avenue to Halleck, Beach, and Wood Streets, ultimately connecting to the Mandela Parkway. Provide an extension of the bicycle system and dramatically improve connections to existing Greenways and the Bay Trail.	$3	CTP ID #50
22	San Francisco Bay Trail and Bay Trail Connectors (Phase 1)	Complete the design, environmental review, and construction of the remaining 53 miles of San Francisco Bay Trail through Alameda County. This includes 20 miles in North County.	$115[1]	CTP ID #63

Notes:

1. Project excludes cost for miles outside of North Alameda County.

Environmental Projects

As shown in **Table 7-3**, four environmental projects are recommended. Projects are not listed in order of priority. The list includes a hydrogen fuel cell drayage truck pilot project, freight electric vehicle charging infrastructure, a green landscaping pilot project, and shoreline flood prevention. Collectively, these projects advance state and regional goals for climate adaptation response and resilience, particularly with regard to maintaining operations at the Port of Oakland and transportation facilities along the East Bay shoreline.

Table 7-3: NACCCP Environmental Projects

ID #	Title	Description	Cost Estimate ($M)	Source
26	Norcal Drayage Hydrogen Fuel Truck Pilot	Implement a pilot program for cleaner, hydrogen fuel cell drayage trucks serving the Port of Oakland.	$23	N/A
27	Prescott Greening	Implement a pilot program to support green landscaping in Prescott neighborhood along Frontage Road.	$1	N/A
33	Near and Mid-Term Port Operations and Emission Reductions	Develop freight electric vehicle charging standards, including the design and construction of infrastructure necessary to establish a permanent electric vehicle/equipment charging facility.	$120	CTP ID #82A, 82B, 82C, and 82D
34	Shoreline Overtopping Near Webster and Posey Tubes	Address shoreline overtopping to prevent flooding and inundation of this critical roadway facilities above the Webster/Posey Tubes (Caltrans property - State Route 260) with a combination of seawall, levee, pumping system and best practice stormwater improvements.	$30	CTP ID #13

Goods Movement Projects

Table 7-4 includes the recommended goods movement project. The Oakland Army Base Master Plan will not only improve the efficiency of goods movement but mitigate the negative externalities associated with freight transport. Two additional major goods movement projects, the 7th Street Grade Separation East and the Freight Intelligent Transportation Systems Projects, are currently underway in the Study Area. They are considered part of baseline conditions and are therefore not included in the recommended projects list.

Table 7-4: NACCCP Goods Movement Projects

ID #	Title	Description	Cost Estimate ($M)	Source
30	Oakland Army Base Infrastructure Improvements	Implement the Infrastructure Master Plan within the former Oakland Army Base, including Outer Harbor Intermodal Terminal improvements funded by the Trade and Corridor Improvement Fund. Construct public improvements for trade, logistics and ancillary maritime services that promote cleaner modes of transportation, efficient goods movement, congestion relief on countywide freight corridors, new jobs, and fulfills a mandate to reduce truck trips through the West Oakland community. The work includes surface roadways and truck parking (complete), rail spurs and wharf facilities serving the logistics center (incomplete).	$34	CTP ID #75

Multimodal Projects

Multimodal projects are the most common project type recommended. As shown in **Table 7-5**, there are 16 recommended multimodal projects, not listed in order of priority. These include coordinated improvements of intersecting transit, bicycle, and pedestrian infrastructure, highway interchange safety improvements, BART access improvements, and a range of strategies that address corridor congestion and prioritize movement of transit and high-occupancy vehicles.

Table 7-5: NACCCP Multimodal Projects

ID #	Title	Description	Cost Estimate ($M)	Source
2	West Grand Ave. Corridor	Install protected bike lanes and a dedicated bus lane for both local and transbay buses.	$93	CTP ID #6A and 6B
4	Transforming Oakland's Waterfront Neighborhoods (TOWN)	Implement infrastructure improvements to connect West Oakland, Chinatown, and Downtown Oakland to the Waterfront. Includes constructing 1.4 miles of new transit-only lanes, 10 miles of new sidewalks, bike lanes and trails, and implementing rail, roadway, and parking improvements to reduce congestion, move more freight efficiently, and increase safety.	$75	CTP ID #257
5	I-80/Ashby Ave. Interchange Modernization	Reconstruct the I-80/Ashby Avenue interchange to build a new bike/ped bridge, increase vertical clearance, and include two roundabouts.	$157	CTP ID #22
6	Oakland/Alameda Access Project	Between Oak Street and Union Street: reconfigure the interchange and intersections to improve connections between I-880, the Posey and Webster tubes, and downtown Oakland. Implement bicycle and pedestrian safety improvements.	$130	CTP ID #26
8	San Pablo Ave. Corridor Near-Term Improvements	Implement multimodal upgrades along San Pablo Avenue in Alameda and Contra Costa counties. This includes dedicated transit infrastructure and safety improvements for bicycle and pedestrians.	$312	CTP ID #28
9	19th Street Bike Station Plaza	Construct a BART-owned and operated bike station at 2029 Broadway (corner of 21st Street) with capacity for 400+ bicycles to support active access to BART. The bike station will have an attended area, as well as a self-service area. The latter will better serve cyclists who need to drop off or pick up their bikes outside of the attended area hours of operation. The bike station will be open to the general public and support bike trips to Uptown and Downtown Oakland.	$6	CTP ID #31
14	West Oakland TOD	Implement a mixed-use, Transit-Oriented Development (TOD) at the West Oakland BART Station to improve access to/from the West Oakland BART Station.	$30	CTP ID #42

ID #	Title	Description	Cost Estimate ($M)	Source
16	Lake Merritt TOD	Implement infrastructure to support the community and transportation hub at the Lake Merritt BART Station, supportive of new Transit-Oriented Development and active community spaces consistent with the vision identified in the Lake Merritt Station Area Plan.	$60	CTP ID #39
19	40th Street Transit-Only Lanes and Multimodal Enhancements	Install bus-only lanes, a two-way separated bikeway on north side, bicycle-pedestrian intersection improvements, and streetscape improvements with opportunities for green infrastructure and art opportunities. The project is projected to result in a 1.5-minute reduction in WB PM peak bus travel time.	$16	CTP ID #49
23	I-580 Design Alternatives Assessments (DAAs) Implementation (Phase 1)	Implement recommendations from the I-580 DAA on the segments from Bay Bridge to I-238 and from I-238 to the I-580/I-680 interchange. The project includes managed lanes, ramp metering, express bus service, park and ride lots, and potential bus on shoulder. The project also includes advancing a DAA on the Altamont Pass through planning and environmental review.	$128	CTP ID #64
24	Bay Bridge Forward	Implement a suite of projects to improve transit travel time and reliability entering and traveling on the Bay Bridge, such as dynamic bridge operations, high-occupancy vehicle lane extensions, and express bus service.	$73	CTP ID #62
25	I-80 Design Alternatives Assessments (DAAs) Implementation	Implement a range of strategies to address corridor congestion and prioritize transit and high-occupancy vehicles. Strategies could include changes to interchange ramps, express lanes, and/or additional lanes dedicated to transit or HOVs.	TBD	I-80 DAA
29	Downtown Oakland East-West Safe Streets	Implement transit, bicycle, and pedestrian improvements on 14th St and 20th St, including bicycle lanes, transit-boarding islands, pedestrian refuges, marked crossings, retimed signals, and sidewalk widening.	$20	CTP ID #72A and 72B
32	West Oakland Industrial Streets	Improve industrial streets in West Oakland by removing defunct rail spurs and incorporating full curb/gutter, sidewalks, drainage, streetlights, pedestrian crossing improvements and bike infrastructure in street reconstruction.	$31	CTP ID #78A and 78B
36	Link 21	The full project is not yet defined, though it will likely include construction of a new transbay passenger rail crossing between Oakland and San Francisco.	TBD	N/A
37	Vision 980	The full project is not yet defined, though the Vision 980 Study will explore alternatives for reconnecting communities along the I-980 corridor, with a focus on environmental justice.	TBD	N/A

Rail Safety Projects

Table 7-6 shows the recommended rail safety project which includes countywide rail crossing safety enhancements, a quiet zone study in Berkeley, and a corridor safety project in Oakland's Jack London District. This project would directly improve safety around rail infrastructure while also providing a road map for mitigating rail operation noise.

Table 7-6: NACCCP Rail Safety Projects

ID #	Title	Description	Cost Estimate ($M)	Source
7	Rail Safety Enhancement Program	Implement a countywide grade crossing program and high priority grade separations as well as rail connectivity and efficiency improvements. Grade crossings in the study area include those located in Jack London Square (which are also part of the TOWN Project), and West Berkeley.	$29 (Est. cost in Study Area)	CTP ID #27

Technology Projects

Table 7-7 includes the recommended technology project which would leverage existing transportation corridors as conduits for fiber optic cable. This is part of a statewide endeavor to strengthen broadband connections and improve access to education, health services, and employment services.

Table 7-7: NACCCP Technology Projects

ID #	Title	Description	Cost Estimate ($M)	Source
35	Broadband Middle Mile Network (Oakland Flats)	Install Fiber Optic cable along Route 80, 980, 880, 77, and 185 corridors in Oakland Flats area	$0.1	Caltrans State Highway Operation and Protection Program 2022

Transit Projects

Table 7-8 shows the seven transit projects, not listed in order of priority. The list includes BART capacity and station improvements, implementation of new transit-only lanes, and development of a modern transit operations facility to support system expansion. Together these projects would improve the capacity and operation of existing facilities, expand the transit system's capacity, and enhance transit operators' abilities to manage their networks efficiently and effectively.

Table 7-8: NACCCP Transit Projects

ID #	Title	Description	Cost Estimate ($M)	Source
1	Shattuck Ave./Martin Luther	Install and operate an enhanced bus service with signal priority and improved bus stops, along either	$57	CTP ID #5

ID #	Title	Description	Cost Estimate ($M)	Source
	King Jr. Way Corridor	Shattuck Avenue or Martin Luther King Jr. Way between Albany, Berkeley, and Downtown Oakland.		
10	19th Street/Oakland BART Station Street Elevator	Construct a new street to concourse level elevator for the 19th Street/Oakland BART Station to improve access to/from the station.	$12	CTP ID #32
11	BART Core Capacity	Program elements include train control modernization, rail car procurement, necessary traction power upgrades, and Transbay Corridor Core Capacity Program.	$1,587	CTP ID #34
12	BART Next Generation Fare Gates	Implementation of fare gate replacement with next generation technology to reduce fare evasion.	$35	CTP ID #35
13	Transit Operations Facility (TOF)	Design and construct a new Transit Operations Facility (TOF) to modernize the current operations-control infrastructure and upgrade technology to support system expansion and handle increases to transit service. The new TOF will support robust operations now, and 40 years into the future. The facility will consist of approximately 40,000-square-feet and include the elements critical to regional rail service.	$60	CTP ID #41
15	BART Station Modernization and Access Improvements	Invest in stations and surrounding areas to advance transit ridership, improve safe access to/from stations, and enhance quality of life. Make investments in BART stations to improve the passenger experience and transform BART into a world-class transit system, including comprehensive and coordinated investments in station design, wayfinding, and passenger flow.	$2,273	CTP ID #288
28	Broadway Transit Corridor	Implement dedicated transit only lanes on outside traffic lanes along Broadway.	$22	CTP ID #71

7.3 Project Evaluation

The evaluation approach used to assess the NACCCP projects built on the Evaluation Framework presented in Chapter 2.

Each project received a series of high, medium, or low scores based on how well the project aligned with each of the six NACCCP goals. **Table 7-9** details the six goals and the high and medium scoring criteria used to evaluate the projects. Projects that did not fulfill the high or medium criteria for a particular goal received a low score.

The scoring methodology relied on both qualitative assessment and location-based criteria. The maps used to evaluate projects are provided in **Appendix C**.

Table 7-9: Evaluation Scoring Factors

Goals	Criteria for High Score	Criteria for Medium Score
1. Improve Safety	• Projects with substantial active transportation improvements that are located on a High Injury Network (HIN) or rail crossing, or • Projects with new Class I or Class IV bicycle facility.	• Projects that include substantial active transportation improvements and are not located on an HIN
2. Advance Access & Equity	• Projects located within or partially within an Equity Priority Community (EPC) that improves EPC access, or • Projects that close an active transportation gap between existing facilities based on the project description.	• All other projects that provide direct access or benefits to the EPC
3. Enhance Travel Reliability & Efficiency	• Transit-priority/High-Occupancy Vehicle/Express projects on roadways operating at LOS E or F, or • Substantial rail transit improvement projects.	• All other transit operations or HOV projects, or • projects that provide a high-quality modal alternative to a congested corridor
4. Support Efficient Land Use	• Local multimodal, active transportation, and transit projects within a Priority Development Area (PDA).	• Local multimodal, active transportation, and transit projects outside a PDA that provide direct access or benefits to a PDA
5. Improve Health & Sustainability	• Multimodal, active transportation, transit service, and environment projects located in Heavy Burden Pollution Areas, or • Projects that reduce air and noise emissions or support climate adaptation.	• Other multimodal, active transportation, transit service, and environment projects
6. Strengthen Economic & Community Vitality	• Projects that improve operations on the Freight Network, or • Projects that received significant support during outreach efforts and from groups representing EPCs.	• Projects that increase Port efficiency, or • Received moderate support from community outreach efforts, or • Projects with placemaking elements (e.g., public art, beautification, greening, etc.)

Evaluation Results

The evaluation results are presented by implementation timeframe below.[82] Projects from the 10-Year Priority Project list in the Alameda CTC CTP were assigned a near-term timeframe (5-10 years), except for Oakland-Alameda Bicycle/Pedestrian Bridge (#3) and 7th Street Grade Separation West (#4), which will be implemented in the medium-term (10-20 years). The evaluated near-term projects are shown in **Table 7-10** and the evaluated medium-term projects are shown in **Table 7-11**.

The evaluation was designed to highlight each project's strengths; the results are not reflective of funding priorities. Each project scored highly under at least one of the six NACCCP goals.

[82] The two long-term 20 to 30-year projects, Link 21 (#36) and Vision 980 (#37), were excluded from the evaluation process because these projects are undergoing planning efforts and are not yet clearly defined. Additionally, the near-term Broadband Middle Mile Network (#35) project was not evaluated as this project serves as a technology upgrade providing wider internet access rather than a transportation-specific service or infrastructure enhancement.

Table 7-10: Near-Term Project Evaluation Results (not in priority order)

#	Project Type	Title	Cost Estimate ($M)	G1. Improve Safety	G2. Advance Access & Equity	G3. Enhance Travel Reliability and Efficiency	G4. Support Efficient Land Use	G5. Improve Health and Sustainability	G6. Strengthen Economic Vitality
1	Multimodal	Shattuck Ave./Martin Luther King Jr. Way Corridor	$57	L	H	H	H	H	L
2	Multimodal	West Grand Ave. Corridor	$93	H	H	M	H	H	H
4	Multimodal	Transforming Oakland's Waterfront Neighborhoods	$75	H	H	M	H	H	H
5	Multimodal	I-80/Ashby Avenue Interchange Modernization	$157	H	H	M	L	H	H
6	Multimodal	Oakland/Alameda Access Project	$130	H	H	L	H	M	H
7	Rail Safety	Rail Safety Enhancement Program	$29	H	H	H	L	H	H
8	Multimodal	San Pablo Avenue Corridor Near-Term Improvements	$312	H	H	H	H	H	H
9	Multimodal	19th Street Bike Station Plaza	$6	L	H	M	H	H	L
10	Transit	19th Street/Oakland BART Station Street Elevator	$12	L	H	M	H	M	L

#	Project Type	Title	Cost Estimate ($M)	G1. Improve Safety	G2. Advance Access & Equity	G3. Enhance Travel Reliability and Efficiency	G4. Support Efficient Land Use	G5. Improve Health and Sustainability	G6. Strengthen Economic Vitality
11	Transit	BART Core Capacity	$1,587	L	H	H	H	H	L
12	Transit	BART Next Generation Fare Gates	$35	L	L	M	H	L	L
13	Transit	Transit Operations Facility (TOF)	$60	L	H	M	H	M	L
14	Multimodal	West Oakland TOD	$30	H	H	M	H	H	M
15	Transit	BART Station Modernization and Access Improvements	$2,273	H	H	M	H	H	M
16	Multimodal	Lake Merritt TOD	$60	H	H	L	H	H	M
17	Active Transportation	Bay Skyway (formerly West Oakland Link)	$63	H	H	M	H	H	L
18	Active Transportation	I-80/Powell St Bike Improvements	$1	M	M	L	L	H	M
19	Multimodal	40th Street Transit-Only Lanes and Multimodal Enhancements	$16	H	H	H	H	H	M
20	Active Transportation	Greenway and Mandela Connector	$3	H	H	M	H	H	M

#	Project Type	Title	Cost Estimate ($M)	G1. Improve Safety	G2. Advance Access & Equity	G3. Enhance Travel Reliability and Efficiency	G4. Support Efficient Land Use	G5. Improve Health and Sustainability	G6. Strengthen Economic Vitality
22	Active Transportation	San Francisco Bay Trail and Bay Trail Connectors (Phase 1)	$115	H	H	M	H	H	M
23	Multimodal	I-580 Design Alternatives Assessments (DAAs) Implementation (Phase 1)	$128	L	H	H	L	H	H
24	Multimodal	Bay Bridge Forward	$73	L	M	H	L	H	H
25	Multimodal	I-80 Design Alternatives Assessments (DAAs) Implementation	TBD	L	H	H	L	H	H
26	Environment	Norcal Drayage Hydrogen Fuel Truck Pilot	$23	L	M	L	L	H	H
27	Environment	Prescott Greening	$1	L	M	L	L	H	M
28	Transit	Broadway Transit Corridor	$22	L	H	H	H	H	L
29	Multimodal	Downtown Oakland East-West Safe Streets	$20	H	H	H	H	H	M
30	Goods Movement	Oakland Army Base Infrastructure Improvements	$34	L	M	L	L	H	H

#	Project Type	Title	Cost Estimate ($M)	G1. Improve Safety	G2. Advance Access & Equity	G3. Enhance Travel Reliability and Efficiency	G4. Support Efficient Land Use	G5. Improve Health and Sustainability	G6. Strengthen Economic Vitality
32	Multimodal	West Oakland Industrial Streets	$31	H	H	L	H	H	M
33	Environment	Near and Mid-Term Port Operations and Emission Reductions	$120	L	M	L	L	H	H
34	Environment	Shoreline Overtopping Near Webster and Posey Tubes	$30	H	M	L	L	H	L

Table 7-11: Medium-Term Project Evaluation Results (not in priority order)

#	Project Type	Title	Cost Estimate ($M)	G1. Improve Safety	G2. Advance Access & Equity	G3. Enhance Travel Reliability and Efficiency	G4. Support Efficient Land Use	G5. Improve Health and Sustainability	G6. Strengthen Economic Vitality
3	Active Transportation	Oakland-Alameda Bicycle/Pedestrian Bridge	$150	H	H	M	H	H	H

Collectively, the near-term and medium-term projects support the goals of the NACCCP:

1. **Improve Safety**: Over half of the projects include substantial active transportation improvements and 70 percent of those are located on the bicycle and pedestrian HIN. Approximately 35 percent of projects provide a high-quality multi-use path or cycletrack.

2. **Advance Access & Equity**: About 80 percent of projects fall within an EPC and support access for low-income people and people of color. Projects that fill gaps in the active transportation network make up 13 percent of the projects.

3. **Enhance Travel Reliability and Efficiency**: About one third of projects include a transit-priority component and nearly 10 percent of projects include an HOV or express lane. Of these projects, 66 percent are on a roadway operating at LOS E or F during the peak period. A third of projects provide a high-quality modal alternative to a congested corridor.
4. **Support Efficient Land Use**: About 61 percent of projects are local multimodal, active transportation, or transit projects within a PDA and therefore provide a variety of access options in areas slated for further development.

5. **Improve Health and Sustainability**: Projects that reduce emissions or support climate adaptation make up over 80 percent of the projects. Almost 70 percent of projects are multimodal, active transportation, transit, and environmental projects located in Heavy Pollution Burden areas.

6. **Strengthen Economic Vitality**: 31 percent of projects facilitate goods movement through improvements on the freight network. Although all projects received public support through previous planning processes, nearly one third of projects received significant or moderate support through the NACCCP engagement process. Nearly a third of projects include placemaking elements, such as public greening and beautification.

7.4 Funding Sources

Table 7-12 and **Table 7-13** provide an overview of federal and state funding sources that Alameda CTC and Caltrans can pursue to fund the NACCCP projects and strategies. Both formula and discretionary funding categories are included in the funding source list.

Table 7-12: Federal Fundings Sources

Name	Funding Type	Eligible Modes / Description
Infrastructure for Rebuilding America (INFRA)	Discretionary	A Federal discretionary grant program reviewed by the US Department of Transportation (USDOT). Emphasis on highway and goods movement projects.
Rebuilding American Infrastructure with Sustainability and Equity (RAISE)	Discretionary	A Federal discretionary grant program reviewed by USDOT. Emphasis on multimodal projects.
New Starts and Small Starts (Federal Transit Administration Section 5309)	Discretionary	Funds light rail, heavy rail, commuter rail, streetcar, and bus rapid transit projects.

Name	Funding Type	Eligible Modes / Description
Highway Safety Improvement Program (HSIP)	Discretionary	Federally allocated to the State by formula, the HSIP program is available for roadway safety projects through a competitive program administered by Caltrans.
Congestion Mitigation Air Quality (CMAQ)	Formula	Federally designated air quality containment areas receive funding by formula to program local and regional projects.
Rail-Highway Crossings (Section 130) Program	Discretionary	Safety improvements to reduce the number of fatalities, injuries, and crashes at public railway-highway crossings.
Grade Separation (Section 190) Program	Discretionary	This competitive grant program provides $15 million each year to local agencies for the construction grade separation projects.
National Highway Freight Program (NHFP)	Discretionary	The Fixing America's Surface Transportation Act established NHFP to improve the efficient movement of freight on the National Highway Freight Network.
National Highway Performance Program	Discretionary	The NHPP provides support for the condition and performance of the National Highway System (NHS), for the construction of new facilities on the NHS.
Nationally Significant Federal Lands and Tribal Projects (NSFLTP)	Discretionary	The NSFLTP program provides funding for constructing, reconstructing, and rehabilitating nationally significant projects on Federal or Tribal lands.
National Significant Freight and Highway Projects (NSFHP)	Discretionary	The NSFHP provides financial assistance—competitive grants or credit assistance—to nationally and regionally significant freight and highway projects that align with the program goals to: improve safety, efficiency, and reliability of the movement of freight and people; generate national or regional economic benefits and an increase in US global economic competitiveness; reduce highway congestion and bottlenecks; Improve connectivity between modes of freight transportation; enhance the resiliency of critical highway infrastructure and help protect the environment; improve roadways vital to national energy security; address the impact of population growth on the movement of people and freight, mitigate impacts of freight movements on communities.
Surface Transportation Block Grant Program (STBG)	Formula	STBG provides flexible 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.
Federal Transit Administration Sections 5303, 5304, 5305	Discretionary	Provides procedural and funding requirements for multimodal transportation planning in States and metropolitan areas. Planning must be cooperative, continuous, and comprehensive leading to long-range plans and short-range programs that reflect transportation investment priorities. Funds are available to States and Metropolitan Planning Organizations for planning activities.

Name	Funding Type	Eligible Modes / Description
Federal Transit Administration Section 5307	Formula	The Urbanized Area Formula Funding program provides Federal resources to urbanized areas and to governors for transit capital and operating assistance and for transportation related planning.
Federal Transit Administration Section 5311	Formula	This program provides formula-based funding for capital and/or operating assistance to rural areas with a population fewer than 50,000 where many residents rely on public transit to reach their destinations.
Federal Transit Administration Section 5312	Discretionary	This program supports research activities that improve the safety, reliability, efficiency, and sustainability of public transportation by investing in the development, testing, and deployment of innovative technologies, materials, and processes.
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 Infrastructure Investment Program (49 US Code 5339) provides Federal resources to states and direct recipients to replace, rehabilitate and purchase buses and related equipment. This programs also allows for the construction of bus-related facilities, including technological changes or innovations to modify low or no emission vehicles or facilities.
Federal Transit Administration Transit-Oriented Development Planning Pilot	Discretionary	Provides funding to advance planning efforts that support transit-oriented development (TOD) associated with new fixed-guideway and core capacity improvement projects. TOD focuses growth around transit stations to promote ridership, affordable housing near transit, revitalized downtown centers and neighborhoods, and encourage local economic development.
Recreational Trails Program	Discretionary	The Recreational Trails Program provides funds annually for recreational trails and trails-related projects. The RTP is administered at the Federal level by the Federal Highway Administration. It is administered at the state level by the California Department of Parks and Recreation.

Source: US Department of Transportation

Table 7-13: State Fundings Sources

Name	Funding Type	Eligible Modes / Description
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 Program (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.
Trade Corridor Enhancement Program (TCEP)	Discretionary	Caltrans and regional entities can be project sponsors. Funding is available for infrastructure improvements in the Central Coast, Bay Area, Central Valley, LA/Inland Empire, and San Diego/Border.
Local Partnership Program (LPP)	60% Discretionary 40% Formula	Eligible funding for "self-help" counties.[1] Most transportation improvements are eligible.
State Highway Operation and Protection Program (SHOPP)	Formula	Projects are selected by Caltrans and adopted by the California Transportation Commission (CTC). Projects included in the program are limited to capital improvements relative to the maintenance, safety, operation, and rehabilitation of the State Highway System (SHS) that do not add new capacity to the system. SB 1 has provided additional funding capacity to this program.
State Transportation Improvement Program (STIP)	Formula	Projects are proposed by regional transportation agencies and approved by the CTC on a bi-annual basis. The majority of the STIP funding comes from Federal sources. SB 1 has provided additional funding capacity to this program.
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, VMT, and congestion.

Notes:

1. Counties that have passed local option sales tax measures to fund transportation improvements.

Source: California Department of Transportation, California Transportation Commission

Appendix A: Additional PBA 2050 Model Outputs

Table A-1 and **Table A-2** provide additional outputs from the Plan Bay Area 2050 (PBA 2050) model related to existing and future vehicle speeds and truck volumes on the Study Area freeways.

Table A-1: Existing and Future Speeds

Route	Direction	Lane	Segment Description	Existing – Observed Speeds (2018) (mph)		Future[1] – Calculated Speeds (2050) (mph)	
				AM	PM	AM	PM
80	EB	GP	Bay Bridge exit to University Ave	61	17	55	13
		HOV	Start of HOV lane to University Ave	69	16	69	16
	WB	GP	University Ave to Bay Bridge entry	24	28	16	26
		HOV	University Ave to end of HOV lane	34	46	32	46
580	EB	GP	I-80 to Harrison	62	18	59	17
	WB	GP	Harrison to I-80	53	59	49	57
880	EB	GP	Oak to I-80	56	44	54	40
	WB	GP	I-80 to Oak	54	28	46	27
980	EB	GP	I-880 to I-580	62	56	62	54
	WB	GP	I-580 to I-880	64	59	62	59

Note: Data based on average weekday outputs.

1. Calculated Future Speeds (mph) = Calculated Future Travel Time (min) / Distance (mi) * 60. Future calculated travel times are provided in Table 5-5: Existing and Future Peak Travel Times.

Source: MTC PBA 2050 Model, October 2021 (2015 Historical Scenario, 2050 No-Project Scenario); Alameda CTC 2018 Level of Service Monitoring Report.

Table A-2: Existing and Future Truck Volumes

Route	Direction	Lane	Description	Existing (2015)			Future (2050)		
				AM	PM	Avg Daily	AM	PM	Avg Daily
80	EB	GP	North of 880/580 exits & merges	1,400	3,300	16,800	1,600	3,100	16,100
		HOV	North of 880/580 exits & merges	-	-	1,300	-	-	1,200
	WB	GP	North of 880/580 exits & merges	1,400	3,500	16,000	1,400	3,400	15,900
		HOV	North of 880/580 exits & merges	-	-	2,100	-	-	1,600
580	EB	GP	East of split/merge with 80	800	2,100	12,700	800	2,000	11,900
	WB	GP	East of split/merge with 80	700	2,200	12,500	800	2,000	11,200
880	NB	GP	South of 80 ramps	500	1,300	6,400	600	1,100	6,000
	SB	GP	South of 80 ramps	700	1,400	8,000	600	1,200	7,000
980	EB	GP	North of 880 ramps	200	800	3,800	400	800	4,200
	WB	GP	North of 880 ramps	200	700	3,300	500	1,000	5,100

Source: MTC PBA 2050 Model, October 2021 (2015 Historical Scenario, 2050 No-Project Scenario)

Appendix B: EMFAC Tool Outputs

Table B-1 provides detailed existing and future outputs from the California Air Resources Board EMission FACtor (EMFAC) tool, including VMT and associated emissions.

Table B-1: EMFAC Tool Outputs for 2015, 2050 (with 2015 fleet mix) and 2050 (2050 clean fleet mix)

Route	Direction	Daily VMT		CO_2 (tons)			NOx (pounds)			Sox (pounds)			PM 2.5 (pounds)		
		2015	2050	2015	2050 (2015 fleet mix)	2050 (clean fleet)	2015	2050 (2015 fleet mix)	2050 (clean fleet)	2015	2050 (2015 fleet mix)	2050 (clean fleet)	2015	2050 (2015 fleet mix)	2050 (clean fleet)
I-80	EB	489,000	647,000	240	380	270	540	992	390	4.7	7.4	5.1	11.2	19.9	3.9
	WB	472,000	612,000	230	322	220	490	752	310	4.5	6.3	4.3	9.5	13.9	2.6
I-580	EB	200,000	253,000	100	125	90	200	275	100	1.9	2.4	1.6	3.9	5.3	1.1
	WB	183,000	268,000	110	90	60	220	184	50	2.2	1.8	1.2	4.5	3.9	0.9
I-880	NB	227,000	236,000	90	106	70	190	222	50	1.8	2.1	1.4	3.9	4.6	1.0
	SB	262,000	212,000	80	112	70	150	218	50	1.5	2.2	1.5	3.3	4.0	0.9
I-980	EB	101,000	102,000	40	44	30	90	90	20	0.9	0.9	0.6	2	1.9	0.5
	WB	74,000	87,000	30	38	30	70	72	20	0.6	0.7	0.5	1.5	1.5	0.4

Source: MTC PBA 2050 Model, October 2021(2015 Historical Scenario, 2050 No-Project Scenario); EMFAC 2021

Appendix C: Project Evaluation Maps

This appendix contains the maps used to evaluate the NACCCP projects based on alignment of the six identified NACCCP goals. The evaluation methodology relied on both qualitative and location-based criteria. The following maps show the Bicycle and Pedestrian High Injury Network, Equity Priority Communities, Corridors with Poor Peak Period Level of Service, Priority Development Areas, Heavy Pollution Burden areas, and the Freight Network within the Study Area.

Figure C-1

BICYCLE & PEDESTRIAN HIGH INJURY NETWORK

Bicycle & Pedestrian High Injury Network

Study Corridors

Major Corridor

Arterial State Route

Source: Alameda County Active Transportation Plan, 2019.

Figure C-2

EQUITY PRIORITY COMMUNITIES

Equity Priority Communities

Study Corridors

Major Corridor

Arterial State Route

Source: Plan Bay Area, 2050

Figure C-3

CORRIDORS WITH POOR PEAK PERIOD LOS

LOS E or F Peak Period Freeways

LOS E of F Peak Period Arterials

Study Corridors

Major Corridor

Arterial State Routes

Source: Level of Service Monitoring Report, 2018.

Figure C-4

PRIORITY DEVELOPMENT AREAS

Transit-Rich Priority Development Area

Study Corridors

Major Corridor

Arterial State Route

Source: Plan Bay Area 2050

Figure C-5

POLLUTION BURDEN

Pollution Burden > 80%

Study Corridors

Major Corridor

Arterial State Route

Source: California Office of Environmental Health Hazard Assessment

Figure C-6

FREIGHT NETWORK

- Major Corridor
- Arterial State Route
- Amtrak Station
- Amtrak/Union Pacific Rail
- Industrial Land Use
- Primary Highway Freight System
- Truck Routes

Source: Caltrans 2021; City of Emeryville General Plan 2019; City of Oakland, 2021; City of Berkeley, 2021; FHA, 2020